

# **20th Anniversary Conference**

## **Toward a Science of Consciousness**

**April 21-26, 2014**

Tucson, Arizona  
Tucson Marriott University Park Hotel

**Sponsored by**  
The University of Arizona  
**Center for CONSCIOUSNESS STUDIES**

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# WELCOME

Welcome to Toward a Science of Consciousness 2014, the 20th anniversary of the biennial, international interdisciplinary Tucson Conference on the fundamental question of how the brain produces conscious experience. Sponsored and organized by the Center for Consciousness Studies at the University of Arizona, this year's conference is being held for the first time at the Tucson Marriott University Park Hotel, steps from the main gate of the beautiful campus of the University of Arizona. Covering 380 acres in central Tucson, the campus is a hub of education, concerts, plays, lectures, museums, poetry readings, athletic events, playing on the great grassy mall, and just hanging out. Adjacent to the UA main gate and hotel are over 30 shops, restaurants and pubs along University Boulevard. A short walk in the opposite direction leads to the village setting of 4th Avenue and then to downtown Tucson.

Toward a Science of Consciousness (TSC) is the largest and longest-running interdisciplinary conference emphasizing broad and rigorous interdisciplinary approaches to conscious awareness, the nature of existence and our place in the universe. TSC brings together perspectives, orientations and methodologies from neuroscience, philosophy, medicine, quantum physics, cosmology, biology, psychology, anthropology, artificial intelligence, technology, contemplative and experiential traditions, the arts, culture, humanities and others. Cutting edge, controversial issues are emphasized.

The TSC 2014 Keynote Speaker is Sir Roger Penrose, esteemed British physicist, mathematician and author renowned for his work on general relativity, cosmology and consciousness. Penrose shared the 1988 Wolf Prize for physics with Stephen Hawking for their contribution to our understanding of the universe. His 1989 book "The Emperor's New Mind: A Search for the Missing Science of Consciousness" helped launch modern consciousness studies. Sir Roger will also give a special Astrophysics Colloquium lecture at Steward Observatory April 21 (*see page 7*).

## Plenary Speakers

Bernard Baars, Anirban Bandyopadhyay, Susan Blackmore, Ned Block, David Chalmers, Deepak Chopra, Karl Deisseroth, Daniel Dennett, David Eagleman, Kenneth Hayworth, Donald Hoffman, Michael Graziano, Alison Gopnik, Rebecca Goldstein, Stuart Hameroff, Russell Hurlburt, Christof Koch, Henry Markram, George Mashour, Julia Mossbridge, Sam Parnia, Mary Peterson, John Searle, Petra Stoerig, Max Tegmark, Giulio Tononi, and Natasha Vita-More.

**The Opening Plenary Session is Tuesday, April 22 at 1:45 PM.**

**Additional Plenary Sessions are Wednesday through Saturday April 23-26.**

**Concurrent, Evening and Pre-conference Workshop Sessions:** 24 concurrent sessions occur in parallel from 5:00pm to 7:05pm, 8 per night on 3 nights, Tuesday April 22nd, Wednesday April 23rd and Friday April 25th. Each session is chaired by a moderator and has 5 speakers, each with 20 minutes plus 5 minutes discussion (125 minutes/session), a total of 120 Concurrent talks. There are also 3 Poster sessions (Wednesday April 23rd and Friday April 24th, 7:00 – 10:00pm), 2 Art/Tech/Health Exhibits/Demos, late-night film showings, and 18 Pre-Conference workshops including an East-West Forum organized by Dayalbagh Educational Institute (DEI), Agra, India.

**Social Events:** Fun social gatherings are a TSC tradition and include the Tuesday Opening Welcome Reception; a Tuesday late-evening Film showing; a Wednesday late-evening

Storytelling session with filmmakers; 3 Poster Sessions with receptions (one for the East-West Forum on Monday evening and general TSC poster sessions on Wednesday and Friday evenings); Optional Thursday Side Trips; Conference Dinner at the Skyline Country Club; the traditional 'Poetry Slam/Zombie Blues' on Friday evening; and the Saturday closing "End of Consciousness" Party. Over 1000 participants are expected from 60 countries over the course of the week. Over 600 abstracts were submitted, and 413 are included in the program.

**History:** The first TSC conference was held in 1994 in DuVal Auditorium at the University of Arizona Medical Center, and subsequently elsewhere in Tucson in even-numbered years. These alternate with co-sponsored international TSC conferences in various locations around the world in odd-numbered years. The Center for Consciousness Studies (CCS) at the University of Arizona was established in 1998 by the Arizona Board of Regents. TSC and CCS are due to the work over the years of Al Kaszniak, David Chalmers, Jim Laukes, Stuart Hameroff and the late Alwyn Scott, a co-founder of CCS. Since 2007, CCS and TSC have been successfully managed by Abi Behar-Montefiore, subsisting almost entirely on TSC conference registration fees. CCS is hosted in the Department of Anesthesiology in the University of Arizona College of Medicine.

Thank you to our international colleagues and friends who helped make TSC alternate year conferences possible:

- 1995** Ischia, Italy; Chloe Taddei-Ferretti
- 1997** Elsinore, Denmark; LO Skolen, Alwyn Scott
- 1999** Tokyo, Japan; UN University, Mari Jibu, Kunio Yasue
- 2001** Skovde, Sweden; University of Skovde, Paavo Pylikkanen
- 2003** Prague, Czech Republic; Ivan Havel
- 2005** Copenhagen, Denmark; Morten Overgard
- 2007** Budapest, Hungary; George Kampis
- 2009** Hong Kong, China; Hong Kong Polytechnic, Gino Yu
- 2011** Stockholm, Sweden; Christer Perffjell
- 2013** Agra, India; Rev. Prof. PS. Satsangi; Vishal Sahni
- 2015** ...and the upcoming June 2015 TSC in Helsinki, Finland; University of Finland, Paavo Pylikkanen (June 9-13, 2015)

## 2014

### BHAUMIK PRIZE – COMMEMORATING THE 20TH ANNIVERSARY

For the first time, the Bhauimik Prize in Consciousness Studies will be awarded. The recipient will be announced, and the \$10,000 award presented at the conference by Dr. Mani Bhauimik. The award is for significant advances in the science of consciousness.

## 20th Anniversary Conference

### Program Co-Chairs

David Chalmers, Australian National University, New York University  
Stuart Hameroff, The University of Arizona

### Conference Manager

Abi Behar-Montefiore, Center for Consciousness Studies, Assistant Director

## Venue

The Tucson Marriott University Park Hotel (880 E 2nd St, Tucson, AZ 85719) is near shops, restaurants and pubs on University Boulevard. A special conference hotel rate of \$109 has been arranged and this rate is extended for 2-3 days pre/post conference start/finish dates.

## Thank you!

The TSC Conference and Center for Consciousness Studies wish to thank the Program Committee, in particular Co-Chairs David Chalmers (Australian National University/New York University) and Stuart Hameroff (The University of Arizona) and CCS-TSC Assistant Director and Conference Manager Abi Behar-Montefiore for her masterful administration.

We are grateful to SBS web guru Ed Xia for many years of IT support. We appreciate the additional support from AHSC BioCommunications team members: Television production team including Ricky Bergeron and Larry McAlister, as well as Darla Keneston, Graphic Designer Senior and Rita Ellsworth, MS, Director, BioCommunications. And to Roma Krebs, Graphic Designer Senior at UA BioCommunications, please accept our gratitude for your overall contribution to present this event through all your design concepts. We have much love and gratitude for Dave Cantrell, BioCommunications illustrator who passed away in November 2013. Dave did most of the conference logo artwork over many years, including this year's Sgt Pepper album cover.

We also thank the University of Arizona Department of Anesthesiology support staff and Dr. Stuart Hameroff's colleagues in the UAMC surgical operating rooms, in particular Dr. Wayne Jacobsen, Chairman, Department of Anesthesiology. We are grateful to our original sponsors, the Fetzer Institute and the YeTaDel Foundation who supported us for many years. We also thank The Deepak Choprak Foundation; The Dayalbagh Educational Institute (DEI); The Bhaumik Foundation; and The Robert Kuhn Foundation.

Thanks and congratulations to Journal of Consciousness Studies, Imprint Academic Exeter, UK for *their* 20 year anniversary; and additional gratitude to UA News and Communications team members, especially (Shelly Littin and Chris W. "Sig" Sigurdson); and the Arizona Health Sciences Center Office of Public Affairs (George Humphrey, Ann Cisneros, and Katie Riley) for all your help with the media.

Special thanks to Czarina Salido for research, editing, and all-around program support, Nick Day, and Sascha Seifert (Conscious Pictures); Jason Canfield (video production) and Dan Maglione (Elite AV) and all the staff at the Tucson Marriott University Park Hotel. We also thank Eric Gonzales and the Arizona Historical Society Museum; and Saatviki Gupta for her help with the DEI program. Thank you Kang Zhou, MS Architecture (and recent UA graduate) for your help in coordinating the art installations, exhibits, and the volunteer schedules.

This year's volunteers include long-time friends Stephen Whitmarsh and Sky Nelson. Thank you to all of our 2014 TSC volunteers! And to the Zombie Blues Band: Michael P. and The Gullywashers – thanks for keeping us in tune!

**Sponsored by:** The University of Arizona Center for Consciousness Studies

## Press Requests

- All press must apply for credentials and complete an online registration form
- No filming/podcasting without permission
- Contact: Abi Behar-Montefiore 520-247-5785 – [center@u.arizona.edu](mailto:center@u.arizona.edu)
- Questions: [www.consciousness.arizona.edu](http://www.consciousness.arizona.edu)



## TUCSON – KEY NUMBERS/ADDRESSES

Marriott University Park Hotel – 880 East 2nd Street	520-792-4100
Riverpark Inn Hotel – 350 South Freeway	520-239-2312
Arizona Stagecoach Shuttle Service from Airport	520-889-1000
Skyline Country Club – 5200 East St. Andrews Drive	520-299-1111
Doug Kramar Convention & Group Services: USA, Inc	520-444-2532

CCS TSC Conference Manager,  
center@u.arizona.edu – cell/text: 520-247-5785

The University of Arizona  
UA Main Telephone Number 520-621-2211  
UA Parking and Transportation 520-626-7275

The University of Arizona Medical Center — University Campus,  
Arizona Health Sciences Center, 1501 N Campbell Ave, Tucson (520) 694-0111

**In case of an emergency dial 911**

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## AIRPORT SHUTTLE SERVICE

## TRANSPORTATION

### Arizona Stagecoach

(877) 782-4355 (520) 889-1000  
pre-arranged \$17 special rate for TSC  
[www.azstagecoach.com](http://www.azstagecoach.com) Discount Code: UACCS  
\$17 per passenger – one way

## TAXI COMPANIES

**Discount** 520-388-9000  
**Yellow** 520-300-0000  
**Jeanni's** 520-889-8294  
**VIP Taxi** 520-300-3000

## TOWNCAR SERVICE

**Integrity** 520-733-1849  
Luxury Towncars – 14 person Vans and Navigators – Mini-Coaches (up to 32 passengers)  
[reservations@integritytucson.com](mailto:reservations@integritytucson.com)  
*Pre-arranged service to Sky Harbor Airport, Phoenix*

**Tucson Resort Transportation** 520-425-1935  
Value and Executive Service [info@tucsonairportrides.com](mailto:info@tucsonairportrides.com)  
Pre-arranged service to Sky Harbor Airport, Phoenix

## SIDE TRIPS - BUS GROUP SERVICES

**Doug Kramar Convention & Group Service** 520-444-2532



# Toward a Science of Consciousness 2014

## PRE-CONFERENCE OVERVIEW

### **Eighteen Pre-Conference Workshops** (see list on pages 10-11)

*Monday, April 21 – 9:00am to 10:30pm*

*Tuesday, April 22 – 9:00am to 1:00pm*

### **East-West Forum**

*Monday April 21 – 9:00am to 7:00pm*

### **Special Talk – SIR ROGER PENROSE**

*Monday, April 21 – 4:00pm to 5:00pm*

*Department of Astronomy and Steward Observatory Room: SO N210*

Sir Roger Penrose, the 2014 TSC Keynote Speaker, will give an additional public talk in the Astrophysics Colloquium at Steward Observatory. He will be speaking about new evidence supporting his “Cyclical Conformal Cosmology” theory that the Big Bang was preceded by another aeon, and other before that, suggesting that we live in a serial rather than a parallel universe.

## 2014 CONFERENCE SESSION OVERVIEW

### **Several types of presentation sessions make up the conference:**

Pre-Conference Workshops and Forum, Plenary Sessions, Concurrent Sessions, Poster Sessions, and Art/Tech/Health Demos.

### **Conference Opening | Marriott University Park Grand Ballroom**

*Tuesday, April 22 – 1:45pm (Plenary 1 Begins)*

### **Plenary sessions** (see INDEX on pages 23-25)

*Tuesday, April 22 – 1:45pm to 4:10pm*

*Wednesday, April 23 – 8:30am to 4:10pm*

*Thursday, April 24 – 8:30am to 12:50pm*

*Friday, April 25 – 8:30am to 4:10pm*

*Saturday April 26 – 8:30am to 4:10pm*

### **Concurrent sessions** (see INDEX on pages 26-34)

*Tuesday, April 22 & Wednesday, April 23 & Friday, April 25 – 5:00pm to 7:05pm*

### **Poster sessions** (see INDEX on page 35-50)

*Wednesday, April 23 & Friday, April 25 – 7:00pm to 10:00pm*

### **Art/Tech/Health Exhibits/Demos** (see INDEX on page 51)

*Wednesday April 23 & Friday April 25 – 7:00pm to 10:00pm*

*Arizona Historical Society Museum, 949 East 2nd Street*

More interactive than concurrent sessions, these demonstrate art, media, sculpture, and experiential techniques with PowerPoint presentations, body and canvas. This year features Art/Tech/Health Demos, Video Game Play, and Second Life Exhibitions.

# Toward a Science of Consciousness 2014

## 2014 CONFERENCE SESSION OVERVIEW

### Late Evening Films Showing

*Tuesday, April 22 – 10:00pm to 11:30pm*

### Late Evening Storytelling Session

*Wednesday, April 23 – 10:00pm to 11:00pm*

## SOCIAL EVENTS

### Welcome Reception

*Tuesday, April 22 – 7:30pm to 10:00pm, Marriott Lobby/Lounge*

### Poetry Slam/Zombie Blues

*Friday, April 25 – 10:00pm to midnight*

9:45pm     Warming up with Michael P. and The Gullywashers

10:15pm     Poetry Slam

11:00pm     Zombie Blues Band (TSC'ers jam Michael P. and The Gullywashers)

11:45pm     Music and Dancing

Following the poems, attendees are invited to perform one or more verses of the Zombie Blues with musical accompaniment by Michael P. and The Gullywashers. Write your own verse to add to the original soulless lament:

*"I act like you act... I do what you do.. but I don't know what it's like to be you"...  
What consciousness is... I ain't got a clue....I got the Zombie Blues."*

### 'End-of-Consciousness' Party

*Saturday, April 26 – 8:00pm until ??? – Location TBA*

This is a TSC Conference tradition. Enjoy food, drinks/cash bar, and music in a party setting!

## OPTIONAL SOCIAL EVENTS

### Brain Mapping Symposium

*Thursday afternoon, April 24 – 2:30pm to 5:00pm*

*The University of Arizona Medical Center – DuVal Auditorium*

Henry Markram, Christof Koch and Anirban Bandyopadhyay hold a special public symposium on technology of brain mapping for the University of Arizona neuroscience and related fields.

### Mt. Lemmon-Sabino Canyon, The Santa Catalina Mts., and a Nature Walk 1-6pm

*Thursday afternoon, April 24 – 1:00 pm to 6:00pm (\$85 per person)*

10,000 feet above the desert floor, 5 climactic zones, and 30 degrees cooler, lies Mount Lemmon. Our trip up the Hitchcock Highway is like traveling from central Mexico to Alaska with foliage changing from desert scrub plants to tall ponderosa pines. A nature walk follows our journey up the mountain. There is a mountaintop community, Summerhaven, with shops and restaurants.

## OPTIONAL SOCIAL EVENTS

### **Desert Jeep Adventure**

*Thursday afternoon, April 24 – 1:00pm to 5:30pm (\$110 per person)*

The four-wheel-drive open-air jeep tour will lead you through some of the most beautiful and rugged desert wilderness surrounding Tucson. Your driver/guide will share with you all of the history and narrate through the cactus forests, canyons, washes and mountains that surround the trail.

### **20th Anniversary Conference Dinner**

*Thursday evening, April 24 – 6:30pm to 10:30pm Skyline Country Club (\$80 per person)*

Reception, hors d'oeuvres, dinner, and dessert.

Transportation round-trip to/from Skyline \$20

Transportation from Skyline to hotel \$10\*

(attire: evening casual – bring change of clothing if attending Mt. Lemmon-Sabino event)

*\*Dinner Guests who are taking the Sabino/Mt Lemmon side trip will have transportation to the Skyline Country Club and will only need a return bus trip back to the Tucson Marriott University Park Hotel after the dinner.*

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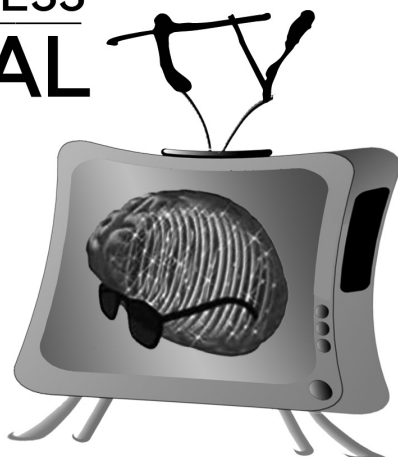
# CONSCIOUSNESS CENTRAL

A daily TV show in the atrium/lobby of the conference hotel with interviews, analysis, remotes, video tweets, debate and fun!

Hosted by Nick Day ("The Man from Mindville"), with roving correspondent Vanda Mikołowski, science sociologist Cameron Keys, and Baba Brinkman, the "reductionist rapper."

Find us on channel 3 at the Marriott Park Hotel.

Plus a daily webcast on Ustream!



Sponsored by Conscious Pictures,  
The Chopra Foundation and  
Newswire.FM

## PRE-CONFERENCE WORKSHOP PROGRAM

*Monday Morning, April 21 – 9:00am to 1:00pm*

- **ALL DAY FORUM: DEI East-West Forum – part 1 / SABINO**  
*East:* P. Sriramam S. Roy, V. Sahni, A.K. Mukhopadhyay, B. D. Dhir, P.S. Satsangi  
*West:* R. Gennaro, J. Barrell, J. Tuszynski, P. Pytkkanen, S. Hameroff  
*Forum Coordinator:* Dr. Bani Dayal Dhir  
*Forum Organizer:* Dr. Vishal Sahni, Dayalbagh Educational Institute

**Abstracts for this Forum are at the back of this book (pages 276-303)**

1. DEI Final Vision and Plenary Talks Outline
  2. Final Oral Abstracts
  3. DEI Final Poster Abstracts
- **Microtubules and Quantum Biology / MADERA**  
(Sir Roger Penrose, Stuart Hameroff, Jack Tuszynski, Travis Craddock, Anirban Banyopadhyay)
  - **Sleights of Mind: The Illusory Nature of Perception and Deception / CANYON A**  
(Stephen L. Macknik)
  - **Nondual Awareness and the Unity of Consciousness: / CANYON B**  
**Experience and Research**  
(Zoran Josipovic, Judith Blackstone)
  - **Toward a Standardized Curriculum of Consciousness Studies / CANYON C**  
(Allan Combs, Jeffery Martin, Nathan Munn, Ed Sarath, Gino Yu, Chip McAuley, Katie Noble)

*Monday Afternoon, April 21 – 2:00pm to 6:00pm*

- **ALL DAY FORUM CONTINUED: DEI East-West Forum – part 2 / SABINO**  
(Poster Setup – after lunch for 5:00pm to 7:00pm DEI Poster Session)
- **New Discoveries in Consciousness Science / MADERA**  
(Bernard J. Baars)
- **Neuroscience of Music, Consciousness & Therapy / CANYON A**  
(Alexander Graur, Giuseppe Vitiello)
- **“First-Person Methods: Philosophers’ Dreams or / CANYON B**  
**Researchers’ Nightmares?”**  
(Jennifer Windt, Sascha Benjamin Fink)
- **Preserving Consciousness: How a Missing Science / CANYON C**  
**of Consciousness Hobbles Life-Saving Medical Research**  
(Kenneth Hayworth, Randal Koene, Max More)

*Monday Evening, April 21 – 5:00pm to 7:00pm*

- **Special East-West Forum Poster Session** / VENTANA

*Monday Evening, April 21 – 7:30pm to 10:30pm*

- **Brain Stimulation** / CANYON A  
(W.J. Tyler)
- **The Reality Problem: Can Science Become Enlightened?** / MADERA-PIMA  
(Deepak Chopra)

*Tuesday Morning, April – 9:00 am to 1:00 pm*

- **From Phenomenology to Consciousness and Back:** / SABINO  
**Integrated Information Theory (IIT) 3.0**  
(Giulio Tononi)
- **Quantum Cognition** / MADERA  
(Harald Atmanspacher, Peter Bruza, Peter beim Graben, Paavo Pylykkänen)
- **The Healthy Human Mind: Tibetan Lamas and The Science of the Stream of Consciousness; Research on the Nature of the Healthy Human Mind Amongst Tibetan Lamas in South and Central Asia** / CANYON A  
(Henry Vyner)
- **Theatre, Literature and Consciousness** / CANYON B  
(Daniel Meyer-Dinkgräfe, Harry Youtt)
- **Philosophical Theories of Consciousness** / CANYON C  
(Rocco Gennaro, Josh Weisberg)
- **Expanded States Through Shamanic Wisdom** / VENTANA  
(Francoise Bourzat)

*Tuesday Evening, April 22 – 10:00pm to 11:30pm*

- **Late Evening Film Showing** / MARRIOTT BALLROOM
  - 10:00pm Doug Wolens – The Singularity
  - 10:30pm Patrick Palucki – Consciousness and Signification
  - 11:00pm Linda Cherry – Press Pause: Reset Your Life

*Tuesday Morning, April 23 – 6:30 to 11:00 pm*

- **Nightwalking – Peripheral Vision for Peak Experience – EVENT IS FULL**  
(Nelson Zink, Petra Stoerig) / OFFSITE at Feliz Paseos Park

*Wednesday Evening, April 23 – 10:00pm to 11:00pm*

- **Late Evening Storytelling Session** / MARRIOTT BALLROOM  
(Nick Day, Sascha Seifert) Evolution of Storytelling



**MONDAY | April 21, 2014 | PRE-CONFERENCE WORKSHOPS**

	SABINO	MADERA	CANYON A
8:00am - 6:00pm	<b>Pre-Conference Workshop REGISTRATION in the Marriott Atrium Lobby</b>		
9:00am - 1:00pm	<b>DEI East-West Forum</b> Full-Day Forum [Part 1]  East: P. Sriramam, S. Roy, V. Sahni, A.K. Mukhopadhyay, B. D. Dhir, P.S. Satsangi  West: R. Gennaro, J. Barrell, J. Tuszyński, P. Pylkkanen, S. Hameroff	<b>Microtubules and Quantum Biology</b>  Sir Roger Penrose Stuart Hameroff Jack Tuszyński Travis Craddock Anirban Banyopadhyay	<b>Sleights of Mind: The Illusory Nature of Perception and Deception</b>  Stephen L. Macknik
1:00pm - 2:00pm	LUNCH – at a location of your choice		
2:00pm - 6:00pm	<b>DEI East-West Forum</b> Full-Day Forum [Part 2]	<b>New Discoveries in Consciousness Science</b>  Bernard J. Baars	<b>Neuroscience of Music, Consciousness &amp; Therapy</b>  Alexander Graur Giuseppe Vitiello
5:00pm - 7:00pm			
7:30pm - 10:30pm			<b>Brain Stimulation</b>  W.J. Tyler





CANYON B	CANYON C	VENTANA	MADERA/PIMA
<b>Nondual Awareness and the Unity of Consciousness: Experience and Research</b> Zoran Josipovic Judith Blackstone	<b>Toward a Standardized Curriculum of Consciousness Studies</b> Allan Combs Jeffery Martin Nathan Munn Ed Sarath Gino Yu Chip McAuley Katie Noble		
1:00pm - 2:00pm LUNCH – at a location of your choice			
<b>“First-Person Methods: Philosophers’ Dreams or Researchers’ Nightmares?”</b> Jennifer Windt Sascha Benjamin Finks	<b>Preserving Consciousness: How a Missing Science of Consciousness Hobbles Life-Saving Medical Research</b> Kenneth Hayworth Randal Koene Max More		
		<b>DEI East-West Forum Poster Session</b>	
			<b>The Reality Problem: Can Science Become Enlightened?</b> Deepak Chopra



## TUESDAY, April 22, 2014 | PRE-CONFERENCE WORKSHOPS

	SABINO	MADERA	CANYON A
8:00am - 9:30am	<b>Pre-Conference Workshop REGISTRATION</b> in the Marriott Atrium Lobby		
10:30am - 5:00pm	<b>General Conference REGISTRATION</b> in the Marriott Atrium		
9:00am - 1:00pm	<b>From Phenomenology to Consciousness and Back: Integrated Information Theory (IIT) 3.0</b> Giulio Tononi	<b>Quantum Cognition</b> Harald Atmanspacher Peter Bruza Peter beim Graben Paavo Pylikäinen	<b>The Healthy Human Mind: Tibetan Lamas Science of the Stream of Consciousness; Research on Tibetan Lamas in South and Central Asia</b> Henry Vynner
1:00pm	<b>END of Pre-Conference Workshops</b>		
1:00pm - 1:45pm	LUNCH – at a location of your choice		

## TUESDAY, April 22, 2014 | CONFERENCE OPENING | PLENARY SESSION 1

1:45pm	<b>CONFERENCE WELCOME – in the Grand Ballroom</b>		
1:45pm - 4:10pm <b>PLENARY SESSION 1</b>	<b>PLENARY SESSION 1: The Hard Problem — Twenty Years On</b> <i>For details, see Plenary INDEX on pages 23-25.</i> David Chalmers   Daniel C. Dennett   Donald Hoffman		
4:10pm - 5:00pm	break		
	SABINO	MADERA	CANYON A
	<i>For details, see Concurrent INDEX on pages 26-34.</i>		
5:00pm - 7:05pm <b>CONCURRENT SESSIONS 1-8</b>	<b>CONCURRENT SESSION 2:</b> Reflexivity and Unity	<b>CONCURRENT SESSION 7:</b> Altered States	<b>CONCURRENT SESSION 1:</b> Materialism and the Explanatory Gap
7:05pm - 7:30pm	break		
7:30pm - 10:00pm	<b>WELCOME RECEPTION</b> at the Marriott Atrium Lobby and Lounge		
10:00pm - 11:30pm	<b>Late Evening Film Showing – Marriott BALLROOM</b>		



CANYON B	CANYON C	VENTANA	MADERA/PIMA
<b>Theatre, Literature and Consciousness</b>  Daniel Meyer- Dinkgräfe Harry Youtt	<b>Philosophical Theories of Consciousness</b>  Rocco Gennaro Josh Weisberg	<b>Expanded States Through Shamanic Wisdom</b>  Francoise Bourzat	

CONCURRENT SESSIONS 1-8 | WELCOME RECEPTION

CANYON B	CANYON C	VENTANA	PIMA	BOARD ROOM
<i>For details, see Concurrent INDEX on pages 26-34.</i>				
<b>CONCURRENT SESSION 3:</b>  <b>Extended and Distributed Consciousness</b>	<b>CONCURRENT SESSION 4:</b>  <b>Perceptual Consciousness</b>	<b>CONCURRENT SESSION 6:</b>  <b>Computational Approaches</b>	<b>CONCURRENT SESSION 8:</b>  <b>Quantum Approaches</b>	<b>CONCURRENT SESSION 5:</b>  <b>Disorders of Consciousness</b>



## WEDNESDAY MORNING, April 23, 2014 | PLENARY SESSIONS 2-4

	GRAND BALLROOM
	<i>For details, see Plenary INDEX on pages 23-25.</i>
8:30am - 10:40am	<b>PLENARY SESSION 2:</b> <b>Attention and Consciousness</b> Michael Graziano   Alison Gopnik   Ned Block
10:40am - 11:10am	break
11:10am - 12:30pm	<b>PLENARY SESSION 3: KEYNOTE SESSION</b> <b>Consciousness and the Laws of Physics</b> KEYNOTE SPEAKER: Sir Roger Penrose
12:30pm - 2:00pm	break
2:00pm - 4:10pm	<b>PLENARY SESSION 4:</b> <b>Subjectivity and Objectivity</b> John Searle   Rebecca Goldstein   Deepak Chopra
4:10pm - 5:00pm	break

## WEDNESDAY AFTERNOON, April 23, 2014 | CONCURRENT SESSIONS 9-16

	SABINO	MADERA	CANYON A
	<i>For details, see Concurrent INDEX on pages 26-34.</i>		
5:00pm - 7:05pm <b>CONCURRENT SESSIONS 9-16</b>	<b>CONCURRENT SESSION 9:</b> <b>Neutral Monism and Panpsychism</b>	<b>CONCURRENT SESSION 13:</b> <b>Brain Stimulation</b>	<b>CONCURRENT SESSION 10:</b> <b>Consciousness and Attention</b>

## WEDNESDAY EVE, April 23, 2014 | POSTER SESSIONS & ART/TECH/HEALTH

6:30pm - 11:00pm	<b>Nightwalking – Peripheral Vision for Peak Experience – <u>EVENT IS FULL</u></b> <b>Feliz Paseos Park (OFFSITE)</b>
	<i>For details, see Poster INDEX on pages 35-50 and Art/Tech/Health INDEX on page 51.</i>
7:00pm - 10:00pm	<b>P1 Poster sessions and A1 Art/Tech/Health Exhibits/Demos are available for viewing during this 3-hour period. – Arizona Historical Society Museum</b>
10:00pm - 11:00pm	<b>Late Evening Storytelling Session – Marriott BALLROOM</b>





CANYON B	CANYON C	VENTANA	PIMA	BOARD ROOM
For details, see Concurrent INDEX on pages 26-34.				
CONCURRENT SESSION 12: Sleep and Dreams	CONCURRENT SESSION 16: Vibrations and Scale	CONCURRENT SESSION 14: Meditation	CONCURRENT SESSION 11: Foundational Issues in the Science of Consciousness	CONCURRENT SESSION 15: History of Consciousness





**THURSDAY | April 24, 2014 | PLENARY SESSIONS 5-6**

	GRAND BALLROOM
	<i>For details, see Plenary INDEX on pages 23-25.</i>
8:30am - 10:40am	<b>PLENARY SESSION 5:</b> <b>Brain Networks and Consciousness</b> Bernard J. Baars   Henry Markram   Karl Deisseroth
10:40am - 11:10am	break
11:10am - 12:30pm	<b>PLENARY SESSION 6:</b> <b>Time and Consciousness</b> David Eagleman   Julia Mossbridge
	NO CONFERENCE SESSIONS UNTIL FRIDAY MORNING: FREE AFTERNOON and EVENING
1:00pm - 6:30pm	<b>Optional SIDE TRIPS</b> (purchase these based on availability at GENERAL REGISTRATION) <b>Buses leave from outside the Marriott Hotel.</b> Optional: Box Lunches (Separate Purchase Fee)
2:30pm - 5:00pm	<b>Optional BRAIN MAPPING SYMPOSIUM</b> (at the University of Arizona Medical Center DuVal Auditorium – more information at GENERAL REGISTRATION) Henry Markram   Christof Koch   Anirban Bandyopadhyay
6:30pm - 10:30pm	<b>Optional CONFERENCE DINNER</b> – at Skyline Country Club (purchase ticket for this event at GENERAL REGISTRATION) (cash bar)





**FRIDAY MORNING, April 25, 2014 | PLENARY SESSIONS 7-9**

	GRAND BALLROOM
	<i>For details, see Plenary INDEX on pages 23-25.</i>
8:30am - 10:40am	<b>PLENARY SESSION 7:</b> <b>Vision and Neural Correlates of Consciousness</b> Petra Stoerig   Mary Peterson   Russell Hurlburt
10:40am - 11:10am	break
11:10am - 12:30pm	<b>PLENARY SESSION 8:</b> <b>Integrated Information Theory</b> Christof Koch and Giulio Tononi
12:30pm - 2:00pm	break
2:00pm - 4:10pm	<b>PLENARY SESSION 9:</b> <b>Quantum Approaches: Twenty Years On</b> Max Tegmark   Stuart Hameroff   Anirban Bandyopadhyay
4:10pm - 5:00pm	break

**FRIDAY AFTERNOON, April 25, 2014 | CONCURRENT SESSIONS 17-24**

	SABINO	MADERA	CANYON A
	<i>For details, see Concurrent INDEX on pages 26-34.</i>		
5:00pm - 7:05pm <b>CONCURRENT SESSIONS 17-24</b>	<b>CONCURRENT SESSION 23:</b> <b>Anomalies of Consciousness</b>	<b>CONCURRENT SESSION 24:</b> <b>Biophysics</b>	<b>CONCURRENT SESSION 17:</b> <b>Philosophy of Perception</b>

**FRIDAY EVE, April 25, 2014 | POSTER SESSIONS & ART/TECH/HEALTH**

	<i>For details, see Poster INDEX on pages 35-50 and Art/Tech/Health INDEX on page 51.</i>
7:00pm - 10:00pm	<b>P2 Poster sessions and A2 Art/Tech/Health Exhibits/Demos</b> are available for viewing during this 3-hour period. – <b>Arizona Historical Society Museum</b>



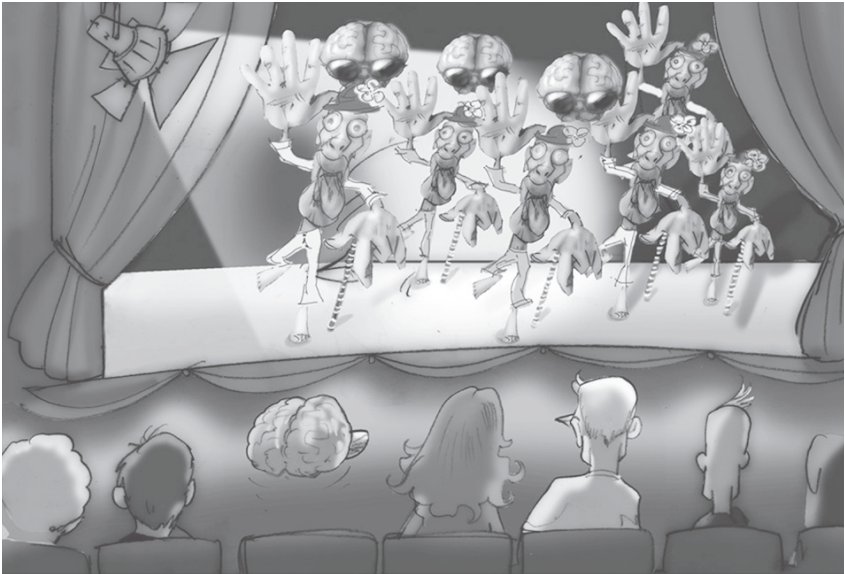




CANYON B	CANYON C	VENTANA	PIMA	BOARD ROOM
For details, see Concurrent INDEX on pages 26-34.				
<b>CONCURRENT SESSION 20:</b>  Emotion and Affect	<b>CONCURRENT SESSION 22:</b>  First-Person Approaches	<b>CONCURRENT SESSION 19:</b>  Time and Consciousness	<b>CONCURRENT SESSION 21:</b>  Brain Networks and Consciousness	<b>CONCURRENT SESSION 18:</b>  Free Will and Agency



	<b>KIVA BALLROOM</b>
	<i>For details, see Plenary INDEX on pages 23-25.</i>
8:30am - 10:40am	<b>PLENARY SESSION 10:</b> <b>Death and Consciousness</b> George Mashour   Sam Parnia   Susan Blackmore
10:40am - 11:10am	break
11:10am - 12:30pm	<b>PLENARY SESSION 11:</b> <b>Mind Uploading</b> Kenneth Hayworth   Natasha Vita-More
12:30pm - 2:00pm	LUNCH at a location of your choice
2:00pm - 4:10pm	<b>PLENARY SESSION 12:</b> <b>Panel Discussion – The next 20 years</b> (Panelists TBA)
4:10pm - 8:00pm	FREE TIME – Dinner at a location of your choice
8:00pm until ???	<b>END-OF-CONSCIOUSNESS PARTY (location TBA)</b> (cash bar, music and food)



## INDEX TO PLENARY SESSIONS

### PL 1 – PL 12

*Tuesday, April 21 through Saturday, April 26, 2014*

**(PL 1 Tues | PL 2-4 Wed | PL 5-6 Thurs | PL 7-9 Fri | PL 10-12 Sat)**

Twelve Plenary Sessions, including one Keynote Session (PL3), will be presented this year in the Tucson Marriott University Park Hotel Grand Ballroom at the 2014 TSC conference.

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#### TUESDAY

##### **PL1: The Hard Problem: Twenty Years On**

*Tuesday, April 22 – 1:45pm to 4:10pm*

- **The Hard Problem of Consciousness: 342 Years On**  
David Chalmers (Department of Philosophy, Australian National University, Canberra; Department of Philosophy, New York University, New York) [45]
- **Does Time Fly When You're Having Philosophical Fun?**  
Daniel C. Dennett (Philosophy, Tufts University, Boston, MA) [46]
- **Conscious Agents: A Formal Theory of Consciousness**  
Donald Hoffman (Cognitive Sciences, University of California, Irvine, Irvine, CA) [10]

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#### WEDNESDAY

##### **PL2: Attention and Consciousness**

*Wednesday, April 23 – 8:30am to 10:40am*

- **Consciousness and the Social Brain**  
Michael S.A. Graziano (Psychology, Princeton University, Princeton, NJ) [178]
- **Lanterns and Spotlights: Childhood Consciousness and Ensemble Coding**  
Alison Gopnik (Philosophy, University of California at Berkeley, Berkeley, CA) [189]
- **Unspecificity and Attention** Ned Block (New York University, New York, NY) [88]

##### **PL3: KEYNOTE – Consciousness and the Laws of Physics**

*Wednesday, April 23 – 11:10am to 12:30pm*

- **Consciousness and the Laws of Physics**  
Sir Roger Penrose (University of Oxford, Oxford, United Kingdom) [254]

##### **PL4: Subjectivity and Objectivity**

*Wednesday, April 23 – 2:00pm to 4:10pm*

- **The Problem of Consciousness After Twenty Years**  
John Searle (Philosophy, University of California, Berkeley, CA) [16]
- **Consciousness and the Novel** Rebecca N. Goldstein (New York, NY) [109]
- **The 'Combination Problem' in Scientific and Eastern Spiritual Approaches to Consciousness** Deepak Chopra, MD, FACP (The Chopra Center, Carlsbad, CA) [6]

## PL5: Brain Networks and Consciousness

*Thursday, April 24 – 8:30am to 10:40AM*

- **Global Workspace Dynamics**  
Bernard J. Baars (The Neurosciences Institute, Berkeley, CA) [114]
- **Emergent States from High Fidelity Brain Models** Henry Markram  
(Swiss Federal Institute for Technology (EPFL), Lausanne, Switzerland) [124]
- **Optical Deconstruction of Fully-assembled Biological Systems**  
Karl Deisseroth (Department of Bioengineering, Stanford University, Stanford, CA) [306]

## PL6: Time and Consciousness

*Thursday, April 24 – 11:10am to 12:30pm*

- **Time and the Brain** David Eagleman (Baylor College of Medicine, Houston, TX) [212]
- **Predictive Anticipatory Activity: Examining the Evidence for Unconscious Prediction of the Seemingly Unpredictable** Julia Mossbridge, Marcia Grabowecy, Satoru Suzuki, Patrizio Tressoldi, Jessica Utts (Department of Psychology, Northwestern University, Evanston, IL) [225]

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## FRIDAY

## PL7: Vision and Neural Correlates of Consciousness

*Friday, April 25 – 8:30am to 10:40am*

- **Investigating Pristine Inner Experience: Implications for Consciousness Science, Developmental Psychology, Neuroscience, and Self-Understanding**  
Russell Hurlburt (Psychology, University of Nevada, Las Vegas, Las Vegas, NV) [117]
- **Beyond the Classical Feed-Forward View of Figure-Ground Segregation**  
Mary A. Peterson (Chair, School of Mind, Brain,, The University of Arizona, Tucson, AZ) [185]
- **Visual Cortical Activation and Qualia** Petra Stoerig (Experimental Psychology, Heinrich-Heine-University Duesseldorf, Duesseldorf D-40225, Germany) [138]

## PL8: Integrated Information Theory

*Friday, April 25 – 11:10am to 12:30pm*

- **Consciousness: Here, There But Not Everywhere**  
Christof Koch (Allen Institute for Brain Science, Seattle, Washington)  
Giulio Tononi (University of Wisconsin, Madison, Wisconsin) [120]



## **PL9: Quantum Approaches: Twenty Years On**

*Friday, April 25 – 2:00pm to 4:10pm*

- **Consciousness as a State of Matter**  
Max Tegmark (Physics, MIT, Department of Physics, Cambridge, MA) [154]
- **Quantum Vibrations In Microtubules - ‘Orch OR’ - 20 Years On**  
Stuart Hameroff (Anesthesiology, MD; Psychology; The University of Arizona, Tucson, AZ) [248]
- **Opening “Pandora’s Box”: Direct Measurement of Microtubule Bundle Resonance in a Live Neuronal Axon Suggests Scale-invariant Brain Dynamics Extends Inside Neurons**  
Anirban Bandyopadhyay (Advanced Scanning Probe Micros, National Institute for Materials Science, Tsukuba, Japan; MIT, Cambridge, MA, Tsukuba, Ibaraki Japan) [282]

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## **SATURDAY**

### **PL10: Death and Consciousness**

*Saturday, April 26 – 8:30am to 10:40am*

- **Consciousness and the Dying Brain** George A. Mashour (Department of Anesthesiology, University of Michigan, Department of Anesthesiology, Ann Arbor, MI) [142]
- **Awareness During Resuscitation - A Prospective Case Study**  
Sam Parnia (Medicine, Stony Brook University, Stony Brook, NY) [144]
- **Dying All the Time**  
Susan Blackmore (University of Plymouth, Plymouth, United Kingdom) [69]

### **PL11: Mind Uploading**

*Saturday, April 26 – 11:10am to 12:30pm*

- **Consciousness and the Connectome: How Brain Circuits Encode Self**  
Kenneth Hayworth (Ashburn, VA) [116]
- **Substrate-Diverse Persons by Design** Natasha Vita-More (Design, Technology, Science, Faculty | University of Advancing Technology, Scottsdale, AZ) [155]

### **PL12: Panel Discussion – The Next 20 Years**

*Saturday, April 26 – 2:00pm to 4:10pm*



# INDEX TO CONCURRENT SESSIONS

## C 1 – C 24

### Afternoon Concurrent Sessions – 5:00pm to 7:05pm

*Tuesday, April 22 | Wednesday, April 23 | Friday, April 25*

There will be 24 Concurrent Sessions at this year's TSC Conference 2014. Concurrent talks are 20 minutes each, with 5 minutes for questions. There are five speakers per session, covering focused areas of the same theme. (LCD projectors and laptops available.)

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## TUESDAY

### C1: Materialism and the Explanatory Gap

*Tuesday, April 22 – 5:00pm to 7:05pm / CANYON A*

- **What is Pereboom's Qualitative Inaccuracy Hypothesis?**  
Bernard W. Kobes (Philosophy, Arizona State University, Tempe, AZ) [27]
- **Three Grades of Internal World Skepticism**  
Josh Weisberg (Philosophy, University of Houston, Houston, TX) [66]
- **Why the 'Hard Problem' Hardly Matters**  
Jonathan Dorsey (Philosophy, National Humanities Center, Chapel Hill, NC) [47]
- **Phenomenological Bias and the Zombie Quarantine Problem**  
Craig DeLancey (Philosophy, SUNY Oswego, Oswego, NY) [100]
- **Modes of Presentation and Phenomenal Concepts**  
Martina Fuerst (Philosophy, University of Graz, Graz, Austria) [48]

### C2: Reflexivity and Unity

*Tuesday, April 22 – 5:00pm to 7:05pm / SABINO*

- **Reflexive Sensibility: The Bedrock of Consciousness**  
Christian Coseru (Philosophy, College of Charleston, Charleston, SC) [54]
- **Deeper-Order Thought ('DOT') – An Alternative Higher-Order Thought ('HOT') Theory of Consciousness** Rocco Gennaro, Paaavo Pylkkanen,  
Stuart Hameroff (Philosophy, University of Southern Indiana, Evansville, IN) [56]
- **Having Experiences that Don't Exist: The Odd Possibility of Targetless HOTs**  
Roger Christan Schriner (Independent scholar, Fremont, CA) [58]
- **Unity of Consciousness and Virtual Selves**  
Robert Van Gulick (Philosophy, Syracuse University, Syracuse, NY) [75]
- **Self-consciousness, Subjectivity and Projective Geometry**  
Kenneth Williford, Daniel Bennequin, Gregory Landini, David Rudrauf  
(Philosophy, The University of Texas at Arlington, Arlington, TX) [315]

### C3: Extended and Distributed Consciousness

*Tuesday, April 22 – 5:00pm to 7:05pm / CANYON B*

- **If Materialism is True, the United States is Probably Conscious**  
Eric Schwitzgebel (Department of Philosophy, Riverside, CA) [30]



- **There is No Such Thing as Derived Intentionality**  
David Pitt (Philosophy, California State University Los Angeles, Los Angeles, CA) [94]
- **The Intramodal Experience of Eye Contact**  
Axel Seemann (Philosophy, Bentley University, Waltham, MA) [106]
- **(Why) Consciousness is not a Strictly Neurological Phenomenon**  
Karina Vold (Department of Philosophy, Department of Philosophy,  
McGill University, Montreal, Canada) [22]
- **Extended Cognition, Extended Consciousness**  
Tobias Schlicht (Philosophy, Ruhr-University Bochum, Bochum, Germany) [15]

#### **C4: Perceptual Consciousness**

*Tuesday, April 22 – 5:00pm to 7:05pm / CANYON C*

- **Personalizing the Objective World by Subjectivizing, Somaticizing, Mentalizing and Flavorizing It** Bill Faw (Psychology, Brewton-Parker College, Mount Vernon, GA) [102]
- **Neural Networks in the Early Visual System May Create What They Cannot Compute: Time-Series of Connected Open Sets of Neurons with Non-Empty Intersections as Visual Objects**  
Raymond Pavloski (Psychology, Indiana University of Pennsylvania, Indiana, PA) [131]
- **Colour Constancy Without Consciousness** Robert Kentridge, Liam Norman;  
Kathleen Akins, Charles Heywood (University of Durham, Durham, United Kingdom) [184]
- **Visual Experience vs. Decisional Confidence: Dissociable Measures of Consciousness?** Manuel Rausch, Zehetleitner, Michael (Psychology,  
Ludwig-Maximilians-Universität München, Munich, Germany) [186]
- **“Happening” is a Distinct Percept and a Perceptual Illusion in the Flow of Time**  
Ronald Gruber, Richard A. Block, Professor of Psychology, Montana State U.  
(Clinical Assoc. Professor, Stanford University Medical Center, Stanford and S.F., CA) [224]

#### **C5: Disorders of Consciousness**

*Tuesday, April 22 – 5:00pm to 7:05pm / BOARD ROOM*

- **Introspection For More Than One Person** Sascha Fink (University of Osnabruck,  
Institute of Cognitive Science, Osnabruck, Germany) [60]
- **Depression, Ketamine Treatment and the Reverse Split-Brain** Michael Cerullo  
(Psychiatry and Neuroscience, University of Cincinnati, Cincinnati, OH) [159]
- **Did cholesterol-Lowering Drugs Play a Significant Causal Role in the Financial Crisis of 2007-2008?** Mathew Gendle, Alyssa G. Flashburg; Kristi L. Higgins;  
Kristianne M. Oristian (Psychology, Elon University, Elon, NC) [160]
- **Implicit Self-Esteem in Borderline Personality and Depersonalization Disorder**  
Heather Berlin, Alexis N Hedrick (Psychiatry and Neuroscience,  
Icahn School of Medicine at Mount Sinai, New York, NY) [195]
- **Interhemispheric Integration in Infancy: Split-Brain Babies?** Kimberly Scott,  
Elizabeth Spelke; Laura Schulz (Brain and Cognitive Sci, MIT, Cambridge, MA) [206]

## C6: Computational Approaches

*Tuesday, April 22 – 5:00pm to 7:05pm / VENTANA*

- **A Turing Test for Visual Qualia: An Experimental Method to Test Various Hypotheses on Consciousness** Masataka Watanabe (Logothetis, Max Planck Institute for Biological Cybernetics, Tuebingen, Germany) [127]
- **Mapping the Space of Possible Conscious Minds** Roman Yampolskiy (Computer Engineering, University of Louisville, Louisville, KY) [210]
- **Declarative Consciousness for Reconstruction** Leslie Seymour (PersInVitro, LLC, San Jose, CA) [209]
- **Why Phi Networks (Not Wifi)? How Hierarchical Predictive Coding Explains Both Why the Phi Measure of Network Structure Is Relevant to Consciousness, and How It Sheds Light on What It Is Like.** Stephen Deiss (UCSD Multimodal Imaging Lab, UC San Diego, Computer Science Dept., San Diego, CA) [272]
- **Can People Control a Brain-Computer Interface Unconsciously?** Doron Friedman, Jonathan Giron (Head of the Advanced Reality L, Herzliya, Israel) [344]

## C7: Altered States

*Tuesday, April 22 – 5:00pm to 7:05pm / MADERA*

- **The Kappa Opioid Receptor (KOR) System and Consciousness: Findings from Salvia Divinorum Research** Peter Addy (Yale University School of Medicine, West Haven,) [157]
- **Transcranial Ultrasound (TUS) Stimulation at the Scalp Vertex Increases Self-Ratings on a Buddhist-Based Nonattachment Scale** Michael Goldstein, Sanguinetti, JL; Tyler, WJ; Hameroff, S; Allen, JJB (Psychology, The University of Arizona, Tucson, AZ) [115]
- **The Healthy Human Mind and the Science of the Phenomena That Appear in the Stream of Consciousness** Henry Vyner (Center for Nepali and Asian St, Tribhuvan University, Lake George, CO) [304]
- **What Can Psychedelics Teach Us About Consciousness?** Albert Garcia-Romeu (Psychiatry/Behavioral Sciences, Johns Hopkins University School of Medicine, Baltimore, MD) [323]
- **Interconnectivity of Expanded States of Consciousness** Francoise Bourzat (CIIS, Woodside, CA) [322]
- **Toward the Science of ASC: Shaping of a New Wisdom** Oded Maimon, Francoise Bourzat, CIIS (Industrial Engineering, Tel Aviv University, Tel Aviv, Israel) [324]

## C8: Quantum Approaches

*Tuesday, April 22 – 5:00pm to 7:05pm / PIMA*

- **Quantum Cognition – A New Frontier in Consciousness Studies** Harald Atmanspacher (Collegium Helveticum, Zurich, Switzerland) [268]
- **Contextual Emergence of Intentional Systems** Peter Beim Graben (Department of German Studies A, Humboldt-Universitet Zu Berlin, Berlin, Germany) [87]
- **Fermions and Quantum Neurodynamics** Donald Mender (Psychiatry, Yale University, Rhinebeck, NY) [151]



- **Consciousness: Down The Rabbit Hole – Just How Deep in Physics do the Roots of Consciousness Go?** John Hagelin (Fairfield, IA) [148]
- **A Possible Source of Proto Consciousness in Quantum Vacuum**  
Mani Bhaumik, MD (Los Angeles, CA) [243]

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## WEDNESDAY

### C9: Neutral Monism and Panpsychism

*Wednesday, April 23 – 5:00pm to 7:05pm / SABINO*

- **Russellian Monisms and Russell's Monism**  
Leopold Stubenberg (Philosophy, University of Notre Dame, Notre Dame, IN) [18]
- **Emergent Panpsychism and Mental Causation**  
Godehard Bruentrup (Munich School of Philosophy, Munich, Germany) [4]
- **Powerful Qualities and the Metaphysics of Mind: Towards a Neutral Monism**  
Alexander Carruth (Department of Philosophy, Durham University, Durham, United Kingdom) [5]
- **Russellian Monism and Epiphenomenalism**  
William S. Robinson (Iowa State University, Ames, IA) [29]
- **Experience Unbound: Neutral Monism, Emergence and Extended Mind**  
Michael Silberstein (Philosophy, Elizabethtown College, Lancaster, PA) [17]

### C10: Consciousness and Attention

*Wednesday, April 23 – 5:00pm to 7:05pm / CANYON A*

- **What is the Scope of Aesthetic Experience?**  
Nicholas Silins (Philosophy, Cornell University / Yale-NUS College, Ithaca, NY) [107]
- **Attention and Consciousness: Asking the Right Questions**  
John Taylor (Durham, United Kingdom) [182]
- **Consciousness and Attention in the Bhagavad-Gita**  
Keya Maitra (Philosophy, University of North Carolina at Asheville, Asheville, NC) [181]
- **Where Is My Mind: Neural Correlates of Involuntary Attentional Lapses and Mind Wandering** Tracy Brandmeyer, Arnaud Delorme (Centre de Recherche Cerveau et Cognition, Paul Sabatier University, Toulouse, Toulouse, Midi Pyrenees France) [215]
- **Consciousness and Attention: Two Sides of the Same Coin**  
Yaojun Lu (Philosophy, Sun Yat-sen University, Guangzhou, China) [180]

### C11: Foundational Issues in the Science of Consciousness

*Wednesday, April 23 – 5:00pm to 7:05pm / PIMA*

- **What Does It Take to Build a Consciousness Meter?**  
Brian Fiala (Philosophy, Washington University in St. Louis, MO) [59]
- **Higher Order (HOT) Theories of Consciousness and Bohmian Active Information**  
Paavo Pylikkanen (Universities of Skovde and Helsinki, Skovde, Sweden) [57]
- **(Neural) Activity and Consciousness**  
Crystal L'Hote (Philosophy, St. Michael's College, Vermont, Burlington, VT) [122]

- **Connecting Visual Qualia to Their Neural Correlates** Stanley Klein (Optometry, UC Berkeley, Berkeley, CA) [130]
- **What Explains Consciousness? Or, What Consciousness Explains?** Don Dulany (Psychology, University of Illinois, Champaign, IL) [237]

## C12: Sleep and Dreams

*Wednesday, April 23 – 5:00pm to 7:05pm / CANYON B*

- **Sleep and Dissociation: Toward an Integrative Model of Dissociative Symptoms and Experiences** Steven Lynn, Harald Merckelbach; Timo Giesbercht; Dalena Van Der Kloet; Liam Condon; Anne Malaktaris; Peter Lemons (Psychology, Binghamton University (SUNY), Binghamton, New York) [168]
- **Dreams, Conscious Experience and Cranial Envatment: A New Look at the Mind-Body Problem** Jennifer Windt (Department of Philosophy, Johannes Gutenberg University, Mainz, Germany) [204]
- **Risk Factors for Frequent Nightmares: Role of Subjective Well-being Measures** Nils Sandman, Katja Valli; Erkki Kronholm; Antti Revonsuo; Tiina Laatikainen; Tiina Paunio (Center of Cognitive Neuroscien, University of Turku, Turku, Finland) [201]
- **Dreams of a Bayesian Brain: A Predictive Processing Account of Dreaming** Alessio Bucci (Philosophy, University of Edinburgh, Edinburgh, United Kingdom) [199]
- **Pre-Sleep Treatment with Acetylcholinesterase Inhibitors Enhances Memory, Cognition and Metaconsciousness (Lucidity) During Dreaming** Stephen LaBerge, Kristen LaMarca (LUCIDITY.com, Tucson, AZ) [200]

## C13: Brain Stimulation

*Wednesday, April 23 – 5:00pm to 7:05pm / MADERA*

- **Transcranial Electric Stimulation: A Tool to Manipulate Subjective Experience?** Clemens Frenzel, Jana Speth; Trevor Harley (Cupar, United Kingdom) [170]
- **Transcranial Ultrasound (TUS) Brain Stimulation in Humans: Effects on Mood/Mental States in Three Studies** Joseph Sanguinetti, Ezra Smith; William J. Tyler; Stuart Hameroff; John J. B. Allen (Psychology, The University of Arizona, Tucson, AZ) [174]
- **Low-Intensity Ultrasound Promotes Neurite Outgrowth in Cultured Cortical Neurons** Uma Raman, Sara Parker, Chris Duffield, Sourav Ghosh, Stuart Hameroff (Tucson, AZ) [146]
- **Tubulin Hydrophobic Pockets and Dynamical States are Essential to Consciousness** Pushpa Sahni (Chemistry, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [152]
- **Ultrasound Vibrations Stabilize Microtubules In Vitro** Saatviki Gupta, Nandita Gupta; Arun Kumar Gupta; Stuart Hameroff (Dayalbagh Educational Institute, Delhi, India) [284]

## C14: Meditation

*Wednesday, April 23 – 5:00pm to 7:05pm / VENTANA*

- **The Dynamics of Binding and Meditation** Peter Walling, MD (Baylor University Medical Center, Dallas, TX) [165]
- **The Unified Context of Consciousness** Zoran Josipovic (Contemplative Neuroscience Lab, New York University, New York, NY) [119]

- **Mindfulness Meditation Enables Proactive Metacognition of Attention** Stephen Whitmarsh, Jensen, O; Barendregt, H. P. (Computer Science, Karolinska Institutet, National MEG facility, Nijmegen, Netherlands) [176]
- **Meditation and Intention** Noa Latham (Philosophy, University of Calgary, Calgary, Alberta Canada) [318]
- **Resting State Connectivity Correlates with Ego Development** Omar Singleton, Andres Fossas, Max Newlon, Susanne Cook-Greuter, Sara W. Lazar (Psychiatry, Massachusetts General Hospital, Psychiatry, Boston, MA) [321]

## C15: History of Consciousness

*Wednesday, April 23 – 5:00pm to 7:05pm / BOARD ROOM*

- **“That Poor and Erring Organ:” Nietzsche on Consciousness and Instinct** Sheridan Hough (Philosophy, College of Charleston, Charleston, SC) [11]
- **Different Trees Same Fruit: Awakened Sages on the Nature of Mind** Miri Albahari (Philosophy, University of Western Australia, Crawley, Western Australia Australia) [67]
- **The “Hard Problem” of Consciousness in Post-Kantian German Thought** Paolo Pecere (Roma, Italy) [52]
- **Philip K. Dick, A Non Dual Fool?** Richard Doyle (English/Information Sciences, Penn State University, State College, PA) [334]
- **Notes on the Prehistory of the Center for Consciousness Studies** J Laukes (Chicago, IL) [353]

## C16: Vibrations and Scale

*Wednesday, April 23 – 5:00pm to 7:05pm / CANYON C*

- **Fractal Meets Sentyon: Information Fractalization in Conscious Particle States (“Sentyons”) and Potential Detection by Bright Matter Radiation** Erhard Bieberich (Instit.of Molecular Medicine, Georgia Regents University, Augusta, GA) [147]
- **Perspectives from the Standing Wave Theory of Consciousness** Selen Atasoy, Isaac Donnelly; Joel Pearson (School of Psychology, University of New South Wales, Sydney, NSW Australia) [171]
- **Coyote Consciousness: Social Predator Vocalization and Communication** Sara Waller (Philosophy, Montana State University, Bozeman, MT) [213]
- **The Effect of Vocalized Sound on Higher Consciousness and Energetic States** Puran Bair, Susanna Bair (Institute for Applied Meditation, Tucson, AZ) [316]
- **A Theory of Musical Consciousness** Kenneth Alewine (Institute for the Medical Humanities, University of Texas Medical Branch, Texas City, TX) [361]

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## FRIDAY

## C17: Philosophy of Perception

*Friday, April 25 – 5:00pm to 7:05pm / CANYON A*

- **Expect Surprises: Prediction in Perception of Absence** Anya Farennikova (School of Philosophy, UNC Chapel Hill, Irvine, CA) [101]

- **The Dominance of the Visual** Stephen Biggs, Dustin Stokes (Iowa State University, Philoso, Ames, IA) [99]
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- **Can a System Based on Free Will and Agency Successfully Transform Into a Desired State?** Anhad Kashyap, Sumat Nanda (Social Sciences, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [369]
- **Communicating with Your Divine Self** Sunita Satsangi, Ms. Parul Verma (DEI Dayalbagh Educational Institute, Agra, UTTAR PRADESH India) [383]
- **Complexities of the Connected World – An Integrated Framework Approach for Consciousness and Information Systems Modeling for Businesses** S S Prasad Satyavolu, Sumati Prasad Satyavolu (MLEU, DEI DEC, Pune, India) [397]
- **Consciousness in Relation to Transformational and Conscious Leadership** Vaibhav Chauhan, Prof. Nandita Satsangee (Foundations of Education, Faculty of Education, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [403]
- **Consciousness, Religiosity and Locus of Control Among Adolescents** Shaktiyanshi Raundeley, Dr. Preet Kumari (Assistant Professor, Department of Psychology, Faculty of Social Sciences, DEI (Department of Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [379]
- **Culture, Environment and its Impact on Development of Values and Consciousness** Gurpyari Prakash, Dr. Ranjeet Kaur Satsangi (Agra, Uttar Pradesh India) [412]
- **Developing Behavioral Strategies to Improve Consciousness Using Fuzzy Cognitive Map (FCM) for Mental Tendencies** Sant Kumar Gaur, Prof. D. S. Mishra (Mechanical Engineering, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [404]
- **Developing Spiritual Consciousness: An Eastern Perspective** Sahab P. Sinha, Surat P. Sinha (Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [385]
- **Devotional Music and Spiritual Consciousness** Vuppuluri Prem Kumari, Mrs. Binathi Gunty, M.A., MPhil in Indian Music (Department of Music, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [378]
- **Eco-villages and Sustainable Practices Lead to Higher Levels of Consciousness and a Better World Order** Prem Aarati Cohly, Kamini D. Cohly; Prem P. Cohly (International Relations, Dayalbagh Educational Institute, NY Center, New York, New York) [411]
- **Effect of Yoga on Spiritual Intelligence** Jyotika Kharbanda, Sarla Paul (Education, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India) [370]

- **Egotism and Attachment as Predictors of Stress** Ira Das, Archana Sharma (Department of Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [364]
- **Enhancing Consciousness of Library Going Children Through a Multi-Media Intervention Programme** Sarla Paul, Prof. Nandita Satsangee, Ms Gagan Deep Nigam (Foundations of Education, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [406]
- **Forms of Consciousness in Materialistic World VS Spiritual World** Maanvi Mathur, Swami Pyari (Management Studies, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [376]
- **Global Consciousness For Sustainable Development?** Preeti Srivastava, Dr. M. K. Gatum, Reader, Dept. of Pedagogical Sciences, Faculty of Education, Dayalbagh Educational Institute, Dayalbagh, Agra (Pedagogical Sciences, Faculty, DEI Dayalbagh Educational Institute, Agra India, Agra, U P India) [400]
- **Holistic Corporate Management and Eastern Philosophy** Aashiq Bommireddipalli, Swanti Devguptapu, DEI; Prem Sewak Sudhish, DEI (DEI Dayalbagh Educational Institute, Agra, India) [399]
- **Importance and Benefits of Value Based Education in the Today's World: Dayalbagh** Gagandeep Nigam, Sudhagilroy (DEI, Agra, India) [405]
- **Improvisation, Intersubjectivity, and The Hard Problem of Consciousness: A Nondual, Integral Perspective** Ed Sarath (Department of Jazz and Contemp, University of Michigan, Department of Jazz and Contemporary Improvisation, Ann Arbor, MI) [413]
- **Inclusive Consciousness** Vasanta Kumari Devulapalli, Deepa Kasturi (Faculty of Education, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [365]
- **Inculcation of Higher Consciousness Through Education and Discipline** Dhun Aadhar, Aashiq Bommireddipalli; Swanti Devguptapu; Prem Sewak Sudhish (Dayalbagh Educational Institute, Agra, India) [401]
- **Information Theoretic Death and the Eastern Spiritual Tradition** Pratul Kant, Prem Sewak Sudhish (DEI Dayalbagh Educational Institute, Agra, India) [368]
- **Integrated EMG Activities of VMO and VL during Selected Rehabilitative Exercises With and Without Chanting of Holy Name** Sanjay Srivastava, Greesh Kumar Singh; Mukesh Kumar (Mechanical Engineering, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [388]
- **Integrated Science of Consciousness for the Treatment of Depression: Healing with Chakra Energy Level** Ashima Srivastava, Tanuja Shrivastava, M.Phil Psychology, DEI (Department of Psychology, DEI, Saran Ashram Hospital, Dayalbagh, Agra, Agra, Uttar Pradesh India) [409]
- **Intuition Demystified by the Integrated Approach of Spiritual Phenomenology and Scientific Methodology Based on the Philosophy of Radhasoami Faith** Ankita Mathur, Purnima Sethi (Dayalbagh Educational Institute, Jaipur, India) [375]
- **Invoking Higher Levels of Consciousness: A Survey on the Relevance of Total Quality Management Framework of Dayalbagh Educational Institute's Education Policy** Purnima Sethi, Ankur Gupta; Arsh Josan; Ankita Mathur (Physics and Computer Science, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [408]
- **Jaina Perspective of Consciousness** Chhavi Gupta (Lecturer, Dayalbagh Educational Institute, Dayalbagh, Agra, Agra, Uttar Pradesh India) [366]

- **Journey of a Soul from Lower Consciousness to Higher Consciousness with Reference to Inferno, Purgatorio and Paradiso** Namita Bhatia, Mr. Soami Das Bhatia (Department of English Studies, Dayalbagh Educational Institute, Dayalbagh, Agra, Uttar Pradesh India) [349]
- **Love: The Crux of Consciousness** Ranjeet Kaur Satsangi (Pedagogical Sciences, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [384]
- **Musical Consciousness Test Based on Indian Classical Ragas** Pritam Pyari, Saran Pyari Roy; Sukhdev Roy (Music, Dayalbagh Educational Institute, Prem Vidyalaya Girls Intermediate College, Agra, Uttar Pradesh India) [362]
- **Peace and Consciousness: An Integrated Approach for a Sane and Harmonious World** Savita Srivastava, Nil (Foundations of Education, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [389]
- **Religiosity and Religious Consciousness Among Jains and Radhasoamis of Agra** Poornima Jain (Sociology and Political Scienc, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [390]
- **Respecting Differences and Being Inclusive – A Way to Achieve High Level of Spiritual Consciousness** Sumiran Satsangi (Gurgaon, Haryana India) [382]
- **Scientific Study of Environment at Holy Places Can Determine Field-Effects on Consciousness** Shabd Roop Satsangee, Sant Saran; Sukhdev Roy (Commerce, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [380]
- **Social Media Versus Gaming Associations with Typical and Recent Dreams** Jayne Gackenbach, Arielle Boyes (Psychology, Grant MacEwan University, Edmonton, Alberta Canada) [394]
- **Spiritual Intelligence and Working Memory of University Students' Involvement in Voluntary Agricultural Field-Work: A Comparative Study** Kavita Kumar, Swati Tripathi (Psychology, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India) [371]
- **The Beginning Was the End: Modeling Hybrid Reality in Javanese Culture** Allison Leigh Holt (Oilly Oowen Laboratories, San Francisco, CA) [392]
- **The Effect of Drivers' Consciousness on Environment Protection and Car Safety in Context of Tire Pressure** Majer Singh, Charan Prasad; Dr. Meenu Singh (Technical College, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India) [391]
- **The Mechanism and Resultant of Higher Consciousness** Neha Sinha Mehta Satsangi (Distance Education Programme, Dayalbagh Educational Institute, Agra, UP India) [386]
- **The Nature of Consciousness as Illuminated by the Experience of Wealth** Peter White (Choteau, MT) [414]
- **Values and Consciousness Among Teachers** Prerana Bhatnagar (Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [402]
- **Well-Being, Religiosity and Consciousness among Adolescents** Preet Kumari, Shaktiyanshi Raundeley, Graduate Student, Dept. of Psychology, DEI, Agra (Psychology, DEI Dayalbagh Educational Institute, Agra, U.P. India) [372]
- **Why Is There Something Instead of Nothing?** Swami Pyari Satsangi, Maanvi Mathur; Vineeta Manhar (Psychology, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India) [381]



## P2: Friday Evening – Poster Session 2

*April 25 – 7:00pm to 10:00pm at Arizona Historical Museum*

- **A Friendly Critique of Subjective Physicalism**  
Noel Boyle (Philosophy, Belmont University, Antioch, TN) [3]
- **A Neutral Identity of Mind and Body: Bridging “The Gap” with Epistemic and Ontologic Integration** Robert Pusakulich (Psychology and Psychiatry, Memphis VA Medical Center, U.TN (ret), Memphis, TN) [14]
- **A Response to the Subject-Summing Problem: Deconstructing the Subject**  
Garrett Mindt (University of Liverpool, Liverpool, United Kingdom) [13]
- **A Revised Model of States of Consciousness Applied to Neolithic Imagery**  
David Miller (Psychology, University of Rhode Island, Kingston, RI) [12]
- **Against the Exclusion Principle** Dylan Wu, Karen Yan (Taipei, Taiwan) [43]
- **Cause, Effect and the Nature of Mind**  
Tam Hunt (UC Santa Barbara, Santa Barbara, CA) [39]
- **Computation, Non-natural Semantic Information, and Representationalism**  
Rex Welshon, Mikhail Luzov (Philosophy, University of Colorado at Colorado Springs, Colorado Springs, CO) [96]
- **Conceptual Topologies and Models of Consciousness**  
Robert Prentner (ETH Zuerich, Zuerich, Switzerland) [113]
- **Consciousness: Intrinsic, Primordial, Multisense Realism**  
Craig Weinberg (multisenserealism.com, Durham, NC) [23]
- **DNA Consciousness, Human Consciousness and Posthuman Consciousness**  
John Grandy (Orchard Park, NY) [110]
- **Emotions: Driving a Wedge Between Intentionality and Consciousness**  
Cecilea Mun (Philosophy, Clemson University, Greenville, SC) [93]
- **How Christof Koch’s Panpsychism and the Integrated Information Theory of Consciousness Are Not the Same Thing**  
Dorian Gomberg (Shimer College, Chicago, IL) [8]
- **Information, Q-bits, and Natural Reference: A Bridge from Bit to It to Autopoesis to Mind** Laura Weed (Philosophy, The College of St. Rose, Albany, NY) [95]
- **Intrinsic Qualia and Unconscious Representation: An Understanding of Consciousness** Yilai Li (Suzhou, Jiangsu China) [32]
- **Introspection and the Explanatory Gap**  
Steven Gubka (Philosophy, The University of Arizona, Oxford, United Kingdom) [49]
- **More Than Awareness: Bernard Lonergan’s Multifaceted Account of Consciousness**  
Daniel Helminiak (Psychology, University of West Georgia, Carrollton, GA) [9]
- **Naturalising Representational Content Using the Free-energy Principle**  
Michael Zehetleitner (Department of Psychology, Ludwig-Maximilians-Universität München, Munich, Germany) [97]
- **No Pain, No gain (in Evolutionary Fitness): Finally, a Representum for Hedonic Experience** Benjamin Kozuch (Philosophy, Cognitive Science, The University of Arizona, Tucson, AZ) [92]

- **Onward with the Science of Consciousness – What Else Is Needed for a Full Fledged Methodology and Epistemology of Subjective Experience? And What Could Be Learned From Buddhism in This Respect?** Nikolaus Von Stillfried (Department of Philosophy, University of Trier, Trier, Germany) [65]
- **Pain As Enactive Perception** Alice Kyburg (Philosophy, University of Wisconsin Oshkosh, Oshkosh, WI) [104]
- **Perceiving the Link between Cognitive Science and Buddhism** Victor Swift (Psychology, University of Toronto, Toronto, Ontario Canada) [108]
- **Quantum Physics, Free Will, Determinism, Spirituality and Health** Hedaya Robert (National Center for Whole Psychiatry, Chevy Chase, MD) [82]
- **Realization, an Ally or an Enemy for Kim?** Jui-Lin (Melody) Hung, Karen Yan, Allen Y. Hwang (Institute of Philosophy of Mind and Cognition, National Yang-Ming University, Taipei, Taiwan) [38]
- **Reflecting on Cognitive Experience: Lessons on Introspection and Phenomenal Knowledge** Will Nelson Leonard (Philosophy, Cognitive Science, The University of Arizona, Tucson, AZ) [63]
- **Tentative Thoughts on Introspection** Ivan M. Havel (Center for Theoretical Study, Charles University, Prague, Czech Republic) [61]
- **The Computational Basis of Consciousness** Edward Porter (Fort Worth, TX) [53]
- **The Dreams of Artificial Intelligence (AI)** James Pagel (Family Medicine - Pueblo, University of Colorado School of Medicine, Pueblo, CO) [35]
- **The Essence of the Self: A Mathematical Model to Help Us Cheat Death** Daniel Caputi (Atmospheric Science, SUNY Stony Brook, Stony Brook, Suffolk) [71]
- **The Information-Information Gap: A New Understanding of the “Explanatory Gap”** Yasuko Kitano (History/Philosophy of Science, The University of Tokyo, Tokyo, Japan) [50]
- **The Ontology of Consciousness: The Principle of Ontological Equality as the Basis of Consciousness Assures Living Organisms of Useful Information About Their Surroundings.** William Altenburg (Smarts Hill Laboratories, Fryeburg, Maine) [1]
- **The Possibility of Shared Experience** Daniel Munoz (Philosophy, The University of Texas at Austin, Austin, TX) [74]
- **The Reliability of Phenomenal Judgements** Brentyn Ramm (Philosophy, Australian National University, Canberra, ACT Australia) [64]
- **The Same Consciousness Theory of Personal Identity** Jenny Hung (Department of Physics, The Hong Kong University of Science and Technology, Hong Kong, China) [72]
- **Thought Insertion and a Mental Sense of Agency** Dax Alford (Hendrix College, Rogers, AR) [77]
- **Universal Consciousness** Dennis Balson (Taree, New South Wales Australia) [2]
- **What Is Wrong With Kim’s Causal Exclusion Argument Against Non-reductive Physicalism?** Yuan-Ho Yao, Karen Yan (Taipei, Taiwan) [44]
- **Brain Imaging and Electroencephalograph Confirmation of the Global Workspace Theory of Consciousness** Nathan Munn, Bernard J. Baars (Society For Mind-Brain Sciences) (General Education, Helena College University of Montana, Helena, MT) [126]

- **Consciousness and Information Flow in Complex Brain Networks**  
Joon-Young Moon, Uncheol Lee; Stefanie Moraes; Dinesh Pal; George Mashour  
(Department of Anesthesia, University of Michigan Medical School, Ann Arbor, MI) [125]
- **EEG Coherence and Connectivity Before the Onset of Somnambulistic Episodes**  
Antonio Zadra, Marie-Eve Desjardins; Jonathan Godbout; Jacques Montplaisir;  
Julie Carrier (Psychology, Université de Montréal, Montréal, Québec Canada) [169]
- **Experimentally Investigating the Quantitative Electroencephalographic (QEEG) Analogues of Human Consciousness in a Synthetic Three-shell Realistic Head Model Using Electroconductive Dough** Nicolas Rouleau (Psychology; Behavioural Neuros, Laurentian University, Sudbury, ONTARIO Canada) [134]
- **Fundamental, Unifying Order Dynamics in a Phase Synchrony Model of Consciousness** John Russell Hebert, John Hagelin, Menas Kafatos (Anesthesiology, Maharishi University, Houston, Texas) [164]
- **Musha's Theorem that an Evanescent Photon in the Microtubule is a Superluminal Particle Is Not Valid** Syamala Hari (Edison, NJ) [149]
- **Subjective Experience Is a Simulation in the Hippocampal Formation**  
Matt Faw, Bill Faw, PhD (Stickman Films, Los Angeles, CA) [167]
- **The Neuro-Integrative Account of Consciousness**  
Lukasz Kurowski (Philosophy, York University, Toronto, Ontario Canada) [121]
- **The Paradox of Information Channel Capacity, Congenital Programs of the Behavior and Mechanisms of Quantum Information Processing in Neurons**  
Alexey Melkikh (Institute of Physics and Techn, Ural Federal University, Yekaterinburg, Sverdlovskaya Reg. Russian Federation) [150]
- **(e)motion: Towards A Kinetic View of Embodied Valuing**  
Frances Bottenberg (Philosophy, Elon University, Greensboro, NC) [191]
- **Are Delusions Really Beliefs? Approaches Towards Describing the Ambiguous Mental State** Emily Barrett (Philosophy, Sunset Beach, CA) [235]
- **Carruthers on Metacognition, and the Unity of Beliefs and Desires in Animals** Gary Comstock, William Bauer (Philosophy, North Carolina State University, Raleigh, NC) [216]
- **Conscious, Unconscious and Self-Conscious Aspects of the Character Traits Conscience, Compassion and Conscientiousness** Ida Hallgren (Dept of Philosophy, University of Gothenburg, Gothenburg, Sweden) [218]
- **Consciousness and Personal Death (Un)Awareness**  
Hector Qirko (College of Charleston, Charleston, SC) [198]
- **Consciousness Quotient as a Predictor of Executive Functioning**  
Sona Ahuja, Sadhna Sharma (Pedagogical Sciences, Dayalbagh Educational Institute, Agra, Uttar Pradesh India) [234]
- **Consciousness, Presence and Time**  
Jose Ignacio Murillo (Philosophy, ICS, University of Navarra, Pamplona, Navarra Spain) [226]
- **Dreaming as Social Simulation** Jarno Tuominen, Valli, Katja; Revonsuo, Antti (Department of Behavioural Scie, University of Turku, Turku, Finland) [203]
- **Electroencephalographic Correlates of Insight Experience**  
Takahumi Mizukuchi, Noriko Hayashi; Yoshi Tamori (Nonoichi, Japan) [232]

- **Elementary and Memory Perception Versus Cognition with Implications for the Brain-Consciousness Problem** Franz Klaus Jansen (Assas, France) [190]
- **Enhancing Adolescent Metacognition and Minimizing Risk Vulnerability Through Instruction in Developmental Neuroplasticity**  
Suzanne Russ (Psychology, Dickinson State University, Dickinson, ND) [205]
- **Feedback Mechanisms at the Heart of Science and Contemplative Traditions**  
Wolfgang Lukas (CERN, Graz, Austria) [220]
- **Free Universe Model: The Nature of Creativity in Man and Our Universe**  
James Tagg (Crockham Hill, Kent United Kingdom) [233]
- **Genetic Encoding of Behavioral Knowledge: Enabling Maternal Care by Ephrin-a5 Gene** Renping Zhou, Michal Sheleg; Ryan Grippio; George Wagner (Chemical Biology, Rutgers University, Piscataway, NJ) [241]
- **Gestalt Thinking: Bridging the Chasm**  
Kang Zhou (Architecture, The University of Arizona, Tucson, AZ) [240]
- **Holistic Hungarian Can Provide a Language for a Holistic Science of Consciousness**  
Andris Heks (Megalong Valley, NSW, Australia Australia) [193]
- **Physiologically-Active Amine-Secretion Correlates of Insight Experience**  
Noriko Hayashi, Takahumi Mizukuchi; Yoshi Tamori (Nonoichi, Japan) [231]
- **Task-Oriented Consciousness – Will My Robot Feel More Happiness and Freedom Than Me?** Rafal Rzepka, Kenji Araki (Graduate School of Information, Hokkaido University, Sapporo, Hokkaido Japan) [208]
- **Time and Qualia** Daniel Beal (Psychiatry, University of Cincinnati, Cincinnati, OH) [223]
- **Anatomies of Awareness: The Claustrum and Neurological Frameworks of Subjectivity** Michael Shanks, Annalena Venneri (Neuroscience, University of Sheffield, Sheffield, South Yorkshire United Kingdom) [221]
- **A New Understanding of Space and Time Infers a Universal Evolution, Which Culminates in the Emergence of the Quantum Mind**  
Eva Deli (Nyiregyhaza, Hungary) [261]
- **A Quantum Physical Argument for Panpsychism** Gao Shan (Institute for the History of N, Chinese Academy of Sciences, Beijing, Beijing China) [258]
- **Algorithmic Information Theory, Non-computability, Thermodynamics and General Relativity. Can We Show that Space–Time Must Have 3 Spatial Dimensions?**  
John Small (Mindoro Marine Ltd, Faversham, Kent United Kingdom) [264]
- **Analysis of the Material and Immaterial Elements in the Healing Places: The Case of Mayantuyacu in Peruvian Amazon Forest** Tania Re, Gavazzi A, Capolupo A, De Lauro E, Falanga M.R, Morese R, Epifani F, Loiacono I, Perotti G, Siri A, Vitiello G, De Martino S, Firenzuoli F, Gori L, Fani R, Valentini, Elia V, Mancuso S, Toso D, Encalada S, Flores J. (Anthropological Department, Unesco Chair – University of Genoa (Unesco Chair Anthropology of Health – Biosph, Torino, Italy) [300]
- **Does Consciousness and Electrons Exist in Water – A Necessity for All Forms of Life?**  
Ingrid Fredriksson (Triquetra-Return AB, Arjang, Sweden) [289]
- **Educating for a Quantum Perspective**  
Carmel Ashton (Mount Victoria, NSW Australia) [305]

- **Energy Is Defined as Information – A Universe Built of Information Requires a Mind-Like Substrate** Klee Irwin (Quantum Gravity Research, Los Angeles, CA) [307]
- **Engaging in a Co-Operative Inquiry into the Evolution of Consciousness** Joan Walton, McCann, Martin (Education, Liverpool Hope University, Alvechurch, WORCS United Kingdom) [298]
- **From Newtonian Medical Model to Einsteinium Holistic Model** Amanda Velloen (Research and Development, QRI, Pretoria, Gauteng South Africa) [303]
- **General Systems Theory (GST) and Concepts of Indian Philosophy May Provide a Holistic View of Consciousness and its Evolution** Surendra Singh Pokharna, Dilip Bobra, MD (General, Research Institute of Scientific Secrets from Indian Oriental Scriptures (RISSIO, Ahmedabad, GUJARAT India) [277]
- **In Self-organized Criticality Models, The Content of Experience is Not Digitizable: As A Result Conscious Information Processing Is Not Computable As Penrose Proposed.** Alex Hankey (Yoga & Physical Scienc, SVYASA, Vivekananda Yoga University, Bangalore, Karnataka India) [274]
- **Information Controlling Energy in Complex Control Loops Enabled Survival of Genes in Cells and Organisms which Evolved into Concepts of Self and Ultimately into Consciousness** Paul Storey (Robotics Engineer,T3M, Citrus Heights, CA) [296]
- **Intrinsic and Induced Extrinsic Properties of Quantum World – Emergence of Consciousness and its Negative Mass** Jianfeng Li (Department of Macromolecular S, Fudan University, Shanghai, China) [250]
- **Mental Control of Single Electron Spin** Markus Fromm (Institute for Applied Consciousness Research, Heidesee OT Kolberg, Germany) [246]
- **Nonlocal Consciousness: The Spirit Paradigm Applied to the Model of the Quantum Brain** Celia Maria Dantas (Instituto de Fisica, Universidade Federal de Goias, Instituto de Fisica, Goiânia, Goias Brazil) [245]
- **Objective Meaning and Meaningful Coincidence in Quantum Mechanics** Sky Nelson (Santa Rosa, CA) [253]
- **Placebo Effects, Mirror Neurons, Biological Motion, and Manual Therapies in the Medical Therapeutic Context: The Art of Medicine** Kristen Corman (English; Health Sciences, Worcester State University; Brigham and Women's Hospital, Boston, MA) [299]
- **Psychoneuroimmunology** Shubhrananda Swami, Shubhranandaswami Psy.D. (San Diego CA and Cornville, AZ, Temple of Bhakti Yoga, Cornville, AZ) [302]
- **Quantum Bridge Between East and West Views on Brain, Mind and Reality** Gerard Blommestijn (Amstelveen, Netherlands) [244]
- **Subtle Energy Legitimized: U.S. Pat. #8,362,766 Circuit for Analyzing and Affecting Subtle Energy Resonance. Principles and Applications.** Stanley Jungleib (Stanley Jungleib Laboratories LLC, Portola Valley, CA) [285]
- **The Natural Problem of Consciousness: Why Feeling Has Not (yet) Been Selected Against in the Actual Natural World** Pietro Snider (Philosophisches Seminar, Swiss National Science Foundation (SNSF), Basel, BS Switzerland) [295]
- **Transcendent Nature of Human Consciousness** Alex Vary (NASA Retired, North Olmsted, OH) [278]

- **What can the Psi Evidence Teach us about Quantum Theories of Consciousness?**  
George Williams (Media Bureau, Federal Communications Commission, Takoma Park, MD) [260]
- **A Crack in the Cosmic Wall... Are Our Memories Located Outside the Body?**  
Eugene Ledezma (Astrophysics, INAOE -National Institute of Astrophysics, Optics and Electronics, San Andrés Cholula, Puebla Mexico) [336]
- **Cognito-Cosmic Harmonics: Transfiguring Ontologies** Kala Perkins  
(Bioethics, Graduate Theological Union, Woodside, CA) [341]
- **Effects of Mindfulness-Based Breathing on Employee Stress as Measured by Epi/gdv: A Mixed Methods Applied Study**  
Debra Lindh (The Mindful Effect, Maple Grove, MN) [319]
- **Life: A Unique Perspective through the Eyes of an Ontologist**  
Thomas La Framboise (Alanson, MI) [329]
- **Mind-Wandering Through The Paint: How Artistic Expression Captures Conscious Impressions** Richard Harrington, Romerita Prates (ICSM-CFSHR, Martinsville, VA) [310]
- **Paranormal Phenomena as Expression of Quantum Theory, Indication of Nature of Consciousness** Jill Hanson (Q.Pscience Project, Gilroy, CA) [335]
- **States of Consciousness are Ruled by Time: How I Became a Spiritual Experiment**  
Ileana Tellechea (Miami, FL) [326]
- **The Concept of Semiosphere As An Explanatory Tool for Understanding Altered States of Consciousness** Vit Pokorný (Academy of Sciences Czech Republic, Institute of Philosophy, Ceska Lipa, Czech Republic) [325]
- **Transpersonal Experiences Among Women During Childbirths – After Effects and Spiritual Midwives** Kersti Wistrand (Stockholm, Sweden) [330]
- **Unconscious Memory and Affect; From Psychoanalysis to Neuroscience** Carlos Eduardo De Sousa Lyra (State University of Piauí, São Raimundo Nonato, Piauí Brazil) [331]
- **Consciousness and Expression: Life Consciousness and Artistic Expression in Chinese Art Songs** Lu Zhang (College of Literature, Lanzhou University, China, Lanzhou, Gansu China) [360]
- **Cult of the Head: Alternative Models of Consciousness and Creative Works as Vehicles of Aspects of Consciousness Such as 'Spirit' – Described by Artists, Musicians and Other Creative Practitioners** Pam Payne (CAiA, Planetary Collegium, Plymouth University, England, Brooklyn, NY) [356]
- **From a Universal Consciousness to Social Consciousness – An Experiential Approach**  
Anjali Nigam, Dr. A K Nigam, Professor (HR& Amp; Amp; IR), Asia-Pacific Institute of Management, New Delhi, India (Training and Consulting, WhiteSwan Consulting Group, WCG, Gurgaon, Haryana India) [377]
- **From Structural to Neuroanthropology: Anthropological Horizons and the Exploration of Consciousness**  
Szoke J. Zsófia (Anthropology, The University of New Mexico, Albuquerque, NM) [393]
- **Information and Energy** Mark Munro (Seattle, WA) [395]



- **Meta-Representation, Contemplation and “Ordinary” Consciousness: Examining Links Between Alphabet, Number, Language [Self] Consciousness/Self-Reflection as Methods of Altering Consciousness**  
Sally Annett (Bedford, Bedfordshire United Kingdom) [348]
- **Parallel Learning, Black-Body Radiation and the Helping Problem**  
Jeffrey Beck (Paradigm Research LLC, Gunnison, UT) [410]
- **Phenomenological Model of Consciousness Altered Through Dance: Implications for Phenomenal and Content Questions of Consciousness**  
Shannon Deets (Meadville, PA) [351]
- **Second Language Social Networking for the Quantum Mind**  
Paul Renigar (Second Language Acquisition and Teaching, Tucson, AZ) [396]

## **ADDITIONAL EVENING EVENTS**

### **Late Night Film Showing & Storytelling**

#### **Late Night Film Showing**

*Tuesday Evening, April 22 – 10:00pm to 11:30pm*

##### **The Singularity**

Doug Wolens [502]

##### **Signification**

Patrick Palucki [503]

##### **Press Pause: Reset Your Life**

Linda Cherry [504]

#### **Late Night Storytelling**

*Wednesday, April 23 – 10:00pm to 11:00pm*

##### **Evolution of Storytelling**

Nick Day and Sascha Seifert [505]

## ART/TECH/HEALTH EXHIBITIONS/DEMOS

### A1

#### **A1: Art/Tech/Health Exhibitions, Presentations & Demos**

*Wednesday, April 23 and Friday, April 25 – 7:00 pm to 10:00 pm*

- **A Clinical Case of Dissociative Identity Disorder Treated With Music Integrative Neurotherapy™** Alexander Jon Gaur (University of Torino, Pavarolo, Italy) [141]
- **Sound Landscape Memory**  
Don Hill (Neuroscience Research Group, Laurentian University, Sudbury, Ontario Canada) [133]
- **Performance of Pain: Exploring Performance Art, Pain and Neuroscience**  
Jareh Das (The Arts Catalyst – Curatorial, The Arts Catalyst, London, Waltham Forest United Kingdom) [217]
- **Artists Between Species**  
Rob La Frenais (The Arts Catalyst, London, United Kingdom) [345]
- **The True Mirror – An Accurate Reflection of One's Self**  
John Walter (True Mirror Co., Highland, NY ) [327]
- **Affecting States of Consciousness and Worldview Using Video Game Technologies**  
Gino Yu, Jeffery Martin (Hong Kong Polytechnic University, Tai Wo, Hong Kong) [398]
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# 1.0 Philosophy

## 1.02 Ontology of consciousness

### 1 The Ontology of Consciousness: The Principle of Ontological Equality as the Basis of Consciousness Assures Living Organisms of Useful Information About Their Surroundings.

William Altenburg <wmj7@wildcats.unh.edu> (Smarts Hill Laboratories, Fryeburg, Maine)

This paper addresses the necessary thermodynamic basis of consciousness. I present the case consciousness is the consequence of the processing of information by living objects about their surroundings for the purpose of doing work. Living objects are dissipative structures in open thermodynamic systems maintaining a steady state (homeostasis) far from equilibrium by assimilating mass and energy from their environment through work on external objects relying on information from the surroundings. I show living structures evolving the capacity for self directed motion and action on objects in their surroundings depend on information from those surroundings which is equal ontologically to the organism. It is this ontological equality which makes possible the transfer and storage of information necessary for survival. I present the case for the principle of ontological equality: the object and its parts inside the boundary of an open thermodynamic system are ontologically equal to the surroundings. The maintenance of a homeostatic steady state by animals, single cell or multicellular, requires a continuous exchange of mass, energy, and information across the thermodynamic boundary of the system, regardless of the direction of flux. All of the components which are exchanged across the system boundary participate in physical and chemical processes which to proceed must have the same ontological status. This will seem self evident to thermodynamicists but restated for biology the implications for consciousness in biology and philosophy become apparent: the biological principle of ontological equality: the mass, energy, and information inside a cell membrane or whole organism originate from, dissipate to, and are ontologically equal to the surroundings. This places the organism, the need to act, the objects on which it must act, the information about the organism and objects, and the surroundings in ontological harmony in accord with the laws of thermodynamics. This makes it possible to gather information on the organism and surroundings and through transduction convert it into chemical instructions for motion and action on objects. Consciousness is the process of awareness of the self identification of the state of the organism, what acts it must perform, what object to act upon and the surroundings in which to act. It requires valid information about the organism, the objects, and their environment. I conclude consciousness is not an emergent or supervenient property added to the parts of living systems but is inherent naturally in the thermodynamics of being a self sustaining dissipative/acquisitive structure ontologically equal to and assembled from its surroundings. The growing disciplines of systems biology, sensory ecology, and chronobiology are founded on the principle of the ontologically equal exchange of information in a state of awareness between the organism and its surroundings. Finally, the tired old issues of illusionism, dualism, and skepticism regarding consciousness can be laid to rest. **P2**

### 2 Universal Consciousness Dennis Balson <danian.b@bigpond.com> (Taree, New South Wales Australia)

The hard problem of consciousness may eventually be determined by biologists and other scientists. This implies there may exist a primary entity before mental activity commences. For example, there is a continuous flow of energy throughout the universe that becomes converted into matter. And there is a continuous flow and transfer of 'information' within and between brain cells that becomes converted into mental activity, but the primary entity is not recognised because it is 'silent' and therefore only mental activity is valued. Living cells are intelligent, they are able to cooperate and communicate with each other by using chemicals called neurotransmitters, yet they are devoid of mental properties. Although matter and energy are both manifestations of the same fundamental entity, there is an entity within all living things that is relative to the biological proto-consciousness dimension. This entity causes instantaneous brain cell activity, whereas when energy is utilised for mental activity, it is relative to matter and to time because the mind is mechanistic and relies on 'information' that was acquired in the past. When the mind is in a meditative

state, or during deep sleep, it can be said that it is part of the natural dimension of consciousness, or momentarily in the dimension of 'nothingness'. Examples are, during deep meditation, or between one thought and another, there is a 'silent moment' before images, thoughts or dreams commence, yet one is not brain dead during those 'timeless' moments. Thoughts or memories may seem real, but in the true sense, most, like dreams, are never real. Each event the mind experiences is made up of separate time-frame images. As soon as the mind thinks it is experiencing a present moment – it's already in the past because it takes time for the cognitive mind to function. Any form of matter, including the human body and brain and the cells within are not just matter, they contain energy. Brain cells and all other living cells are merely vehicles for this "Universal Consciousness", but without energy vehicles cannot function. When conditioned thoughts end, enlightenment can transform the mind, but to rely on false knowledge and beliefs, there is nothing real to find. In a way, wisdom is the cessation of thought because the ending of preconceived concepts is the beginning of wisdom. The mind tends to forget that it is similar to a computer, if false information or belief systems exist then conclusions will be wrong. When what is known or what is owned is overvalued then the mind tends to forget that thoughts and 'things' and life are only temporarily real. This planet and all life on it will change or come to an end in the future, yet the future, the past and time, are mainly constructs of minds. When a secondary consciousness occurs in living things, then it seems that languages, spiritual dimensions and gods are creations of human mental activities. But, it is energy (not temporal matter) that remains the fundamental property of everything in the universe – including consciousness. **P2**

### **3 A Friendly Critique of Subjective Physicalism** Noel Boyle <noel.boyle@belmont.edu> (Philosophy, Belmont University, Antioch, TN)

Many philosophers have sought to articulate a position that simultaneously recognizes that the world is purely physical world and that there are properties or features of the world that are subjective in the sense that they can only be understood from the first person point of view. Such theorists hold, for instance, that Frank Jackson's famous knowledge argument fails in that the stipulated restrictions on Mary's qualitative experiences undermine the assertion that possesses an exhaustive physical understanding of our world; some physical information can only be known by means of colored experiences. Among the most recent and comprehensive articulations of such a position is the subjective physicalism of Robert Howell. Deeply sympathetic to the overall project of navigating a path between the reductionism typical of physicalist ontology and the dualism typical of phenomenal realism, while taking Robert Howell to be representative of the broader approach, I offer three closely related critiques of Howell's subjective physicalism. First, while it may be the case that the phenomenal features of our world are subjective in the sense of being graspable only from a first-person point of view, it is not a necessary truth that such phenomenal features are subjective. There are possible worlds inhabited by creatures that share our phenomenal experiences but are able to give descriptions of those experiences that are objectively accessible. Second, like other features of our world, the phenomenal features of the world are best individuated from other features by indicating the aspect of nature that such features capture. In other words, the phenomenal features of our world should be recognized as subjective not in virtue of how they are known, but in virtue of what they are; they are subjective in that they are about our subjective experiences, much as biological properties are biological not in virtue of being accessed by means peculiar to the biological sciences but in virtue of being about the living aspects of the natural world. Third, the above misunderstanding of the essence of phenomenal features reinforces the continued avoidance of best practice in understanding the phenomenal features of the natural world. In seemingly every other domain of enquiry, researchers ultimately formed a method of investigation around a frank recognition of the aspects peculiar to the domain of the natural world they sought to investigate. Pursuing such an approach to phenomenal properties would require developing concepts and methods adequate to describing and explaining subjective experience as such. Though it is far from obvious or clear that such a phenomenological science is genuinely possible, subjective physicalism as articulated by Robert Howell presumes, rather than establishes, that objective methods of investigation are off the table when it comes to consciousness. **P2**



### **4 Emergent Panpsychism and Mental Causation** Godehard Bruentrup <gbru@hfph.mwn.de> (Munich School of Philosophy, Munich, Germany)

In this paper panpsychism will be construed as a dual-aspect monism, claiming that all concrete entities have both (proto-)mental and physical aspects. It is thus to be distinguished from absolute idealism according to which the world consists solely of minds and their activities. It is also to be distinguished from materialism for which the world consists ultimately of mindless physical entities and their configurations. And finally, it is distinct from substance dualism which assumes two categorically different realms of substances, mental and physical. Panpsychists thus claim that mental being is a fundamental and ubiquitous feature of the universe, but is not the only fundamental and ubiquitous feature of the universe. The mental and the physical together make up the basic furniture of the universe in such a way that we can speak of a dipolar psycho-physical nature all concrete entities. There are many ways to spell this out in a metaphysical system. The most common one in recent debates is the idea that physical structure as described in mathematical physics cannot by itself provide the ultimate grounding of reality but it needs to be complemented by non-structural intrinsic facts which escape the vocabulary of physics. These so-called “quiddities” are omnipresent in the cosmos, and at least some of them are metaphysically necessary to ground the emergence of consciousness in the process of evolution. Within this general meta-physical framework a further subdivision has been widely accepted: constitutive panpsychism and emergent panpsychism. Constitutive panpsychists claim macroexperience is grounded in or constituted by microexperience. It is the thesis that the complete categorical nature (including the quiddities) of the physical states a priori entails the phenomenal states. Constitutive panpsychism is thus very much analogous to physicalism where all facts strongly supervene on the physical facts. The notion of the physical, however, is expanded to also include the non-structural categorical natures that give rise to conscious experience if functionally structured in an appropriate way. Emergent panpsychism, in contrast, claims that the unity of higher-level units of conscious experience is more than a simple combination of lower-level phenomenal events. Additional emergent laws of nature are required to account for higher-level phenomenal consciousness. David Chalmers has argued that constitutive panpsychism is the more interesting version of panpsychism because it alone opens genuine new middle ground between classical physicalism and dualism. It can solve the problem of mental causation without giving up the causal closure of the physical, thus avoiding the problems of dualism, and at the same time it avoids the conceptual problems of physicalism (no apparent a priori entailment of phenomenal facts by structural-physical facts). I will argue that constitutive panpsychism runs into the same intractable problems with mental causation as classical physicalism. Emergent panpsychism can provide a more robust account of mental causation that is nevertheless perfectly in accordance with contemporary science. Also, emergent panpsychism does not inherit the most damaging problems of (emergent) dualism. It still is a position that is conceptually distinct from both physicalism and dualism. C9

### **5 Powerful Qualities and the Metaphysics of Mind: Towards a Neutral Monism** Alexander Carruth <a.d.carruth@durham.ac.uk> (Department of Philosophy, Durham University, Durham, United Kingdom)

In recent years, the debate concerning the ontology of mind and body has been structured around an opposition between monistic, physicalist ontologies (both reductive and non-reductive) and some form of dualism (both of property types and of kinds of substance). This, however, has not always been the case. In the early twentieth century, a monistic, but non-physicalist, ontology-neutral monism was also considered a serious contender, favoured especially by theorists working within what James characterises as the radical empiricist tradition. This paper outlines a new version of this third species of position in the mind-body debate. Unlike its predecessors, however, this version of neutral monism is motivated not by primarily epistemological considerations, but on the basis of recent developments on the ontology of properties. It is argued that, if one adopts the ‘powerful qualities’ account of properties which was originally formulated by C. B. Martin and developed by Martin and by John Heil, then neutral monism is the most natural position for one to adopt in the mind-body debate. The first section of this paper outlines the powerful qualities account of properties. It goes on to briefly summarise the core commitments

of neutral monism, situating these within the historical development of the theory, as elaborated by Ernst Mach, William James, Bertrand Russell and, most recently, Kenneth Sayre and David Chalmers. The second section elaborates the new version of neutral monism, which is argued to be the natural position to adopt concerning the ontology of mind and body if one accepts the interpretation of the powerful qualities view outlined in section one. This paper does far less than present a fully-fledged theory of mind and body or account of the place of consciousness in the natural world. Rather, it outlines the shape which such a theory should take if one adopts the powerful qualities account of properties; and identifies the direction that future work on the topic ought to take. Following this, the paper examines the space occupied by this version of neutral monism in the conceptual landscape of the mind-body debate, exploring how it relates to other monisms, both mental- and physicalistic; to emergent dualism and to panpsychism. Responses are then given to some objections often raised to neutral monism. It concludes with a brief look at the advantages of adopting this version of neutral monism, and at potential areas of application. *Prima facie*, the version of neutral monism sketched has the potential to make headway on difficult questions in the philosophy of mind, including the problems of mental causation, and in metaphysics more generally. On these grounds it merits serious consideration. **C9**

## **6 The ‘Combination Problem’ in Scientific and Eastern Spiritual Approaches to Consciousness** Deepak Chopra, MD, FACP <carolyn@chopra.com> (The Chopra Center, Carlsbad, CA)

Reality is generally viewed as material particles influenced by force fields, and consciousness as subjective first-person experience, but how the two relate remains unknown. For example John Searle says physical processes in the brain cause subjective conscious experience, but also that computation per se cannot give rise to consciousness. If not computation, then what? How does the brain solve the “hard problem”? Christof Koch, Giulio Tononi, Max Tegmark and others embrace panpsychism and pan-protopsyism, claiming that subjective experience is a property of the particles which comprise the world. In this approach, the consciousness of a pebble differs from that of a human by the degree of complex, “bottom-up” integration of its constituents (the “combination problem”). I come from a “top down” tradition, Vedanta, which posits consciousness as the ground state of the universe. In essence consciousness is a field with properties akin to those in quantum theory and general relativity, smaller in scale but vast and interconnected in the fine scale structure of the universe. When Krishna states in the Bhagavad-Gita, “I am the field and the knower of the field,” we are hearing a version of quantum complementarity, in which the opposites of objective and subjective states are reconciled by going to a deeper level (the so-called three-in-one state) in which observer, observed, and observation are fused. Unlike some versions of panpsychism, Vedanta doesn’t hold that consciousness is a property of matter but that materialism is a property of consciousness. Both the hard problem and the combination problem are thus radically revised. Consciousness does not have to be built up, derived from combinatorial states of simple “building blocks,” but “top-down” from a deeper level of “cosmic consciousness” which includes the potential for all experience. Penrose’s embrace of Platonic values in spacetime geometry gives primacy to non-material laws, functions, and relationships. In Vedanta, consciousness is perfectly capable of setting up the universe to be lawful and to evolve conscious observers who explore those laws. In physics, values of cosmological constants determine suitability for consciousness (the antidote to the anthropic principle). With consciousness imbued in it’s structure, it’s not surprising the universe is optimal for consciousness. And in genetics, Platonic values may influence DNA mutations and guide evolution. With specific regard to the combination problem, in Vedanta, organized, intelligent cosmic consciousness is primary, fundamental and universal. Rather than “bottom-up” combination, e.g. by integration, what must occur instead is “top-down” combination, e.g. by filtering, censoring or “localizing” for human consciousness. This also implies that enlightened states of awareness tap into deeper level ground state of cosmic consciousness. **PL4**

### 7 The Consciousness Science Ontology: A Integrative Resource for Consciousness Studies

Chris Fields, Allan Leslie Combs, California Inst. Integral Studies; Eric Dietrich, Binghamton Univ; James Fallon and Fabio Macciardi, UC Irvine; Jeffery Martin, Ctr. Study of Non-Symbolic Consciousness <fieldsres@gmail.com> (Sonoma, CA)

The objective of the Consciousness Science Ontology (CSO) project is to develop an open-access, fully-searchable formal ontology of types, forms and expressions of consciousness that is compatible with existing neuroscience, cell biology, biochemical and medical ontologies. The CSO will integrate vocabularies from across consciousness science, from neurology and systems neuroscience through transpersonal psychology to contemplative practices and traditions. All vocabularies will include searchable links to relevant source literature and databases. To facilitate interoperability with ontology resources in relevant domains, the CSO will be implemented in the OWL web ontology language (<http://www.w3.org/TR/owl2-overview/>) in compliance with the development standards of the National Center for Biomedical Ontologies (NCBO; <http://www.bioontology.org/>). The NCBO's Protege<sup>®</sup> ontology development environment allows a decentralized, modular development strategy with broad community participation. This kind of strategy has been successfully employed with several large-scale ontologies, including the Gene Ontology and the BioPAX biochemical pathway ontology. The CSO project is currently in the requirements analysis and exploratory prototyping phase. Initial prototyping efforts are focused on vocabularies in two areas: descriptions of states of consciousness and descriptions of emotions and epistemic feelings. These areas each offer multiple, relatively well-defined vocabularies from different research traditions and multiple points of connection to existing NCBO ontologies. Within the first area, initial vocabularies for prototyping include those of anesthesiology, coma and sleep research, the core through metacognitive awareness levels defined within cognitive neuroscience, and the vocabularies defined by both Martin and Wilber from studies of meditation and transpersonal awareness. Within the second area, initial vocabularies include those of primary and social emotions and intrinsic and extrinsic motivations. The goals of this stage of prototyping are to develop familiarity with available development tools, understand multi-site coordination issues, and investigate the semantic issues that arise when linking vocabularies from disparate sources. It is anticipated that multiple new relational terms may be required to address such semantic issues; a project goal will be to develop a minimal, extensible set of such relations. The CSO is expected to be a multi-year effort that incrementally expands its scope by prototyping and then integrating vocabularies from different areas of consciousness science. Vocabularies from areas with robust supporting data and documentation within the publicly-accessible literature will be given priority. Fundamental issues concerning the metaphysical nature of consciousness and its role in the universe will not be explicitly addressed until later stages of the project; indeed it is expected that the CSO may clarify, but will not resolve such issues. The CSO is primarily a descriptive effort. It will be successful to the extent that by connecting data and ideas from different domains and experiential/experimental orientations it becomes, as other formal ontologies have become, a tool for formulating hypotheses and facilitating transdisciplinary experiment designs that fulfill standard requirements for testing falsifiable hypotheses. The authors invite all interested researchers to consider participating in the CSO project. **P1**

### 8 How Christof Koch's Panpsychism and the Integrated Information Theory of Consciousness Are Not the Same Thing

Dorian Gomberg <dorianelectra@gmail.com> (Shimer College, Chicago, IL)

John Searle (Searle 2013) criticizes panpsychism as presented by Christof Koch (Koch 2012) for not being able to determine the "units of consciousness" (the boundaries of conscious systems) and for claiming that consciousness is "everywhere." He then extends this criticism to the integrated information theory of consciousness (IIT) (Tononi 2008) that Koch claims to represent. This paper shows how Searle's criticisms of Koch's panpsychism (which Koch derives from the IIT) do not apply to Tononi's original theory. It points out inconsistencies of Koch's panpsychism within his own book as well as contradictions between Koch's panpsychism and basic tenets of the IIT. I aim to show that Searle is mistaken in treating Koch's and Tononi's views as one and the same by demonstrating the explicit differences between them. Additionally, I point out a subtle, but important difference between Koch's and Tononi's discussion of the "consciousness" of a

single photodiode, a controversial topic (Searle 2013, Koch 2012, Tononi 2008, Koch and Tononi 2013). I argue that although both Koch and Tononi claim that a single photodiode is in some way “conscious,” they assert this claim with different ends in mind. I show how Koch brings it up to support his formulation of panpsychism, whereas Tononi brings it up to emphasize the gradation of consciousness, that idea that consciousness comes in degrees and is not an all-or-nothing property. In arguing that, according to the IIT, even a binary photodiode enjoys “exactly 1 bit of consciousness” Tononi problematizes our commonsense notion of “consciousness.” We know in a very real sense that a photodiode can’t be conscious in the way that we are. But what does “consciousness” even mean? And how do we measure it? The IIT begs these questions. Tononi wants to provide us with a more precise way to define and measure consciousness and he proposes the integrated information theory as a way to do so. Although the possibility of a certain kind of panpsychism stemming from Tononi’s IIT remains open, Koch’s presentation of panpsychism should not be treated as representative of the integrated information theory of consciousness. Tononi says that all conscious systems are integrated, while Koch suggests that all integrated systems are conscious. **P2**

**9 More Than Awareness: Bernard Lonergan’s Multifaceted Account of Consciousness** Daniel Helminiak <dhelmini@westga.edu> (Psychology, University of West Georgia, Carrollton, GA)

This paper presents an overview of Bernard Lonergan’s (1957/1992, 1972, 1980/1990) phenomenology-like analysis of human consciousness, which exceeds treatments in most other cases. According to Lonergan, human consciousness is bimodal: It is conscious as well as intentional. It carries a non-objectified experience of self (conscious subjectivity) as well as an experience (awareness) of any possible object. Via this self-consciousness, this presence ‘to’ oneself, data on consciousness itself are available and can be attended to, raised to intentional awareness, and articulated. On this basis, consciousness is understood to be a particular kind of being, which determines the distinctiveness of the human species and governs all genuinely human – not mere animal-like endeavors. Deliberately avoiding debate over differing approaches to phenomenology, Lonergan called this exercise, rather, “self-appropriation.” It reveals a list of discernible characteristics of consciousness. To begin with, consciousness expresses itself variably on four interactive ‘levels’ or through four shifting facets: experience, understanding, judgment, and decision. Experience is only an initial process that provides data for analyses on further levels. In contrast, other approaches tend to bottle up data, their conceptualization, and its affirmation in an undifferentiated act of “awareness of an object.” But beyond experience, acts of understanding, judgment, and decision may follow, driven by primordial question, wonder, marvel, or awe and specified by three spontaneously emerging particular questions: the question for understanding, What is it? The question for judgment, Is it so (as understood)? And the question for decision, What am I going to do about it? Then still further characteristics follow. Consciousness is dynamic, open-ended in its purview, ordered in its unfolding and, thus, self-regulating and unifying, geared toward understanding everything about everything and in some way embracing it all. The self-regulation built into the four levels of unfolding entails inherent criteria for epistemology on the first three levels and ethics on the fourth. On the basis of the epistemology – whose criterion of correct affirmation is the attainment of understanding reasonably grounded in relevant evidence “consciousness can be affirmed as a kind of reality in its own right, one facet of being; and expressing the generic epistemology that guides all knowing: “transcendental method,” such affirmation enjoys the same validity as that regarding other non-palpable realities (such as quarks and leptons) reasonably affirmed by contemporary science on the basis of relevant evidence. In light of Lonergan’s analyses, other approaches to consciousness appear to be modeled on perception even as they generally appeal to merely perceptual examples and, generally overlooking the distinctive characteristic of consciousness as conscious, focus on that other mode of consciousness, intentionality or awareness of objects. Yet the conscious mode, as also William James (1890/1950) noted, is “the indispensable subjective condition of their [intentional objects?] being experienced at all” (p. 304). It, then, rather than the intentional mode, is the more telling although it is also most subtle and easily ignored. Attention to the conscious mode of consciousness shows consciousness to be a dynamic system in itself and to effect much more than awareness of objects. **P2**

**10 Conscious Agents: A Formal Theory of Consciousness** Donald Hoffman <ddhoff@uci.edu> (Cognitive Sciences, University of California, Irvine, Irvine, CA)

Despite substantial efforts by many researchers, we still have no generally-accepted scientific theory of how brain activity can create, or be, conscious experience. This is troubling, since we have a large body of correlations between brain activity and consciousness (NCCs), correlations normally assumed to entail that brain activity creates conscious experience. In this talk I propose a solution to the mind-body problem that starts with the converse assumption: NCCs arise because consciousness creates brain activity, and indeed creates all objects and properties of the physical world. To this end, I develop two theses. The interface theory of perception states that perceptual experiences do not match or approximate properties of the objective world, but instead provide a simplified, species-specific, user interface to that world. Conscious realism states that the objective world consists of “conscious agents” and their experiences; conscious agents can be mathematically defined and empirically explored in the normal scientific manner. In support of the interface theory of perception, I present Monte Carlo simulations of evolutionary games in which perceptual strategies that see the truth compete with perceptual strategies that do not see the truth but are instead tuned to fitness. The result is that natural selection drives true perceptions to swift extinction. Monte Carlo simulations of genetic algorithms lead to the same result. Our perceptions have evolved to guide adaptive behaviors, not to report the truth. In support of conscious realism, I present a mathematical definition of “conscious agent,” and derive from this formalism a dynamical theory of consciousness in which the observer and the observed have precisely the same mathematical structure, i.e., in which there is a mathematically precise nondualism. I show how the formalism of conscious agents solves the combination problem of consciousness. Conscious agents can be mathematically combined together, e.g., using tensor products, to create a new conscious agent. That is, when conscious agents are properly combined together, the new composite mathematical structure satisfies the definition of a conscious agent, and thus constitutes a new, richer, conscious agent. I show that the quantum wave function of the free particle can be interpreted as a representation of the asymptotic behavior of the dynamics of pairs of conscious agents. I then propose that the asymptotic behavior of the dynamics of pairs of conscious agents can naturally be represented in a framework of a geometric algebra of signature (2,4), which is formally identical to certain conformal representations of relativistic spacetime. This provides a bridge from the asymptotic dynamics of consciousness to massless relativistic fields and the twistor theory of Penrose. This is a step toward a concrete solution to the mind-body problem that starts from the assumption that consciousness, not physics, is fundamental. **PL1**

**11 “That Poor and Erring Organ:” Nietzsche on Consciousness and Instinct** Sheridan Hough <houghs@cofc.edu> (Philosophy, College of Charleston, Charleston, SC)

Nietzsche's writings contain multifarious and conflicting claims about consciousness: consciousness is deemed superfluous; consciousness involves “thorough corruption, falsification, reduction to superficialities.” (‘Gay Science’ 354) A number of commentators, including Leiter (2002) and Riccardi (2011), argue that Nietzsche endorses some form of epiphenomenalism; however, in his 2005 essay, Paul Katsafanas persuasively argues that Nietzsche's remarks about the ‘dangerous’ nature of consciousness commit him to the claim that consciousness is causally efficacious. Nietzsche, to my thinking, is surely not an epiphenomenalist, but I want to elaborate on what role Nietzsche does take consciousness to play in human life (and, in so doing, investigate just what Nietzsche means by ‘consciousness.’) In what follows, I will focus on a passage in the second essay of ‘On the Genealogy of Morality’: in it Nietzsche observes, “Just as water animals must have fared when they were forced either to become land animals or to perish, so fared these half animals who were happily adapted to wilderness, war, roaming about, adventure—all at once all of their instincts were devalued and ‘disconnected.’ From now on they were to go on foot and ‘carry themselves’ where they had previously been carried by the water: a horrible heaviness lay upon them. They felt awkward doing the simplest tasks; for this new, unfamiliar world they no longer had their old leaders, the regulating drives that unconsciously guided them to safety—they were reduced to thinking, inferring, calculating, connecting cause and effect, these unhappy ones, reduced to their ‘consciousness,’ to their poorest and most erring organ! I do not believe there has

ever been such a feeling of misery on earth, such a leaden discomfort—and yet those old instincts had not all at once ceased to make their demands!” Nietzsche’s account of consciousness in this passage is a neatly proleptic naturalizing of Heidegger’s embodied skills account. The ‘existential analytic’ of ‘Being and Time’ schematizes the way in which ‘human being’ is always already constituted by its culture; a human being is thus born with the capacity to embody and enact contingent local practices, long before these practices can be reflectively examined or critically analyzed. Heidegger does not deny that we can, and do, experience ourselves as conscious subjects (whose conscious mental activity grooms and develops the cultural practices on which they reflect), but that conscious reflection is a product, not the source, of our ‘being-in-the-world.’ I will argue that we find the first version of this view in Nietzsche’s thinking. In examining what Nietzsche means by ‘instinct,’ we will discover that he provides us with a picture of socialized habits and practices that can, of course, be consciously entertained, but that are themselves the ground and origin of conscious mental states; furthermore, those conscious states shape—and sometimes distort—the ways in which the world is made available to us. **C15**

## **12 A Revised Model of States of Consciousness Applied to Neolithic Imagery** David Miller <dlmiller@uri.edu> (Psychology, University of Rhode Island, Kingston, RI)

A two-stage states of consciousness model is presented as a simplification of the three-stage system used to explain the emergence of Neolithic graphic artifacts as introduced by Lewis-Williams (2005) in *Inside the Neolithic Mind*. His current model is a shift from an ethnographic analogy based on contemporary shamanistic phenomenology of altered states of consciousness (ASC) to a typology of hypnagogic states and their associated imagery, as described by Mavromatis (1987). While retaining the fundamentals of Lewis-Williams’ neuropsychological approach, there is a closer alignment of Neolithic imagery to the larger experiential corpus of altered states of consciousness. This paper will examine some of his better known imagery correspondences, but will also address more significant omissions of experiential outliers. The result is an integration of ASCs with more normative perceptual and higher-order cognitive processes. These processes are in closer accord with contemporary neuropsychological approaches which emphasize the role of recurrent visual processing. This approach removes the over reliance on entoptic and feedforward phenomena that characterizes Lewis-Williams’ tripartite theory. Integration across these domains of cognition and consciousness provides additional explanatory power for a more parsimonious two-stage model linking sensory/perceptual and cognitive processes. **P2**

## **13 A Response to the Subject-Summing Problem: Deconstructing the Subject** Garrett Mindt <grmindt@email.arizona.edu> (University of Liverpool, Liverpool, United Kingdom)

As it stands our current definition and conception of the subject is so strong as to exclude a great many things which may be subjects from failing to satisfy these stringent conditions. If we are to take a philosophic outlook onto the world then any definition or conception which fails to meet our rational and empirical scrutiny should be done away with. I intend to show that our current conception of the subject fails to encompass all the great many things which may be subjects. Panpsychism has endeavored to challenge some of our more stringent preconceptions regarding the mind, consciousness, and reality as a whole, but has failed to question our preconception of what a subject is. Because of this panpsychism faces one of its strongest objections, the subject-summing problem. How does one get a distinct macrosubject from the combination of a number of microsubjects? The panpsychist must show that a distinct macrosubject is necessarily entailed by the combination of a number of microsubjects. To formulate a response on behalf of the panpsychist one must first question what it means to be a subject of experience. If we are conceiving of subjects the wrong way, then any response the panpsychist gives in regards to what it means for a number of microsubjects to become a distinct macrosubject is going to look lackluster. To defend panpsychism from the subject-summing problem, one must first make clear the motivations for the worries presented by it. William James is cited as first articulating the worry posed by the subject-summing problem, in his work *The Principles of Psychology*. After the motivations and the subject-summing problem itself have been elucidated I will be in the position to confront the issues which have arisen. The point of this essay will be to question the conception



of the subject which is implicit within James's motivations and the position of those who hold the subject-summing problem as an objection to panpsychism. The project will take a detailed look at the various criteria for what a subject is, which I think have been taken for granted in the subject-summing problem. Then I will call into question these criteria and attempt to show the worries within the common conception of the subject. Once this is done I will move on to give an account of what a subject is, and what it means to be a subject. An account which not only bolsters the position of the panpsychist from the kind of worries in the subject-summing problem, but one which may have implications for our conception of a subject within the wider sphere of philosophy of mind in general. Only once the subject has been examined, deconstructed, and reconceived will one be in a position to object and overcome the kind of worries within the subject-summing problem for panpsychism. **P2**

**14 A Neutral Identity of Mind and Body: Bridging “The Gap” with Epistemic and Ontologic Integration** Robert Pusakulich <pusakulichr@bellsouth.net> (Psychology and Psychiatry, Memphis VA Medical Center, U.TN (ret), Memphis, TN)

The neural configurations of a generating brain and its respective functions can be concomitantly experienced by its possessor as a conscious awareness of being that very same possessing entity. That awareness of consciousness is seated in a physical body which is experienced as singularly different from it, i.e. the former as mental and non-material, the latter as physical and material. This experienced consciousness incorporates a sense of dualistic separation between its self and its body. However, that sensed duality creates an ontologic tension between the natures of that conscious mind and that possessing body. But it is argued here that this sensed dualistic separation between a conscious mind and its containing body is, in fact, that of different kinds of knowledge: one of an experienced mind; the other of an experienced body. However, it is argued here that both those experiences are generated by a single ontology. Moreover, it is argued that this single ontology carries those dual epistemic experiences of mind and body as “neutrally identical” properties. Here, a neutral identity is conceived to be a “blending” of two entities such that their concomitance bears the properties of both, while each entity retains its respective single property. It is posited here that these two epistemically constructed experiences, one of mind, and one of body, constitute that which is a neutrally identical composition of both the epistemic and ontologic features of such a conscious mind. The natural world does offer examples of such apparent neutral identities, where one entity has the nature of two entities; yet those respective two entities, also appear to retain a common one entity nature. For example, two photons under the conditions of quantum entanglement manifest a relationship in which they appear to behave as a single photon; while simultaneously, remaining two photons. Recently, a nuclear particle named the “neutrino” has been discovered to have within it the properties of its anti-neutrino counterpart; thus, also appearing to manifest the neutral identity nature of one thing being two things, while still retaining its “one thing” nature. Although mind and body are not particulate, they are postulated here to bear the similar common properties of a neutral identity. Finally, it is argued that mind and body are constituted by a single common ontology endowed with the neutrally identical properties of an experienced duality of that mind and body. It is further argued that this neutral identity of mind and body is that of ontology that carries an epistemic duality of that mind and body. It is a single ontology that has the embedded dual epistemic properties of an experienced mind and body. Thus, it is proposed that our apparent sensed duality of mind and body actually is that of a single ontology, with the intra-leavened nature of the neutrally identical knowledge of an experienced duality of mind and body. It is nothing more, but nothing less than a neutral identity of an experienced conscious mind and its containing body. **P2**

**15 Extended Cognition, Extended Consciousness** Tobias Schlicht <tobias.schlicht@rub.de> (Philosophy, Ruhr-University Bochum, Bochum, Germany)

It is controversially debated whether the mind literally extends beyond the brain into the body and the physical and social environment (Clark & Chalmers 1998, Menary 2010). If it is the case that the mind is extended, then mental processes include parts of the environment as constitutive elements. For example, a blind mans cane may count as a cognitive extension in the case of seeing, or a smartphone may count as a cognitive extension of memory. Now, in this debate,

cognition and consciousness are typically distinguished. Whereas cognition comprises a bundle of capacities like perceiving, thinking, remembering, learning etc., consciousness is understood in its subjective phenomenal sense, i.e. in the sense that there is something that it is like to experience something (tasting red wine, say). The strongest claim in this debate is that both cognition and consciousness are extended (Noe 2009); the weakest claim is that neither cognition nor consciousness is literally extended, while both are supported causally by these external factors (Adams & Aizawa 2008); finally, Clark (2009) defends a position in-between these extremes, arguing that while cognition is extended, consciousness is not (its supervenience base is firmly placed in the brain). In this talk it is argued that Clarks middle position is not plausible. The argument is based on the following points: First, the argument in Clark & Chalmers (1998) presupposes (a) a wrong-headed notion of cognition as information-processing, where information is to be understood in the sense used by Shannon, and (b) it presupposes Chalmers distinction between the easy problems of explaining cognition and the hard problem of explaining consciousness. Using examples, it is argued that this notion of information does not capture what is essential about human cognition, and that the easy problems cannot be solved in the way it is presupposed in the argument. Since these presuppositions are not supported, the argument for extended cognition and its separation from consciousness is not persuasive. Finally, it is demonstrated, based on the example of Otto, the patient suffering from Alzheimers disease, (1) that Ottos cognitive process of remembering would not get off the ground if it werent for the conscious feeling of knowing (Korican 2000) that the information he is looking for is contained in his notebook (this information itself cannot be found in the notebook). It is then argued (2) that this epistemic feeling is a conscious phenomenal state and (3) that it is partly constitutive of the cognitive process of remembering that ensues once Otto consults his notebook. Since the cognitive process thus involves an essentially conscious element, Clark and Chalmers must admit that either both cognition and consciousness are extended or none of them is. **C3**

**16 The Problem of Consciousness After Twenty Years** John Searle <searle@cogsci.berkeley.edu> (Philosophy, University of California, Berkeley, CA)

This talk will offer a solution to the philosophical consciousness-brain problem. It will also discuss the progress and disappointments of the past 20 years in addressing the neurobiological parts of the problem. Basically, current research techniques, imaging and single-cell recordings, have built-in limitations. I will also discuss and refute the most outrageously false of current views. **PL4**

**17 Experience Unbound: Neutral Monism, Emergence and Extended Mind** Michael Silberstein <silbermd@etown.edu> (Philosophy, Elizabethtown College, Lancaster, PA)

The hard problem (HP) is a conceptual problem that cannot be resolved by any empirical means alone, but rather demands a metaphysical solution. The explanatory gap (EG) is at least in part an empirical problem, i.e., what would constitute a scientifically robust explanation of phenomenal experience (PE). At least since the first TSC conference twenty years ago, there has been a renewed attempt on the part of some to provide an emergentist resolution to the HP and the EG. The hope was that such an account could provide an alternative to the odious choice between materialism and dualism without epiphenomenalist implications. Neutral monism in one form or another has often been taken as a competitor to an emergentist ontology of PE and is currently enjoying a resurgence in some quarters. Here it is argued that emergence and neutral monism properly conceived actually go hand in hand, and taken together, can discharge the HP without any hint of epiphenomenalism. Building on recent previous work (Silberstein and Chemero 2012a and b, Silberstein 2012) it will be further argued that extended accounts of cognitive science and neuroscience grounded in dynamical systems theory and graph theory, in combination with the new aforementioned ontology, could together help resolve the EG. **C9**

**18 Russellian Monisms and Russell's Monism** Leopold Stubenberg <stubenberg.l@nd.edu> (Philosophy, University of Notre Dame, Notre Dame, IN)

Russellian Monism is best thought of as a growing family of views about the mind-body relation, all of which are rooted in some of Bertrand Russell's ideas. In his recent attempt to bring

some order to this somewhat unruly area of philosophical inquiry, David Chalmers has singled out panqualityism as a particularly promising version of Russellian monism. It is the view that the physical ultimates exemplify (but do not experience!) the same sorts of properties with which we are acquainted in experience. But despite its many theoretical virtues, and despite the fact that this was the sort of doctrine defended by James, Mach, and Russell, Chalmers concludes that it is fatally flawed. The quality/awareness gap is at the heart of the problem: no matter what qualities are instantiated in a being, there is no guarantee that it will be aware of those qualities. In short: qualitative zombies are possible. Before accepting neutral monism, Russell raised many objections the views of Mach and James. The one he regarded as “most conclusive” is somewhat reminiscent to the problem Chalmers raises with the quality/awareness gap. A world devoid of subjects and their mental acts is a world in which there would not be anything like a point of view, nothing like perspective. Such a world lacks the resources to make an object (a quality) uniquely “intimate and near and immediate” to a subject. A few years after raising this problem, Russell embraced neutral monism. How did he overcome this crucial difficulty? Can we use his approach to shed light on the problem that the quality/awareness gap raises for panqualityist version of Russellian monism? And does the reflection on this case suggest that the contemporary panqualityist take on board more of Russell’s ideas than is typically the case in current Russellian monism? **C9**

**19 What causes the Split of David Chalmers’ “Phenomenal and the Psychological Consciousness” to form Universe as a Hologram?** Hasmukh Taylor, PhD <hasmukh\_taylor@hotmail.com> (Director of Yoga, Philosophy a, Pranava Yoga, Orlando, FL)

Answering the above Question would resolve the Hard Problem of Consciousness, 20 years on. According to David Chalmers, Consciousness is the biggest mystery. It may be the largest outstanding obstacle in our quest for a scientific understanding of the universe. I intend to show what causes the split in the Consciousness. A split, which explains the difference between Consciousness and Observer, Subjectivity and Objectivity and how it helps to understand whether the Universe is a Hologram? Which came first, Consciousness or Absolute Reality? Any object that is consciously experienced is also cognitively represented with incorporation of the founding principles of the Theory of Consciousness (including the first-order, second order and third order judgements), namely, [1] The remarkable coherence between conscious experience and cognitive structure or in other words between Consciousness and Awareness (or Global availability). [2] Where there is consciousness, there is awareness, and vice-versa [3] The principle of structural coherence. [4] The principle of organizational invariance. And the five principles that form the Awareness to vibrate resulting in the Cosmic Dance which appears as Illusion in the Viewing Hologram after the Interference [1] Coherence [2] Standing Waves [3] Harmonics [4] Resonance [5] Synchronicity and their internal mutual relationships in accordance with Carl Jung. In the book “The Holographic Universe” it states that, the question that began to bother Karl Pribram, neurophysiologist at Stanford University, was, if the picture of reality in our brains is not a picture at all but a hologram, what is it a hologram of? Which is the true reality, the seemingly objective world experienced by the observer or the blur of interference patterns recorded by the nervous system? The holographic model implies that our perceptions are merely an illusion. If we are perceiving an interference pattern, what is the true nature of the thing we are perceiving? The hologram consists of both a reflected and reference beam. What is the nature of the thing being reflected? Is there difference between “Consciousness & Observer”? If Bohm believed that the universe was a hologram, why did not he think for a moment where is the real universe? And how was it formed in the first place? After all, holograms can only be made of objects that are real in the first place!!!! These are the questions that would be answered. The world – might not even exist, or at least not exist in the way we believe it exists. Was it possible, that what the mystics had been saying for centuries was true, reality was maya, an illusion, and what was out there was a really vast, resonating symphony of waveforms, a “frequency domain” that was transformed into the world as we know it. “Consciousness Light is what enfolds all the universe” – Light in its generalized Divine sense (not just ordinary physical light) is the means by which the entire universe unfolds into itself. Basically it is the ‘play’ of lights consisting of the phenomenal and psychological consciousness lights and Absolute Reality called Brahman. **C24**

**20 The Non-Trivial Subject Unity** Lin Ting-An, Allen Y. Hough <isly17@gmail.com> (National Yang-Ming University, Taichung, Taiwan)

Unity of consciousness is an important phenomenon of our conscious experiences. In Bayne's 2010 book, after defining different types of unities, he claims that it is the phenomenal unity that provides us with the conception of the unity of consciousness that we are after. Any set of conscious states are phenomenally unified when they are jointly experienced. There is something it is like to be in those conscious states of at once. In this paper, I will argue that the unity that can provide us with what we are after is not the phenomenal unity but rather the subject unity, which is treated as trivial by Bayne. According to Bayne's definition, any set of conscious states are subject unified when they are had by or belong to the same subject. I argue that the subject unity captures an essential part of the unity of consciousness which is presupposed by the phenomenal unity and thus should not be treated as trivial. First, the phenomenal unity omits an essential part of the unity of consciousness, that is, the common subject who can experience this unity. What we concern about the unity of consciousness, is not only the jointly experienced of any set of conscious states, but also the jointly experienced by the common subject, me. There are two elements should be accounted for. One is the co-experience part, and the other is the common subject part. The phenomenal unity only explains the first part but omits the second one. The subject unity explains the second part. Second, the phenomenal unity presupposes the subject unity. The subject unity is the basis of the phenomenal unity. As Kant asserts, awareness of certain objects presupposes awareness of oneself as "subject of the categories" (Kant, 1781). In order to have awareness of jointly experiencing of a set of conscious states, there must be awareness of me as the common subject. The common subject part captures by the subject unity is the basis for the co-experience part describes by the phenomenal unity. In conclusion, the subject unity captures an essential part of the unity of consciousness and should not be treated as trivial. The question we are left with is what might be the cause of the subject unity. I suggest that it is related to the issue of self and spacetime structure. **P1**

**21 Picturing Panpsychism: New Approaches to the Combination Problem** Keith Turausky <bickbyro@gmail.com> (University of Texas at Austin, Tucson, AZ)

Beyond its prima facie strangeness, panpsychism faces resistance due to a seemingly intractable puzzle known as the combination problem: how can the experientiality of countless ultimates "add up" to what we experience as humans? Herein, I focus on developing plausible new responses to the combination problem, which I believe is best analyzed as three interrelated problems: (1) the problem of cohesion of subjects, (2) the problem of derivation of experiences, and (3) the problem of imagining the experiential/subjective nature of the physical ultimates. Particular attention will be paid to the latter two problems, with an eye toward resolving what Chalmers has called the "palette problem." Though speculative, my suggestions exclusively parallel established physical phenomena. These thought experiments do not in themselves "solve" the combination problem(s), but I believe they make it significantly easier to imagine the shape viable solutions must take. **P1**

**22 (Why) Consciousness is not a strictly neurological phenomenon** Karina Vold <karina.vold@mail.mcgill.ca> (Department of Philosophy, Department of Philosophy, McGill University, Montreal, Canada)

A dominant view about consciousness is that it is located in the brain, and perhaps, the central nervous system (CNS). In other words, the physical states underlying, or realizing, conscious mental states are all states of the brain and CNS, and nothing more. As such consciousness is widely thought to be a strictly neurological phenomenon. Many philosophers of mind share this belief—and not just about conscious mental states, but all mental states. Andy Clark and David Chalmers' (1998) have challenged this view with their Extended Mind thesis (EM), which maintains that parts located beyond one's brain, CNS, and even beyond one's body, can serve as constitutive parts of one's mental states. In this sense, they say the mind can 'extend' beyond what are traditionally thought to be its boundaries. But Clark and Chalmers (1998) limit their "parity argument" for extension to non-occurrent mental states. Both explicitly deny that an agent's conscious mental states could extend—a view Clark (2009) calls the 'extended conscious mind'

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thesis (ECM)—and agree that consciousness is a strictly neurological phenomenon. But they do not explain why their argument only applies to non-occurrent mental states. Though we do get glimpses of their reasoning in later works, e.g. Clark (2009) and Chalmers (2008). Thus my objective in this paper is two-fold: first, to evaluate Clark and Chalmers' reasons for denying ECM while still supporting EM; and second, to evaluate the dominant view that consciousness is a strictly neurological phenomenon. To do this I first outline the major differences between EM, ECM, and a related thesis about 'embodied consciousness' (EmC). I then assess the reasons that Clark and Chalmers give for rejecting ECM, while still endorsing EM. I argue that even if their reasons for rejecting ECM work, they do not work against EmC, which is enough to cast serious doubt on the dominant view about consciousness. **C3**

**23 Consciousness: Intrinsic, Primordial, Multisense Realism** Craig Weinberg <multisenserealism@gmail.com> (multisenserealism.com, Durham, NC)

Multisense Realism (MSR) is philosophical hypothesis which is intended to pick up where panpsychism leaves off. Consisting of an informal framework of core concepts developed from diverse influences such as semiotics, information theory, and anthropology, MSR proposes a united continuum of physics and phenomenology which is fundamentally aesthetic. MSR addresses five problems (The Hard Problem of Consciousness, The Explanatory Gap, The Combination or Binding Problem, The Symbol Grounding Problem, and the Mind Body Symmetry Problem) as a single Presentation Problem, while exposing critical flaws in popular competing approaches. MSR aspires to be a reality theory which reconciles the plausible and the absurd under the umbrella of a single irreducible synthetic a priori, and in the process reinterprets the number one, the Big Bang, and the ontology of light. **P2**

**24 The Adaptive Effect of Mind Wandering in Emotional Regulation** Li-Hao Yeh, Wen, Fang-Ying <lhyeh@miners.utep.edu> (Psychology, Chung-Yuan Christian University, Chung Li, Tao Yuan Taiwan)

The current study aims at examining the adaptive effect of mind wandering in emotional regulation. Mind wandering is a common cognitive activity in which individuals cannot concentrate on the on-going task and unrelated thoughts spontaneously arise. These Spontaneous Repetitive Thoughts (SRTs) or Task Unrelated Thoughts (TUTs) are generally manifested as visual images, auditory images and verbal thinking. Previous mind wandering research such as Smallwood, Fitzgerald, Miles and Philips (2009) associates the frequency of mind wandering with negative emotion implying that mind wandering is maladaptive to individuals' emotional regulation. Their findings correspond well with the other clinical research focusing on rumination and negative emotional states. Although, those spontaneous and self-focus thoughts are usually reported related with negative emotion, they may not be harmful when the content of those thoughts according to other studies. Interactive Cognitive Subsystems (ICS) proposed by Teasdale (1999) and Watkins and Teasdale (2001) argue that in comparison with the analytical self-focus rumination, experiential self-focus style rumination could be beneficial to emotion recovery. Based on their theory, the current study will test adaptive effect of mind wandering in emotional regulation. In our study, participants' states of mind and cardiovascular indices are tested before the negative emotion induction task (serve as baseline), right after the negative emotion induction and immediately after the counting backward task (serve as a mind wandering measure). At the end, participants' thinking style will be measured by the rumination-reflection questionnaire. We hypothesize that for those participants who prefer experiential thinking style will demonstrate better emotional recovery evidenced by the content of SRTs, the state of mind measure and cardiovascular indices. The discussion will talk about relations between mind wandering, experiential thinking, and mindfulness intervention. **C20**

## 1.03 Materialism and dualism

**25 Reductive Idealism: An Idealist Ontology Consistent with Scientific Realism** Peter Ells <peterells@hotmail.co.uk> (Oxford, United Kingdom)

Metaphysics is deeply unpopular. But without upholding a metaphysical stance, at least implicitly, it is impossible to come to grips with the world. It is therefore better to discuss such positions explicitly and critically. Materialism and dualism are not the only options. This presentation will describe and defend reductive idealism, a metaphysical framework that (1) has an idealist ontology, (2) accepts scientific realism, (3) is a physics-to-mind reductive identity theory, in which (4) all of the ultimates of objective physics are reductively identified as being experients. (Note the direction of the reductive identity in three and four.) Reductive idealism is thus a form of panpsychism. In more detail (1): The ontic furniture of the universe consists entirely of experients. Everything that exists is either an experient, or a hierarchical system of experients, or an aggregate of them. The fundamental concrete relationships that bind the universe together are experiential: each experient has a qualitative percept of at least some others. The only dynamic in our universe is volition based on perception. The world is not chaotic: there are laws of inter-subjective consilience that reconcile the experiences of the various experients. For example, I will myself to raise my hand and I then perceive that it is above my head. As a result of my volition, people nearby have a corresponding experience. (2): Because experients are ubiquitous we may define the objective physics of the universe in a novel way, in terms of the mathematical structures that could, at least in principle, be abstracted from the inter-subjective consilience between the percepts of \*all\* of the experients that exist within it. (3): A is reductively identical to B if and only if A is identical to some aspect of B: 'A is nothing over and above B'. Objective physics as defined here is in toto reductively identical to mind. (4): is unproblematic. I will defend reductive idealism against objections that might be made against it by physicalists. These are: that any version of idealism must be a form of irrealism; that the definition of objective physics given here is inadequate; that reductive idealism might not be consistent with current scientific knowledge and practice. I will also give solutions that reductive idealism provides for several problems that are intractable under the assumptions of physicalism: combining mental and physical causation; the Explanatory Gap within identity theories; the Zombie Problem; and human perception. Finally, consider a book in a locked drawer. The particles making up these items are experients in their own right. They exist concretely in the sense that there is something it is like to be them. They each perceive at least some of the other particles, and have rudimentary volitions to act on these percepts. The objective physics of the book in the drawer is abstracted from this rich, concrete, experiential foundation. Although objective physics is an abstraction, the experiential foundation that determines it is as substantive as anyone could wish. **P1**

**26 A New Look at the Mind-Body Problem: How the Evolution of Language Created the Mind-Body Problem** Jack Friedland <jack@adeeperintelligence.com> (New Gateway Press, Fountain Hills, AZ)

This monograph discusses how the mind-body problem came into existence. The basic premise is that the duality between mind and body was created by a considerable increase in scientific terminology and thought during the seventeenth century. This relatively rapid growth in science was in sharp contrast to our emotionally based vocabulary, thereby greatly increasing our awareness of the difference between our objective and subjective experiences. This difference was brought to a head, most notably by Rene Descartes, who solidified the dualism between spirit (mind) and matter (body) that began with Plato. This new paradigm explains how the evolution of language enabled us to expand, clarify and objectify both our objective and subjective experiences and, in so doing, forced us to acknowledge the distinction between them, thereby resulting in dualism. **P1**

**27 What is Pereboom's Qualitative Inaccuracy Hypothesis?** Bernard W. Kobes <kobes@asu.edu> (Philosophy, Arizona State University, Tempe, AZ)

Derk Pereboom, in *Consciousness and the Prospects of Physicalism* (2011), argues that the Qualitative Inaccuracy Hypothesis (QIH) is a serious epistemic possibility; QIH states that



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introspective representation is inaccurate in that it represents phenomenal properties of experience as having qualitative natures that they in fact lack. We know that external things lack the (Edenic, primitive) color qualities that they appear to us to have; by analogy, theoretical pressures might justify the claim (QIH) that phenomenal properties lack the qualitative natures that we introspect them as having. Pereboom argues that QIH is a salient way in which physicalism may turn out to be true, despite the Mary and conceivability arguments for dualism. I consider precisifications of QIH, and argue that at least one is not a serious epistemic possibility; one other is a serious epistemic possibility, but generates a tension with Pereboom's later idea that conscious states are not neural states but are constituted by neural states. **C1**

**28 Dim Prospects for the Qualitative Inaccuracy Hypothesis** Shea Musgrave <ssmusgra@asu.edu> (La Mesa, CA)

One of the primary objections to physicalist accounts of consciousness concerns the inability of these theories to explain the first-person aspect of consciousness in terms of a third-person description of physical properties. The problem is that upon introspection our mental states seem to have qualities that cannot be explained in purely physical terms. Derk Pereboom attempts to answer this objection by arguing for what he calls the Qualitative Inaccuracy Hypothesis (QIH). The QIH claims that introspection misrepresents our phenomenal states as having a qualitative nature that they do not in fact possess. Pereboom argues that if the QIH is an open possibility the common arguments against physicalism (e.g., the knowledge and conceivability arguments) fail: because our first-person descriptions of the world are inaccurate there is nothing substantial for the physicalist to explain. I shall argue that the QIH is not an open possibility in the required sense because it is either incomprehensible or else committed a straightforward form of eliminativism. My argument proceeds in three stages. First, I briefly outline the identifying marks of eliminativism in order to show what the QIH must avoid. Second, it is argued that the QIH must be supported by a positive account for how introspection is inaccurate if it is to be successful. The QIH is contrasted with Daniel Stoljar's "epistemic strategy", which argues that the explanatory gap arises due to the fact that our current physical theories are incomplete. The epistemic strategy only claims that we are missing some piece of evidence (i.e., some physical fact), whereas the QIH purports to undermine a large amount of our current evidence (i.e., the evidence gained through introspection). Thus the QIH carries a significant burden of proof. Finally, I proceed to analyze Pereboom's positive account to see if it can meet this demand. Pereboom's primary argument for the QIH turns on an analogy between introspection and perception wherein the qualitative nature of phenomenal states is likened to colors as Lockean secondary qualities. In order to make sense of this analogy, our introspective representations must themselves have the qualities that they project upon the phenomenal states they represent. However, Pereboom denies that anything possesses the qualitative nature that is projected. In fact, the account of introspection presupposed in this analogy (i.e., the broad perceptual model) treats introspective representations as beliefs, which cannot have the same phenomenal quality as sensory states. The best way to make sense of this account is to cash out the notion of projection in terms of certain perceptual states initiating a causal chain where the end result is verbal behavior. This, however, constitutes a form of eliminativism. Pereboom's arguments that he is not committed to eliminativism are then considered and shown to turn on a semantic sleight-of-hand wherein phenomenal states are treated as brain states. I conclude that since there seems to be no positive account for the QIH that does not simply presuppose some form of eliminativism, the QIH fails to provide an adequate defense of physicalism. **P1**

**29 Russellian Monism and Epiphenomenalism** William S. Robinson <wsrob@iastate.edu> (Iowa State University, Ames, IA)

Russellian Monism (RM), together with a surrounding physicalist outlook, is currently regarded as a view worthy of serious investigation, while the Epiphenomenalist Proposal (EP) is often dismissed out of hand because it violates a Causal Intuition (CI) — the intuition that some of our behavior occurs in virtue of our having certain sensations. This paper argues that this asymmetry is based on an inadequate understanding of RM, because RM likewise leads to denial of CI. Ubiqui-



ty of fundamental physical entities, and thus their nonrelational inner natures, shows that instances of those inner natures are not by themselves our own ephemeral human sensations; a conclusion that holds whether or not those instances are conceived as sensations in their own right. RM's inner natures (whether taken to be phenomenal or protophenomenal) can thus be involved in our sensations only by occurring in particular positions in arrangements of physical entities. However, it will be shown that, on phenomenal RM, the behavioral effects of arrangements of physical entities do not occur in virtue of our having sensations, even if it is held that such arrangements (or some subset thereof) are identical with our sensations; and so phenomenal RM fails to respect CI. A similar conclusion for protophenomenal RM is slightly less definite, but only because that view is so weakly specified. These results are not offered as reasons for rejecting RM; they are reasons for rejecting the asymmetry of attitudes toward RM and EP. C9

**30 If Materialism is True, the United States is Probably Conscious** Eric Schwitzgebel  
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If you're a materialist, you probably think that rabbits are conscious. And you ought to think that. After all, rabbits are a lot like us, biologically and neurophysiologically. If you're a materialist, you probably also think that conscious experience would be present in a wide range of naturally-evolved alien beings behaviorally very similar to us even if they are physiologically very different. And you ought to think that. After all, to deny it seems insupportable Earthly chauvinism. But a materialist who accepts consciousness in weirdly formed aliens ought also to accept consciousness in spatially distributed group entities. If she then also accepts rabbit consciousness, she ought to accept the possibility of consciousness even in rather dumb group entities. Finally, the United States would seem to be a rather dumb group entity of the relevant sort. If we set aside our morphological prejudices against spatially distributed group entities, we can see that the United States has all the types of properties that materialists tend to regard as characteristic of conscious beings. C3

## 1.04 Qualia

**31 Disaggregating Qualia: As Center, As Context and As Representations** Rodolfo Bachler  
<rodolfo.bachler@gmail.com> (Universidad de Playa Ancha y Universidad Autonoma de Madrid, San Sebastian De Los Reyes, MADRID Spain)

As noted by David Chalmers, understanding the mechanisms under which conscious experience occurs should have implications for the study of the mind in a broader sense (Chalmers, 1995). The philosophy of the mind seems to have followed a path inspired by this maxim, first trying to answer this fundamental problem and those which are more complex, before dealing with matters, which are in principle simpler. However, over the years, this strategy, deductive, has proved unsuccessful\*. We still do not exactly understand the connection between the neurons and experience, and perhaps as a result of this ignorance, we continue to miss other matters related to qualia, which are also very important. In this paper I focus on a strategy of induction. I intend to analyze some "easier" issues, already evaluated and look at the consequences which they have on the treatment of the fundamental problem. I will specifically focus on the study of the role played by consciousness in the overall functioning of cognition. Following this logic, I have found that within the wide range of cognition which we call "qualia", there are different types of mind states playing different roles in the functioning of the mind, so it is an ontological mistake to treat them all equally. Although it is redundant, the main differences are structured on the basis of the qualitative properties of qualia. \*\* Given the above, one can distinguish two broad categories of phenomena of this kind. The first relates to states which are products of their specific properties and which are directly involved in the emergence and formation of mental representations. A quale of this type can act as implicit cognition center when given its particular "experiential color", allowing the emergence of certain kinds of representations and not others. For example, you cannot think of the success of a task when you are sad, because this state facilitates the production of reflective thinking (Stein & Jewett, 1986). On the other hand, a quale belonging to this category participates as a context and according to its degree of activation it determines the

intensity of a particular cognitive state. This is what happens when we think of the economic crisis whilst having a toothache at the same time. The second category corresponds to qualia that play an indirect role in the production of cognitive states, acting on behalf of other things. Examples of this are the visual perceptual sensations such as "redness" or "greenness", which in the absence of an intrinsically pleasant or unpleasant character do not play a cognitive role, but representationally mediate the process. It is likely that, if belonging to the first category, these qualia might be interchangeable in a given sensory experience or even between different kinds of systems. To evaluate this possibility, I analyze cases such as those of cyborg Neil Harbisson, the use of tactile vision glasses for the blind, or the development of the understanding and experience of music by the deaf percussionist Evelyn Glennie. **P1**

### **32 Intrinsic Qualia and Unconscious Representation: An Understanding of Consciousness** Yilai Li <elili8110@gmail.com> (Suzhou, Jiangsu China)

In this paper, I present a new understanding of consciousness. My two personal commitments are behind this understanding: 1. Mental states that can be introspected are pure phenomenal states constituted exclusively by intrinsic phenomenal properties (qualia). 2. Reporting to be having a informational state or a propositional attitude of some kind, instead of meaning that a representational state gets to be introspected, only indicates the "unconscious entertaining" of that representation. The consequences of accepting these two claims are a taxonomy of mental states between pure phenomenal states on the one hand, and unconscious representational states on the other and hence a basic understanding of consciousness that a mental state is conscious just in case it is a pure phenomenal state. I develop this into a casual theory of consciousness by further suggesting that every pure phenomenal state has an unconscious representational state as its casual cause which also plays a role in determining the phenomenal character of the mental state of which it is the cause. This casual account of consciousness entails both a novel view of propositional attitudes on which there is no conscious thought but only thought-caused consciousness and a conception of experience on which experience is not a matter of perceiving (representing) the world, but rather a matter of instantiating qualia derived from unconsciously perceiving the world. An argument for my commitments proceeds in two stages to motivate this novel triad. 1. By appealing to the use of metaphorical expression, I argue that reporting to be having a, say, belief per se can't rule out the possibility that the introspected state is not a belief even if introspective knowledge is taken to be infallible. If our introspective beliefs are allowed to be expressed in the same way as we describe things metaphorically such as calling some person (a snitcher) a rat, then the introspected state in question might not be a belief or even a propositional attitude since the term "belief" might adopt a metaphorical meaning. After considering several potential objections, I claim that "metaphorical reporting" definitely can happen. It follows from this conclusion that relying on introspective processes only, and not introspective reports should be taken as some sort of principle to follow if determining what's accessible is the goal. 2. I claim that qualia are the only thing we can be aware of through introspection. Following "the principle", this leads to the conclusion that the only thing introspectively accessible is pure phenomenal states if mental states being the target of introspection is taken as a premise. However, this conclusion faces a problem: introspective expressions involve not only terms but also propositions which certainly cannot be explained as a result of accessing qualia. My second commitment can be thought of as constituting the core of a proposal to solve this problem within the context of introspectible states being pure phenomenal. I end the paper by discussing the implications of the proposed theory as well as some other considerations in favor of it. **P2**

### **33 Modally Structured Contents: A Representational Theory of Qualia** Alison Springle <aas99@pitt.edu> (University of Pittsburgh, Graduate Program, Pittsburgh, PA)

Representational views of perception (as represented by Dretske and Tye) have many attractive features, but in extending representationalism to consciousness, these theories fail to adequately handle qualitative consciousness. My paper provides a novel representational account of qualitative consciousness. Many representationalists are too quick to reduce cognitive phenomenology to the phenomenology of perception. While the basic approach is correct, we need a richer account

that adequately captures the qualitative aspect of conscious experience. Consider Dretske's discussion of the dogfish in *Naturalizing the Mind*. Dogfish are able to perceive electromagnetic fields. According to Dretske, we can know what it is like to be a dogfish so long as we have access to the information the dogfish represents, i.e., the pinches and the curves of the electromagnetic field. By the same token, Dretske would hold that we know what it is like to be a bat so long as we can perceive the objects the bat perceives via sonar. This just seems to ignore the compelling phenomenological intuitions qualia realist thought experiments like those of Nagel and Jackson are intended to illuminate. If we don't have a perceptual modality for sensing electromagnetic fields, we do not know what it is like to be a dogfish even if we can (visually) represent the pinches and curves in the field, just as we do not know what it is like to be a bat because we have no sense modalities equipped to pick up sonar. While in describing experience, the modality and the perceived objects are difficult to distinguish between, there nonetheless does seem to be such a distinction. My view aims to capture the aspect of qualitative experience that reflects the medium-determined aspect of 'what it's like,' while explaining why it's so hard to separate the medium from the object perceived. I suggest that within a single representation both the object (the external information) and the means by which it is perceived (visual, auditory, etc.) are present. The object/information is the representational content, while the sense modality structures the content (the more or less objective information); it is a mode of presentation. For instance, imagine that color perception were the product of molecular shape. The information about edible fruits, then, is indicated by the shape of the molecules that compose the fruit's skin. One way an organism could represent this information is visually, with certain receptors that indicate the presence of fruits whose skins' molecular composition results in certain light reflectancies (colors). Another way would be echolocation capable of detecting the molecular shape of objects, and yet another way would be tactile receptors that can feel the shape-texture of the molecules. While all of the information is the same (the molecular shape, which is an indicator of edible fruit), the way in which different sense modalities receive the information structures the information; it is presented as a color, a sound, or a texture respectively. I also explore ways the relationship between representational structure and content might be modeled. **C17**

## 1.05 Machine consciousness

**34 An Alternative to the Turing Test** Donald Padelford <dfp07@dfpnet.net> (Integral Review, Seattle, WA)

In my 2009 essay (Google padelford consciousness) I observed that self-organizing ("hierarchically negentropic") systems exhibit "non-local learning" with similar systems. Since the most advanced self-organizing systems are conscious, this coupling (of consciousness with entangled or non-local learning) may provide an alternative – or addition – to the Turing Test for consciousness. This could be termed "the Coupling Test." If presented with two systems of equal intelligence (eg a human Jeopardy champion vs. "Watson") if one of those systems exhibits non-local learning (the human) while the other (Watson) does not, we may infer that the first has the better claim on consciousness. Of course, if Watson fails the test, this is not, in itself, proof that it is a zombie. Likewise my cat would fail the Turing Test, but Fluffy none the less appears to be sentient. On the other hand if Watson were to pass the Coupling Test, this is probative that it is sentient, and sentient in the same way that humans are. In other words both the Coupling Test and the Turing Test are indications (as opposed to proofs) of consciousness, and they are more probative in the positive than the negative. Combined they may make a strong *prima facie* case for consciousness in systems that pass both tests. **P1**

**35 The Dreams of Artificial Intelligence (AI)** James Pagel <pueo34@earthlink.net> (Family Medicine – Pueblo, University of Colorado School of Medicine, Pueblo, CO)

There is excellent evidence that there are AI equivalents for dreaming. A multidisciplinary panel of experts in the field has operationally defined dreaming to have the following characteristics: (1) existing on a sleep/wake continuum, (2) reported recall, and (3) content (1). In order to meet criteria for dreaming, AI systems must have the capacity for sleep – behaviorally and

experimentally defined as a state of reversible perceptual isolation. Perceptual isolation while otherwise functional is utilized by AI systems such as the Mars Landers that are programmed to have periods of quiescence during periods of solar dark when sensors are turned off while other processing systems remain in operation. These AI systems continue to report data (content) during these periods of perceptual isolation. Like most dreams, that content has continuity with sensory input obtained during periods of full operational capacity (wake). Such AI systems easily meet the sleep/wake, report and content criteria required by the accepted operational definition for dreaming. It has been proposed that dreaming would mark the development of consciousness by AI systems, evidence for the development of an independent subjective component of mental process within hard-wired systems. The visual imagery, emotions, and memory systems required for the biologic framework of dreaming are based on well-described neural-processing and anatomy. While complex, equivalent systems can be artificially constructed that include digital on-off neuron connections, memory storage, extra-cellular electrophysiology, visual operative processing, interactive messaging, and emotional triggering/buffering systems. Dreams function in biological systems to expand creative capabilities, providing unexpected and alternative answers to difficult questions. Weather/climate forecasting suggests that such capacity may already be within the capability current AI systems that utilize mathematical models constructed around extended sets of dynamic equations that are impossible to solve through direct analytical methods. The accuracy of predictions varies with the density and quality of data, as well as any deficiencies and limitations inherent in the numerical models, with the outcome derived sometimes unexpected and often difficult to explain. Such analyses share characteristics with dreaming: the integration of extensive sensory data; the associative interactions of memory processing subsystems; attained results that diverge from expectations and are often incomprehensible except when presented as a visual display changing through time; and result analysis, that like dream interpretation, is often a metaphoric and allegoric process affected by the training and belief systems of the researchers. Such 'AI dreams' share these characteristics with their biologic counterparts. While AI systems meet definition criteria for dreaming, clearly there is much missing. What is missing is not complexity or computing capability. AI systems often exceed the sensory capability, complexity and processing capacity of biological systems. Missing are aspects of mind, with the short list including self-reflexive consciousness, significance and meaning, inspiration, and empathy. The longer list includes aspects of mind even more difficult to define and artificially create: compassion, conscience, transcendence, and ecstasy. 1) Pagel JF (Chair) et. al. (2001) Defining Dreaming – A paradigm for comparing disciplinary specific definitions of dream, *Dreaming*, 11(4);195-202. **P2**

**36 From the Mill to the Abstraction Layers of Computers' Architecture: Thoughts Experiments and Artificial Consciousness** Aida Raoult <aidaraoult@gmail.com> (PhD Candidate, Aix-Marseille University, Marseille, France)

Thought experiments are a recurring way to address the question of consciousness. This paper is a comparison of six significant thought experiments, and an essay on their implications on machine consciousness: Leibniz's Mill (LM), Robert Kirk and David Chalmers' Total Zombies (TZ), Thomas Nagel's Being a Bat (BAB), Ned Block's Chinese Nation (CN), John Searle's Chinese Room (CR) and Franck Jackson's Mary's Room (MR). As an introductory paragraph, the context, initial formulation, and main debates these thought experiments generated are presented. My first step is to present four of the six studied thought experiments as variations and precisions of LM. As a starting point, LM's explicit conclusion is that perceptions are not observable. Since perceptions are widely recognized as a component of consciousness, LM implies that consciousness is not observable. This key concept is the basis for BAB, CN, MR and TZ. These thought experiments all expand this starting point: BAB becomes "consciousness is subjective", CN "qualia cannot emerge from brain functions alone", MR "no physical description can capture a perception" and TZ "consciousness supervenes on the physical level". The next step is to show that these thought experiments can each be translated in the language of LM to better understand the subtle precision that is made by the authors since Leibniz. For instance, in CN the physical components of the Mill are replaced by radio signals exchanged by Chinese citizens. BAB implies that that visiting a giant bat is not equivalent to the experience of being a bat, and for the Mill (or,

more generally, a machine) to be conscious there must be “something it is like to be” a machine. TZ can be translated has an “inverse Mill”: instead of building a conscious machine and failing to observe consciousness inside it, the zombie is a non-conscious human for which nothing observable is different. Remarkably, our only thought experiment specifically designed around computers and consciousness is not centered on the non-observability of qualia. CR centers the question on intentionality and argues over the semantics of a computer program while the matter of perception is not involved. The last part of the paper is a transposition of issues raised by these thoughts experiments to the subject of machine consciousness, using contemporary models of computer architecture, instead of LM, as a starting point. While visiting a giant computer would only result in observing physical components such as its electronic circuitry (hence giving a conclusion similar to Leibniz), the layers of abstraction model defines that the closer a computing process becomes to an interaction with a human user, the higher the level of abstraction is. If the hardware layer, the firmware layer or the application layer are not abstract enough to raise consciousness, we should consider the possibility of additional layers. This avenue of research could be fruitful to building enhanced models of machine consciousness, as it addresses at the same time the issue raised by the “consciousness is not observable” thought experiments as well as by the CR intentionality problem. **P1**

**37 Large Scale Deep Learning Vis-a-Vis Synthetic Consciousness** Prem Sewak Sudhish <pss@alumni.stanford.edu> (Physics and Computer Science, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The ongoing large scale deep learning experiment at Google, popularly known as the Google-brain project, with sixteen thousand CPU cores and more than a billion connections has been a significant breakthrough in machine learning research – with the machine being able to recognize previously unlabeled data – unprecedented in the history of artificial intelligence and pattern recognition. The results from this and other deep learning projects are both exciting and encouraging but on the flipside, present yet another negative evidence on the possibility of synthetic consciousness. In some schools of thought, it is believed that matter is fundamental and that consciousness is an emergent property. It is argued that complex material structures, as existent in the brain, give rise to consciousness. The complexity of the hardware and the underlying connections of the Google-brain project compares well with a newborn brain but while a neonatal or even a prenatal distinctly exhibits traits of consciousness, it is completely devoid in the network of machines that emulates a neural network of the same magnitude. This paper, while laying a clear distinction between intelligence and consciousness, asserts that while machines may exhibit intelligent behavior are completely devoid of qualia, attention or intuition. While discarding the reductionist and regressive position of consciousness emerging from physical matter, the draws from the rich wealth of eastern philosophy that has stood the test of time for several thousand years and places matter and the primal cause of consciousness, the life force (or spirit) in their rightful positions. **P1**

## 1.06 Mental causation and the function of consciousness

**38 Realization, an Ally or an Enemy for Kim?** Jui-Lin (Melody) Hung, Karen Yan, Allen Y. Houg <melody2013@ym.edu.tw> (Institute of Philosophy of Mind and Cognition, National Yang-Ming University, Taipei, Taiwan)

Kim uses his causal exclusion argument to argue that the causal power of the mental, if there is any, is excluded by the causal relation among the physical. The generation argument is the argument to show that if Kim's causal exclusion argument is right, then it can be generalized to all special sciences. That is, all the higher-level properties, such as biological properties and chemical properties, cannot be causally efficacious with respect to their underlying lower-level properties. In order to escape this generation problem, Kim argues that mental properties are not higher-level properties, but second-order properties realized by some first-order properties, i.e., some physical properties. He then uses this claim as a basis to argue against Non-Reductive Physicalism (NRP). In this paper, we reconstruct Kim's (1998 & 2000) argument against the NRP based on his claim that mental properties are second-order properties. We argue that, for Kim's argument to be

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valid, he has to use a substantive presupposition in his argument. This presupposition is about the relation between the ontological status of the mental and the causal power of the mental. Having pointed out this presupposition, we will present a counterargument of the organizational chart and employees of XYZ company to challenge this presupposition. **P2**

**39 Cause, Effect and the Nature of Mind** Tam Hunt <tam.hunt@gmail.com> (UC Santa Barbara, Santa Barbara, CA)

What causes things to happen? How does one thing affect another thing? How does the mind affect the physical world, or the physical world affect the mind? Does the mind affect the physical world, or is it a helpless bystander to the real action? What is causality itself? These questions are precious gems in the philosopher's goody bag of perennial questions. I offer here some explanations that rely on the observation that all "things" are continuously and necessarily interconnected to all other things through a universal web of causal influence. This is what it means to "be in the universe". To be is to be causally influenced – and to be capable of exerting causal influence on other things. As such, our view of things as isolated and discrete objects is inherently incomplete. All things also include a practically infinite web of causal emanations. Or, more accurately, all things are actually events taking place at a particular locus in this infinite web. This paper explores the ramifications of this insight in the philosophy of mind and the philosophy of physics, relying on Whitehead's process philosophy, Tononi's Integrated Information Theory of consciousness, and similar insights in Eastern philosophy. **P2**

**40 Utiles of Mice and Men: Pains, Pleasures and Preferences Across Species** Kelly Inglis <kellyinglis@yahoo.com> (General Education, United International College, Zhuhai, Guangdong China)

Since Singer's publication of *Animal Liberation* in 1975, the idea of incorporating animal pains, pleasures and preferences into utilitarian calculations has been widely accepted by philosophers interested in animal welfare. However, the problem of how to compare the utility of an animal with the utility of a human being has been scarcely broached. How does the pain of an animal compare with the pain of a person? Are they equivalent? Through an analysis of the evolutionary function of conscious pains, pleasures and preferences, I attempt to provide some insight into the problem of cross-species comparisons of utility. In this paper, I argue that the most important function of conscious pain is as an input to conscious decision-making processes. I argue further that the more sophisticated a decision-making process a species has, the more nuanced pains must be. Hence there are systematic differences in the experience of pain in different species of animal which are due to their various abilities to engage in consciousness decision-making. This provides a rationale to the allocation of different weights to the pains of different types of creatures in moral calculations. From this I conclude that giving more consideration to the pains of a human being over those of another animal is not necessarily speciesism and can be justified in terms of an inclusive utilitarian framework. I then extend the claim to the valuation of animal pleasures and preferences, and conclude that, while non-human animal pains, pleasures and preferences are of moral significance, their significance is generally less than those of human beings in circumstances that appear externally to be equivalent. **P1**

**41 Can Non-Reductive Physicalism Dodge the Exclusion Problem?** Shih-Kai Liu, Sky Liu and Karen Yan, Institute of Philosophy of Mind and Cognition, National Yang-Ming University, Taiwan – Liusky@livemail.tw – Karenyan@ym.edu.tw <liusky@livemail.tw> (Taipei, Taiwan)

In her paper, *Exclusion again* (Bennett 2007), Bennett argues that the exclusion argument is not a problem for the non-reductive physicalism (NRP) but for the dualism. She defends for the non-reductive physicalism by holding Distinctness, Completeness, Efficacy, Nonoverdetermination and denying Exclusion. She claims that there is an effect which is not overdetermined, but a sufficient mental cause and a sufficient physical cause. To prove that, she proposes that overdetermination requires the nonvacuous truth of two counterfactuals, (O1) and (O2). (O1) is that if the mental event *m* had happened without its realizer the physical event *p*, the effect *e* would still have happened. (O2) is that if *p* had happened without *m*, *e* would still have happened. She thinks it's difficult for both the NRP and the dualists to deny (O1). However, (O2) is alternatively



vacuous or false for the NRP but still hard to deny for dualist. The reason why (O2) is alternatively vacuous or false for the NRP is that: the closest  $p \& \sim m$  worlds are not the  $e$  worlds. If there are any closest  $p \& \sim m$  worlds are  $e$  worlds, then it is inconsistent with the physicalism's hypothesis that the mental type necessarily supervenes upon the physical type. If it is inconsistent with the physicalism's hypothesis of the mental type necessarily supervening upon the physical type, then (O2) is vacuous. In other words, none of the  $p \& \sim m$  worlds can make (O2) true, because they are not the closest worlds. I think this argument assumes that for any two worlds, they are closest to each other if and only if they have identical physical facts. Otherwise, one may argue that the closest worlds lack other physical facts which make  $m$  not occurring. The mental event  $m$  may supervene upon other physical event  $p^*$  rather than upon its realizer  $p$ . To exclude this possibility, I think we have to assume that the physical facts in the closest worlds are identical with the physical facts in the actual world, or the argument would not be valid. Nevertheless, (O1) is vacuous, if we accepted the assumption that two worlds are closest to each other if and only if they have identical physical facts. The reason why (O1) is vacuous is that  $p$  occurs in actual world but not in any other possible worlds. But, if (O1) is not nonvacuous true, then Efficacy is fail. In other words, mental causation fails. **P1**

#### **42 Role of Consciousness: A Proposal** Penelope Rowlatt <penelope.rowlatt@gmail.com> (University College London, London, United Kingdom)

The decisions of lower order organisms relating to their actions are programmed in before birth, or arise through learning from feed-back during their lives, and operate along the lines of an "if A then B" type process. So suppose you wanted to design a more deliberative decision process, one that allowed the likely consequences of choosing one action rather than another to be compared by the organism so that it could choose the action that it perceived as likely to produce the best outcome. What sort of a gadget would you design to perform that function? In this paper I suggest that one way of solving this problem involves something along the lines of consciousness; the organism must have the ability to experience, and then to imagine, what some outcome might feel like so that the benefits and disadvantages of different outcomes can be weighed by the organism, one against the other. If this decision-taking role is the *raison d'être* of consciousness one would expect it to be selected for by an evolutionary process since the taking of appropriate decisions by organisms in life threatening or life enhancing circumstances is crucial to the organism surviving and flourishing. However, for this to be the case, it is necessary that what something feels like is a fact (a phenomenal fact) that is not reducible to the facts studied in the science of physics. So consciousness must then be a property of matter similar to, but very different from, the familiar properties of matter that are studied in the science of physics (electricity, mass and so on); and it must arise, as the other properties do, as the result of a law of nature. Mental states (sensory impressions, thoughts) would then be instantiations of this property of matter (that one might call 'mind'); what it feels like for a normally sighted person to see red is then a fact relating to an instantiation of this property of matter. Further, the mental state associated with taking a decision about action must be capable of affecting the neurons and itself triggering the action; mental states must be causally effective. In this context it may be helpful to suppose that there is a highly localised field associated with taking a decision that can influence the paths of the electrons in the neurons. This proposal regarding the ontology of consciousness enables the two familiar anti-physicalist arguments to be resolved. In the knowledge argument Mary actually learns new facts, facts about sensory impressions, when she leaves her black and white room. In the conceivability argument, the existence of a zombie (a creature that is identical to a person regarding the disposition of the matter it is composed of but is without consciousness) is not conceivable in a world which has this law of nature, not because its existence is ruled out by logical necessity, but because it is ruled out by nomological necessity. **P1**

#### **43 Against the Exclusion Principle** Dylan Wu, Karen Yan <idylic98@gmail.com> (Taipei, Taiwan)

Kim (2005) argues that Non-Reductive Physicalism (NRP) is an inconsistent position. Kim shows this inconsistency by listing the claims assumed by NRP. The inconsistency turns on the tension between the causal efficacy of the mental and the so-called exclusion principle, i.e., "[n]



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o single event can have more than one sufficient cause occurring at any given time – unless it is a genuine case of causal overdetermination”. (Kim, J. 1998. *Mind in a Physical World*, Cambridge, MA: MIT Press; Bennett, K. 2003. “Why the Exclusion Problem Seems Intractable, and How, Just Maybe, to Tract It? *Nous* 37(2), pp.471-497). Kim’s idea is that if a mental property has any causal efficacy, this causal efficacy is excluded by the causal efficacy of the physical world because of the exclusion principle. In this paper, we will argue that the NRP does not necessarily assume the exclusion principle. Therefore, the conclusion of Kim’s argument does not follow. **P2**

### **44 What Is Wrong With Kim’s Causal Exclusion Argument Against Non-reductive Physicalism?** Yuan-Ho Yao, Karen Yan <yry66@gmail.com> (Taipei, Taiwan)

The exclusion problem is first presented by Kim (1989) to argue against non-reductive physicalism. Kim argues that, given this problem, Non-Reductive Physicalism (NRP) has to concede that the causal power of the mental, if there is any, is irrelevant to the physical. In this paper, we reconstruct the way Kim presents the exclusion problem and his argument against NRP. According to Kim, the exclusion problem occurs when one holds the following claims at the same time: (1) There is a mental event *m* causes another mental event *m*\* (assumption). (2) *m*\* has a physical state *p*\* as its supervenience base (from physicalism). (3) *m* caused *m*\* by causing *p*\* (from (1) & (2)). (4) *m* also has a physical supervenience base *p* (from physicalism). (5) *m* causes *p*\* and *p* causes *p*\*. (from the causal closure principle) (6) *m* is not identical with *p* (from NRP). (7) *p*\* is not causally overdetermined by *m* and *p* (from non-overdetermination principle). Kim argues, there is the exclusion problem because one can derive the following claim from the above seven claims: (8) *p* causes *p*\* but *m* does not cause *p*\*. If this is the case, then the causal power of *m* is excluded by the causal relation between *p* and *p*\*. Therefore, the causal power of *m* is causally irrelevant to *p*\*. We argue that (5) can’t be deduced from the causal closure principle, so this argument is invalid. The causal closure principle states that every physical effect (that is, caused event) has physical sufficient causes. What we can get from the causal closure principle is that, there is a physical state *p*’, which causes *p*\*. However, we can’t conclude that *p* causes *p*\*, until we prove that *p* is identical with *p*’. We can only deduce that, (5’) *m* causes *p*\* and there is a physical state *p*’ that causes *p*\*. If one wants to get (5), one should prove that, (id) *p*=*p*’. In the original argument, Kim use (id) without a proof. We will show that (id) is not always true so it must be proved if someone wants to use it. **P2**

## 1.07 The ‘hard problem’ and the explanatory gap

### **45 The Hard Problem of Consciousness: 342 Years On** David Chalmers <chalmers@anu.edu.au> (Department of Philosophy, Australian National University/New York University, Canberra – New York, Australia)

I will discuss the history of the hard problem of consciousness, the strategies that have been applied to solving or dissolving it over the last twenty years, and what I see as the currently most promising prospects for progress. **PL1**

### **46 Does Time Fly When You’re Having Philosophical Fun?** Daniel C. Dennett <daniel.dennett@tufts.edu> (Philosophy, Tufts University, Boston, MA)

Two decades of philosophical footwork ought to be enough to convince us that the Hard Problem was a chimera, as I said at the outset. Those two decades reveal no advance of outlook, no new theoretical ideas, no novel predictions. Meanwhile, there have been notable advances, both empirical and theoretical, among those who averted their attention from the so-called Hard Problem. **PL1**

### **47 Why the ‘Hard Problem’ Hardly Matters** Jonathan Dorsey <jedorsey@ucdavis.edu> (Philosophy, National Humanities Center, Chapel Hill, NC)

I argue that the hard problem can be split into two problems: one of those problems (very roughly, the problem of explaining some consciousness) is relatively easy to solve, whereas the other problem (very roughly, the problem of explaining all consciousness) is in fact extremely

hard. I then argue that i) neither of those problems makes an ultimate difference to the debate over physicalism and ii) the latter problem – though philosophically interesting and, arguably, the “real” hard problem – deserves only very limited attention in the study of consciousness. It is the former problem – which, thankfully, is relatively easy to solve – that is much more important and much more deserving of theorists’ attention. C1

**48 Modes of Presentation and Phenomenal Concepts** Martina Fuerst <martina.fuerst@uni-graz.at> (Philosophy, University of Graz, Graz, Austria)

Physicalism is confronted with well-known anti-physicalist arguments such as the knowledge argument and the explanatory gap argument. These arguments are based on the phenomenal character of consciousness that gives rise to the “hard problem” of consciousness. One powerful response to anti-physicalist arguments is the phenomenal concept strategy (PCS) that relies on phenomenal concepts to explain why we draw anti-physicalist conclusions from these arguments. Proponents of the PCS claim that in these anti-physicalist arguments we employ both physical and phenomenal concepts that co-refer and pick out physical referents. Hence, the PCS aims at accounting for anti-physicalist intuitions without being committed to ontological anti-physicalist conclusions. Defenders of the PCS grant that phenomenal concepts cannot be deduced a priori from physical concepts and hence are conceptually isolated. Moreover, phenomenal concepts play a specific cognitive role—they carry introspectively accessible information about the phenomenal character of experiences. Proponents of the PCS point to different features of phenomenal concepts to provide an explanation of their conceptual isolation and their cognitive role. Some accounts construe phenomenal concepts analogously to demonstrative concepts; others focus on the special mode of presentation involved in phenomenal concepts. In this talk, I will argue that only the latter accounts can explain both particularities of phenomenal concepts in a satisfactory way. In particular, I will demonstrate that phenomenal concepts can fulfill their cognitive role only if they are necessarily tied to a specific phenomenal mode of presentation. I will argue for this claim via a *reductio ad absurdum*: First, I will construe different scenarios that are conceivable if a contingency in the relation of a phenomenal concept and its mode of presentation is allowed. Such a contingency is allowed by pure demonstrative accounts as well as by accounts that focus on the vehicle of phenomenal concepts, but it is ruled out by accounts that focus on the phenomenal mode of presentation involved in phenomenal concepts. Second, I will show that the transparency thesis motivates an analogy between phenomenal concepts (that refer to experiences) and perceptual concepts (that refer to objects of experiences). Thus, I will construe analogous scenarios involving perceptual concepts. Third, I will compare and evaluate these scenarios. It will turn out that a contingency between a phenomenal concept and its phenomenal mode of presentation leads to implausible scenarios and to false judgments of the subject employing these concepts. The analogous scenarios involving perceptual concepts do not result in the same problem and provide an explanation why some philosophers think that phenomenal concepts can be construed analogously to perceptual concepts. Thus, the outcome of my analysis will be twofold: First, I will conclude that an adequate account of phenomenal concepts has to posit a necessary link between a phenomenal concept and its phenomenal mode of presentation. Second, by considering the transparency thesis and comparing phenomenal concepts to perceptual concepts, I will also provide an explanation as to why some philosophers fail to recognize the importance of the phenomenal mode of presentation involved in a phenomenal concept. C1

**49 Introspection and the Explanatory Gap** Steven Gubka <steven.gubka@balliol.ox.ac.uk> (Philosophy, The University of Arizona, Oxford, United Kingdom)

Although physicalists often argue from the armchair that the explanatory gap is merely psychological and should not figure into our theory of consciousness, Fiala, Arico, and Nichols (2011) offer a psychological model that purports to explain the explanatory gap. If accurate, such a model would presumably provide leverage against the explanatory gap as evidence that the phenomenal facts are not explained by the physical facts. On their view, the gap has its origins in our dual systems of cognition for detecting conscious agents. Low level (or system-1) attribution of conscious states to other agents occurs when we encounter certain visual cues for agency. We can

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also make high level (or system-2) conscious state attributions according to a physical theory of consciousness, but the conscious state attributions from high level reasoning seem incorrect to us when those attributions are not confirmed by the visual cues that indicate agency for the low level system. This gives rise to the explanatory gap, or the feeling that something is left out of physical theories of consciousness. However, I argue that their account predicts the gap in cases when conscious state attribution is not mysterious, such as when we reason about agents outside of our immediate perception, and that their account does not predict the gap in cases when conscious state attribution is actually mysterious, such as when we try to explain the conscious experience of visually perceived agents through physical theories of consciousness. Moreover, I suggest that an explanation of the gap should include introspection to explain why we find the qualitative aspect of consciousness, rather than conscious states generally, to be mysterious. Finally, I examine the general prospects for psychological explanations of the gap to debunk arguments for dualism. P2

### 50 The Information-Information Gap: A New Understanding of the “Explanatory Gap”

Yasuko Kitano <yasukos@sannet.ne.jp> (History/Philosophy of Science, The University of Tokyo, Tokyo, Japan)

In this presentation, I argue that studies of consciousness over the last twenty years have revealed that our conception of the “explanatory gap” has not yet been fully elaborated on, and that with the necessary revisions, it will likely be reduced to an informational gap. This has great implications for the science of consciousness. It is often said that the “explanatory gap” problem stems from the isolation of phenomenal concepts from physical (functional) concepts. However, Metzinger (2003), Prinz (2007), and Tye (2009) have already presented arguments against phenomenal concepts, based on empirical evidence. In addition, recent consciousness studies in neuroscience suggest that the existing conceptualization of qualia requires revision that will cancel the two central assumptions about phenomenal concepts. These are: (1) specificity, the assumption that a phenomenal concept has specific content, such as the redness of red; and (2) first-person privilege, in which a concept’s basic application is from the first-person point of view, via introspection. Regarding (1), Balduzzi and Tononi (2009) characterize one quale as the phenomenal experience that, at a moment, covers multiple sensory modalities, such as vision, auditory, and so on. Regarding (2), Wilke et al. (2009) suggest that the neural correlates of qualia can and should be distinguished from the neural activity that is associated with cognitive access and perceptual reports through introspection. The scientific understanding of qualia requires us to distinguish phenomenality from cognitive access, and, given that phenomenal concepts do not work for the formulation of the alleged functional-phenomenal gap, there remains an information-information gap that must be bridged between “instructive” (like genes) and “semantic” (like sentences) information. While functional states are basically understood as instructions, phenomenal states are conventionally thought of as “bearing content” that is meaningful and accessible to the introspective subject. Speaking in this way, we tend to attribute semantic features to phenomenal states. If we can see phenomenal states solely as instructions, then the gap will be filled. This presentation sheds light on a path toward such an understanding. P2

### 51 A Shift in Conceptual Paradigm for Consciousness

Tai Nguyen <nguyenquyentai@gmail.com> (Neurosurgery, University of Florida, Jacksonville, FL)

Neurophysiological research in the last few decades has made big strides in the understanding of many brain functions necessary for the genesis of consciousness, such as the formation of percepts and memory. This paper aims at demonstrating that the ‘Hard Problem’ of consciousness can be solved by incorporating findings of those studies in a new conceptual paradigm. Studies of organs of perception have shown that the different components of sensory stimuli are decomposed, analyzed, and recomposed to give rise to the final representations, incorporating along the way other data previously stored in memory banks, before eliciting a behavioral response. For example, in the case of vision, the brain analyzes different aspects of visual scenes, such as local contrast, orientation, color, movement, surface properties and contours, and incorporates these different features into a unified percept that is recognized. Other sensory modalities undergo similar analysis, reconstitution, integration and recognition. Efforts at understanding the genesis

of consciousness hit an impasse if the final representation is considered as an image that the 'mind' perceives. To avoid this return to some form of dualism or to a homunculus as spectator in a 'Cartesian theater', representations or percepts should be considered not any differently in their electrochemical essence from other final neuronal products elicited by afferent stimuli that give rise to a behavioral response such as in a simple reflex. These neuronal processes will occur unconsciously, if not for two additional factors – emotion and phonation – which lead to the development of 'consciousness'. Certain stimuli elicit strong physiological responses in situations where the brain detects challenging situations. These emotions give rise to modifications in behavior that are common to animals of the same species and acquire important significance as indicators of present danger or sources of food. Variations in behavior in the form of gestures, facial grimaces and vocal sounds are thus imbued with significance and serve as means of communication between animals. These signals constitute rudimentary forms of language and give different meanings to objects and events. In this manner, an animal that perceives and reacts unconsciously in other circumstances will perceive certain objects and events with their imbedded significance given by emotional signals. Body language constitutes symbols of observable objects and events, and forms the 'explanatory bridge' from unconscious neural percepts to percepts imbued with significance. With further development of their vocal apparatus, humans built a richer vocabulary and were able to designate different objects and different events by different words. They identified and named different aspects of percepts, such as the red of a fruit, the pain in their big toes and the pleasure of a good meal; thus, they were able to better communicate with each other and formed complex ideas, such as the concepts of 'physical' and 'mental'. Consciousness is not a spark that is ignited but gradually develops along the phylogenic line of different species as they acquire better perception, memory and means of communication. Consciousness attains its present status in humans with the acquisition of natural language. **P1**

**52 The "Hard Problem" of Consciousness in Post-Kantian German Thought** Paolo Pecere <paolopatch@yahoo.it> (Roma, Italy)

Kant's arguments supporting the position of a "limit" between psychology and physiology, in his late essay "On the organ of the soul" (1796), deeply influenced XIXth century German philosophy and physiology. A consequence of Kant's arguments is the logical impossibility to describe consciousness (*Bewusstsein*) by means of the concepts and methods of natural sciences. This issue was further discussed by philosophers and scientists such as J. Mueller, H. Helmholtz, G. Fechner, E. Du Bois-Reymond, W. Wundt, F. Lange and other Neokantian philosophers. In this neglected chapter of the history of the problem of consciousness we can find already arguments about the physiological and physical unexplainability of qualia (e.g. Du Bois-Reymond, Wundt), as well as mental experiments about a world with no consciousness (Lange), which have been rediscovered in XXth century philosophy. The paper will outline two ways out of Kant's problem, a monistic and indeterministic one (exemplified by Fechner) and a "property dualistic" one, which was supported Lange and the Marburg Neokantian school until the early XXth century **C15**

**53 The Computational Basis of Consciousness** Edward Porter <ewporter@gmail.com> (Fort Worth, TX)

People experience consciousness as awareness of information and its computation – as awareness of what they see, hear, taste, touch, smell, and feel – of what they emote, intuit, understand, think, and imagine. These are all nothing but awareness's of information and its computation. Science describes physical reality as nothing but information, computation, and the awareness of information inherent in computation. When a computer adds X to Y to get Z, it has to be aware of the values of X and Y. When physical reality computes the acceleration of an object, it has to be aware of the mass and position of the object, and of the many forces acting upon it. This is "computational awareness," the awareness of input values required for a computation's output to vary as a function of those inputs. It is causal information flow creating mutual information. Thus, both consciousness and physical reality seem nothing but webs of information, computation, and computational awareness. No dualism, and no mysticism, is required to explain consciousness, because – despite vastly different characteristics – consciousness and physical reality both seem

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to be made of the same basic “stuff.” The “hard problem of consciousness” is not explaining how consciousness has awareness – because all physical reality has awareness to some degree, however limited. The “hard problem” is not how consciousness can have something “it is like to be” – because all reality has something “it is like to be.” It all has both “being” and computational awareness of that being. The “hard problem” is not how or why consciousness is subjective when the rest of reality is supposedly objective – because the computational awareness of all reality is “subjective” in the sense that each part of reality has awareness of information no other part can even begin to fully share. Instead, the “hard problem of consciousness” is more specific. It is explaining how our consciousness’s particular type of computational awareness – with its sense of unity and its many distinct phenomenal qualities – arises from the computational awareness of tens of billions of neurons and hundreds of trillions of synapses. My poster, and my discussion of it, will address this more targeted, interesting, and tractable, version of the hard problem. It will do so using ideas from artificial intelligence and brain science, leaning on the work of people like Baar, Edelman, Tononi, Koch, Shastri, Hawkins, O’Reilly, and Granger. It will describe the observed and hypothetical architectures of computational awareness that appear most likely to correspond to the awareness we call “human consciousness.” P2

### 1.08 Higher-order thought

**54 Reflexive Sensibility: The Bedrock of Consciousness** Christian Coseru <coseruc@cofc.edu> (Philosophy, College of Charleston, Charleston, SC)

“Every consciousness upon whatever object it is primarily directed, is constantly directed upon itself,” wrote Franz Brentano in ‘Psychology from an Empirical Standpoint.’ This assertion of the unity of consciousness as reflexive awareness, which finds its roots in Aristotle, has been both criticized and vigorously defended. In this presentation, I first consider various alternatives to reflexivism, specifically higher-order and representationalist theories. Theories that reject the reflexivity thesis tend to share certain underlying assumptions about the structure of consciousness and its functional and phenomenal properties. Higher-order theories, for instance, attempt to explain consciousness as a two-state process: a mental state is conscious in virtue of a distinct second-order state that is directed toward it. By assuming that consciousness must be an external, relational property of mental states in order to be intelligible and analyzable, they ignore its proprietary phenomenology. Representationalist theories of consciousness, on the other hand, rest on two phenomenologically implausible assumptions: the transparency assumption (which claims that experience is diaphanous, that we are only conscious of the content and never of the conscious act itself) and the property assumption (which asserts that all we are consciously aware of are phenomenal properties or qualia like blueness and coldness). Both these approaches conflict with our pre-theoretical understanding of consciousness as that which makes present at once both our subjectivity and the surrounding world. Dan Zahavi’s account of “pre-reflective self-awareness” and Uriah Kriegel’s “self-representational” theory attempt to respond to this problem by emphasizing, on the one hand, the distinctness of pre-reflective experience and, on the other, its symmetry with regard to its subjective and intentional aspects. But while such phenomenologically sensible approaches might justify taking reflexivity as an ineliminable dimension of consciousness, they leave open the question of whether it is constitutive of its character of merely caused by it. I will attempt to answer this question by focusing on accounts of self-awareness that are both logically and ontologically more basic than conceptual and linguistic forms of self-awareness, specifically on epistemic feelings (e.g., calm, surprise, concern). My claim is that such minimally reflexive states, which reach quite far back into our primate lineage (and emerge in the transition from zygote to adult), also allow for the binding of self-presentation and the intentional structure of self-conscious experience. Finally, I entertain the question whether epistemic feelings, as minimally reflexive states, stand in the same relation to full-fledged emotions as pre-reflective mental states stand to reflective states, and what this relation tells us about the structure of consciousness, and its functional and phenomenal properties. C2

**55 Animal Consciousness and Functional Homologies** Rafael Cruz, Garcia, Claudia Lorena <rafacv2000@hotmail.com> (Faculty of Philosophy, Faculty of Philosophy and Literature, National Autonomous University of Mexico (, Mexico, Distrito Federal Mexico)

In the study of consciousness, it has been recently discussed whether other animals, besides humans, are conscious. Most authors agree that to attribute this capacity to other organisms depends on what are we referring with the term Consciousness. For example, Rosenthal (2004), distinguishes between intransitive and transitive consciousness. Intransitive consciousness occurs when it is possible to know if and organism is awake or asleep, thus we can say that an organism  $x$  is conscious when is awake and that  $x$  is not conscious when is asleep or in coma. Most people accept that a lot of organisms have this kind of consciousness. On the other hand, transitive consciousness implies that an organism  $x$  is conscious of an object  $y$ , this object can be a physical or mental (a mental state). While it seems clear that most organisms are conscious of the physical world around them (because of its adaptable behavior to the environment), the question whether an organism can be conscious of a mental state, i.e. can have Higher Order Thoughts (HOT), remains unanswered. This, has resulted in a variety of HOT theories of consciousness which, in general terms, say that what makes a mental state conscious is the presence of a suitable higher order thought about that state (Gennaro [1996]; Rosenthal [2005]), i.e. a HOT is a mental state directed at another mental state. There is a wide debate whether HOT theories rule out the capability of animals and little infants to have this kind of consciousness, since they are incapable of having higher order thoughts. For example, Carruthers (2000) is in favor of this argument. On the other hand, Gennaro (1996, 2004) has proposed a less complex HOT theory that includes other animals and little infants, he strongly suggest that experimental and observational data from psychology, biology and ethology show that animals are capable of performing tasks that require HOT. On this research, It is argued in favor of non human organisms having some kind of HOT but there is more emphasis in the necessity of analyzing with more detail the type of presented evidence (Such as episodic memory, self recognition on the mirror and concept generation tasks). It's also discussed whether there are criteria that could be useful to determine functional homologies between this kind of consciousness in other animals and in humans, i.e. if there is an evolutionary continuum between this kind of consciousness in humans and other animals. **P1**

**56 Deeper-Order Thought ('DOT') – An Alternative Higher-Order Thought ('HOT') Theory of Consciousness** Rocco Gennaro, Paavo Pylikkanen, Stuart Hameroff <rjgennaro@usi.edu> (Philosophy, University of Southern Indiana, Evansville, IN)

Higher-order thought (HOT) theories view higher-level brain areas projecting HOTs downward as responsible for lower-level brain states becoming conscious (Rosenthal 2005, Gennaro 2012). For example, in a 3-step process, sensory inputs mediated through thalamus (1) project to primary sensory cortex (e.g. visual cortex V1) which then (2) project feed-forward processes upward to secondary associative and executive regions, such as pre-frontal cortex (PFC). From such higher areas, (3) HOT activity then projects downward (feedback) to brain regions whose represented content becomes conscious. HOT theories are supported by evidence showing tertiary feedback from PFC and other areas to lower cortical areas which correlate with conscious experience (Lamme & Roelfsema), and that such tertiary feedback is selectively inhibited by anesthesia (Lee et al., Mashour). But the nature of HOTs and why their target states become conscious (and sensitive to anesthesia) remain under investigation. Although HOT theorists typically look to the neural level for the physical realization of HOT theory, here we present an alternative view which suggests that HOTs and their target activities differ from non-conscious brain activities by extending downward in scale, inward, to involve deeper order thought (DOT) processes inside neurons (e.g. as Bohmian active information). Specifically, cytoskeletal microtubules (e.g. inside cortical pyramidal neurons) have megahertz and kilohertz quantum resonances and voltage fluctuations (40 to 50 mV) whose interference are proposed to generate slower membrane fluctuations seen as EEG. Microtubules may also process and store synaptic information (memory), perform quantum computation necessary for consciousness (Penrose-Hameroff Orch OR theory), and be the target of anesthetic action (rather than membrane proteins, as is commonly assumed). DOT augments HOT philosophical theories and consolidates them with intra-neuronal and quantum approaches



to consciousness. References: Gennaro, R. 2012. *The Consciousness Paradox*. MIT Press. Lamme V. & Roelfsema, P. 2000. The distinct modes of vision offered by feedforward and recurrent processing. *Trends Neurosci.*, 23: 571-9. Rosenthal, D. 2005. *Consciousness and Mind*. Oxford Univ. Press Lee, U. et al. 2013. Disruption of Frontal Parietal Communication by Ketamine, Propofol, and Sevoflurane. *Anesthesiology* 118: 1264-75. C2

**57 Higher Order (HOT) Theories of Consciousness and Bohmian Active Information** Paavo Pyllkanen <paavo.pyllkanen@his.se> (Universities of Skovde and Helsinki, Skovde, Sweden)

The basic problem in consciousness research is the hard problem (Chalmers) or the generation problem (Seager): to explain how the physical workings of the brain generate or underlie conscious experience. Given the difficulty of answering this question in traditional neural terms, some have considered more fundamental physical theories, especially quantum theory. Matter at the quantum level has new properties – could these help explain the relationship of matter and consciousness? One relevant scheme is the ontological interpretation of quantum theory (OIQT, Bohm and Hiley 1993). Here the wave function is assumed to describe an objectively real field that always accompanies and guides a particle (so that an electron, for example, is a particle AND a field). They propose radically that this field does not act mechanically (like, say, the electromagnetic field). Instead it is only the form of the field (reflecting the form of the environment of the system, e.g. slits) that affects the motion of the particle. This suggests that the field contains active information (analogously to the way radar waves carry information about the environment and guide the movement of a ship on autopilot). The idea that information might play a role in fundamental physics is potentially relevant to philosophical problems. Indeed, Bohm himself sketched a theory of the relation of mind and matter, where quantum theory is extended into a hierarchy of levels of active information. This helps to understand – at least in principle – how information content at the subtle levels our thoughts could influence (and be influenced by) processes in more manifest physical levels (Bohm 1990; Pyllkanen 1992; Hiley and Pyllkanen 2005). These subtle levels (which include the level of the quantum field) may well correspond to what Hameroff has called “deeper order thought” (DOT); they might also provide the physical correlate of “quantum cognition” (Pothos and Busemeyer 2013; cf. Pyllkanen 2004). However, while OIQT may illuminate the causal powers of the mental, it is not obvious that it can resolve problems of consciousness, especially the hard problem. One could follow the approach of Chalmers (1996) and postulate that active information (at least in some circumstances e.g. brains) has both physical and phenomenal aspects (Pyllkanen 2007, ch6). One could further argue that (at least sometimes) the phenomenal aspects of information are causally efficacious, thus answering a key objection to Chalmers’ theory, namely that it leaves the phenomenal epiphenomenal. But we still lack an account of what makes non-conscious information content conscious in the Bohmian scheme. Given that this scheme describes mind in terms of a hierarchy of levels of information, a natural possibility is to consider higher order (HOT) theories of consciousness. This is the aim of the present paper. I first suggest that Bohm himself would probably have favored a higher order perception (HOP) theory of consciousness. But I will also consider whether some variant of higher order thought (HOT) theories of consciousness might provide an illuminating account here (cf. Gennaro 2012). Reference: Pyllkanen, P. (2007) *Mind, Matter and the Implicate Order*. Springer. C11

**58 Having Experiences that Don’t Exist: The Odd Possibility of Targetless HOTs** Roger Christian Schrinier <cshrinier@uuma.org> (Independent scholar, Fremont, CA)

According to Ned Block, the possibility of ‘targetless’ thoughts exposes a fatal flaw in higher-order theories of consciousness. David Rosenthal has attempted to refute this objection. Higher-order theories say that under normal conditions a lower-order state such as a visual quale is conscious if and only if it is the target of a particular sort of higher-order state. For Rosenthal, this would be a higher-order thought (HOT), and HOTs can be roughly expressed by statements such as, “I am now experiencing a greenish afterimage.” In general, then, conscious experiences involve both a target state such as a greenish image and a higher-order state that is in touch with this target. But when one state of mind monitors another, it may fail to monitor it accurately, so there could be some inconsistency between the HOT and its target. In principle, we could even have a HOT about a state of mind that isn’t there. Suppose my brain malfunctions and I have the



sort of higher-order thought that is normally associated with seeing an ice cream sundae, but this dessert is not represented in my visual cortex. All I've got is the HOT: "I am now experiencing a visual image of an ice cream sundae." The crucial question is: What would it be like to have this targetless higher-order thought? Some, such as Rosenthal, say that what it would be like to be in this situation could be exactly the same as what it would be like to be aware of an actual image of the sundae. If we have a HOT about a non-existent perception, we may have a conscious experience of that perception even though it does not exist as a first-order perceptual state. In this paper I agree with Block that targetless higher-order thoughts would not give us the same experience as normal, accurately-targeted HOTs. Even so, Rosenthal's view could be modified and defended. Instead of saying that conscious experiences are normally linked to HOTs, I will argue that they are linked to another sort of subjective state. I explain the nature of this subjective state, and consider whether the difference between this sort of state and Rosenthal's HOTs is substantive or merely semantic. I also consider whether my proposal is a higher-order theory or a same-order theory of consciousness, and whether a higher-order account that allows for targetless states is actually a same-order theory. I conclude by considering the intuitive plausibility of targetless conscious states. **C2**

## 1.09 Epistemology and philosophy of science

**59 What Does It Take to Build a Consciousness Meter?** Brian Fiala <bffiala@artsci.wustl.edu> (Philosophy, Washington University in St. Louis, Tucson, AZ)

The 'privacy' of experience seems to pose a serious epistemic barrier to the scientific study of consciousness. While conscious experience is known most directly and surely from the first-person perspective, science paradigmatically trades in third-person data. Attempts to measure consciousness via third-person variables inevitably seem to beg important questions about the nature of consciousness (e.g. that a high degree of information integration indicates consciousness). But such measurements are of crucial importance for a science of consciousness, and additionally for medical applications such as anesthesia, coma, and vegetative states. Using a hair dryer as a prop, Chalmers famously lampooned the very idea of a "consciousness meter". Nonetheless, I argue that it is possible to measure subjective consciousness via objective third-person variables, so long as we accept that the inquiry must rest on fallible foundations. How do we measure that for which no "meter" yet exists? Similar problems vexed pioneers in the measurement of temperature, as detailed in Chang's (2004) "Inventing Temperature." While the example of temperature (and phlogiston) is often mentioned in passing in consciousness-debates, the epistemological underpinnings of temperature's measurement have been largely ignored. Attending to these details suggests an approach that can yield epistemically viable measurement techniques for subjective experience. The key epistemic commitments include (i) defeasible and revisable measurement-standards that initially comport with common sense; (ii) interplay between our concept of consciousness and theory of consciousness; and (iii) iterative methodology wherein both concept and theory may be incrementally and progressively revised over time. **C11**

**60 Introspection For More Than One Person** Sascha Fink <safink@uos.de> (University of Osnabrück, Institute of Cognitive Science, Osnabrück, Germany)

Could two or more people introspect the same phenomenal experience? For example, could you and I both come to believe that I am hallucinating a goat in a raincoat (Plummer et al. 2007), merely by introspecting? The usual answer is: No! Phenomenal consciousness is private. One and only one person, the experiencer herself or the owner of the mental state, can be acquainted with the phenomenal aspects of a mental token: Introspective access is limited to one person and one person only. So, if person a knows by introspection that a is hallucinating a goat in a raincoat, and person b knows by introspection that a is hallucinating a goat in a raincoat, then a = b. While this is true for most cases, arguments that phenomenal consciousness is necessarily private are rare. But it is the necessity of phenomenality's privacy that make a science of phenomenal consciousness controversial: Scientific objects of inquiry ought to be public and intersubjectively accessible; if phenomenal consciousness were necessarily private, then it is not a scientific object of

inquiry (cf. Dennett 1991, Metzinger 2004). In this talk, I want to raise doubts about the necessary privacy of phenomenal consciousness in order to defend it as an object of scientific inquiry. To do so, I first present a standard analysis of privacy stemming from the economic distinction between private and public goods, which is based on the properties of excludability and rivalry. I then present two cases (one literary, one actual), arguing that it is possible that more than one person can know by introspection about a phenomenal experience (such that person a not identical with person b). These cases link to the proposal by Hirstein (2012), who present buildings blocks for a process called Mindmelding, whereby two persons share a mind. Lastly, I present an account of introspection that is compatible with introspective access for more than one person: The detection account of introspection Armstrong (1968/1993), Prinz (2004), Hill (2009). Yet, this twist only affects the rivalry condition, not excludability. If successful, the argument shows that the private/public distinction does not apply neatly to science and phenomenality. While consciousness is as a matter of fact private in most cases, it is so only contingently. This entails that there are no deep problems raised by the privacy of phenomenality for a science of consciousness, because contingent limitations of access are the scientific norm. // References: Armstrong, D. (1968/1993). *A Materialist Theory of Mind*, London: Routledge. / Dennett, D. C. (1991). *Consciousness Explained*, Boston: Little, Brown and Company. Hill, C. S. (2009). *Consciousness*, Cambridge, UK: Cambridge University Press. / Hirstein, W. (2012). *Mindmelding: Consciousness, Neuroscience, and the Mind's Privacy*, Oxford: Oxford University Press. / Metzinger, T. (2004). *Being No One*, Cambridge, MA: MIT Press. / Plummer, C., Kleinitz, A., Vroomen, P. and Watts, R. (2007). Of Roman chariots and goats in overcoats: The syndrome of Charles Bonnet, *Journal of Clinical Neuroscience* 14(8): 709-714. / Prinz, J. J. (2004). The fractionation of introspection, *Journal of Consciousness Studies* 11(7-8): 40-57. **C5**

**61 Tentative Thoughts on Introspection** Ivan M. Havel <havel@cts.cuni.cz> (Center for Theoretical Study, Charles University, Prague, Czech Republic)

The recent rise, or more aptly revival, of interest in introspection (or in the first-person approach) in psychology and cognitive science on the one side and calls for naturalization of phenomenological concepts on the other, is more than welcomed. However, such interest is often, perhaps unnecessarily, motivated by an implicit or explicit intention of bringing phenomenology as close as possible to the objective third-person methodology of natural sciences. In the paper I suggest a way of approaching human conscious experience that offers a third, alternative, approach to both philosophical (transcendental) phenomenology and phenomenologically informed cognitive science. The proposed method, called 'Introspection Plus', concentrates on subjective perceptions of concrete episodic experiences that can be pursued prior to and, initially, independently of any later attempts to verbalize findings and adopt the third-person objective point-of-view. My aim is to build on the essential incorrigibility and self-intimacy of currently ongoing or very recently past experience while it is still held in retentive consciousness (in the Husserlian sense). I will illustrate the method by applying it to experiences of very short duration—to be called the “snap experiences”—, exemplified by phantasma, or “microdreams”, occurring in microsleep episodes. **P2**

**62 The Dichotomy in Consciousness Studies and the Limits of the Scientific Approach** Christopher Kloth <christopher.kloth@gmail.com> (Reno, NV)

In this paper, I argue that there is a dichotomy in the philosophical study of consciousness. This dichotomy prohibits the furthering of our knowledge and understanding of consciousness, as it maintains a pre-established and limited worldview. I begin by providing a brief history of consciousness studies, in order to make this dichotomy more obvious. I argue that the 'scientific' approach currently has monopoly on our understanding of consciousness. This approach, which is urged by many contemporary philosophers of mind, maintains a view that severely limits possible solutions to the problem of consciousness. Further, I discuss alternatives to this approach, maintaining that, though they are seemingly not plausible, with regards to the dichotomy, they have something critical to offer to the study of consciousness. Using this as a foundation, I argue that the dichotomy favors the 'scientific' approach. Though, as I contend, this is not reason to believe

that this approach is necessarily on the right track. Rather, I argue that it is creating a sort of stalemate in the discussion. In the end, I conclude that this dichotomy is an issue that must be reckoned with if we are to proceed in the philosophical study of consciousness. **P1**

**63 Reflecting on Cognitive Experience: Lessons on Introspection and Phenomenal Knowledge** Will Nelson Leonard <will.leonard@arizona.edu> (Philosophy, Cognitive Science, The University of Arizona, Tucson, AZ)

Brentano argued that introspection is impossible because the attempt to focus one's attention on the qualities of experience as such would necessarily interfere with the experiential process to be observed. Few contemporary theorists hold that all experiences are elusive in this way, but many accept that there are non-introspectible forms of experience. It doesn't seem, however, that theorists have considered the possibility that cognitive experience eludes introspection. There is reason to believe that this is the case. The same attentional mechanisms that produce cognitive experience might be required for introspective attention to the phenomenal character of experience as such. The cognitive experience of feeling that *modus tollens* is valid may be possible only when one is thinking about *modus tollens*, rather than about one's experience as such. It is also possible that cognitive experiences are disrupted by introspection not because introspecting them is impossible, but because it is very difficult given limited cognitive resources. Because introspection is more demanding of cognitive resources than are ordinary forms of attention and because cognitive experiences already demand cognitive resources, our brains may lack the processing power required for cognitive experiences and introspection of those experiences. Cognitive psychology research on ironic failures of concentration provides a framework for this second possibility. The hypothesis that cognitive experience is elusive helps to explain the longstanding debate regarding the existence of non-imagistic conscious thought (i.e. cognitive phenomenology), as well as contemporary theorists' reliance on phenomenal contrast methods. Further, those who deny the existence of proprietary cognitive experience often propose to reduce it to forms of sensory experience, and that project becomes more difficult if cognitive experience eludes introspection. Finally, since we have phenomenal knowledge of non-introspectible forms of experience (including cognitive experience), it follows that introspection is not necessary for phenomenal knowledge. More attention needs to be paid to retrospection as a means of gaining phenomenal knowledge. In particular, since theorists have tended to assume that introspection is necessary for the acquisition of phenomenal concepts, we must expand our theories to account for the non-introspective acquisition of phenomenal concepts. **P2**

**64 The Reliability of Phenomenal Judgements** Brentyn Ramm <brentyn.ramm@anu.edu.au> (Philosophy, Australian National University, Canberra, ACT Australia)

Introspection is not always reliable. I don't always notice when I'm grumpy, or that my visual field lacks acuity at the periphery. I am often uncertain about the phenomenal character of my emotions. Philosophers also disagree about the phenomenology of thought and visual perspective. Schwitzgebel (2011) draws upon such problem cases to motivate the conclusion that phenomenal judgments are far less reliable than perceptual judgements – 'introspective pessimism'. I distinguish between: 1. Intrinsic Phenomenal Unreliability – Phenomenal judgements are less reliable than perceptual judgements overall, due to factors intrinsic to phenomenal judgements. 2. Extrinsic Phenomenal Unreliability – Phenomenal judgements are less reliable than perceptual judgements, but not due to factors intrinsic to phenomenal judgements. Based upon empirical evidence, I classify the problem cases and argue against the first form of pessimism. My thesis is that the reliability of both phenomenal and perceptual judgements depends upon the domain general factors: attention, conceptual adequacy, and working memory limits. When these factors are held fixed, the reliability of introspective judgements are (at least) on par with that of perceptual judgements. Distinguishing between reliable and unreliable phenomenal judgements also provides a means of resisting 'introspective scepticism'. That is, it provides a reason for trusting phenomenal judgements when attention is correctly engaged and appropriate concepts are active in working memory. I conclude with reasons for holding that, contrary to Schwitzgebel, phenomenal judgements are in fact epistemologically superior to perceptual judgements after all. **P2**

## **65 Onward with the Science of Consciousness – What Else Is Needed for a Full Fledged Methodology and Epistemology of Subjective Experience? And What Could Be Learned From Buddhism in This Respect?** Nikolaus Von Stillfried <stillfried@uni-trier.de> (Department of Philosophy, University of Trier, Trier, Germany)

The invitation to the 6th TSC conference asked: “Toward a Science of Consciousness – Are we there yet?” and answered: “The dictionary defines science as: ‘The observation, identification, description, experimental investigation and theoretical explanation of phenomena’. Among these, consciousness has clearly been identified, described, experimentally investigated and elicited theoretical explanations (though disagreements certainly exist among various approaches in each category). Regarding observation, consciousness cannot be directly measured or observed by third persons, but first person accounts are prevalent. Thus it appears that, yes indeed, there may now be a science of consciousness.” I posit that this conclusion still applies, both with regard to the general advance as well as the remaining uncertainties. In order to explore possible directions for further progress, I analyze the science-theoretical situation of consciousness studies in some more detail. A particular focus is placed on the questions arising from the above-mentioned fact that direct observation of consciousness requires first person experience. I start with an analysis of what, from a philosophy-of-science point of view, can be considered the essential ingredients of empirical science. I come to the conclusion that it is indeed theoretically justifiable to use the observation of one’s own consciousness as empirical raw data in the same way as is traditionally done with observations of the external world. I then identify three interrelated aspects of such a first person empirical science that are in need of further development: Firstly, we need to increase the number of “first-person-scientists”: So far a majority of research on phenomenal consciousness depends on verbal reports of study participants who are themselves not involved in the interpretative discourse in the scientific community. This entails the risk of not having an adequate understanding of the nature of the data at hand, let alone the “objects” it refers to. Secondly, we need to advance the methodology of observation: While there is an increasing understanding that introspection can and needs to be trained, much data is still produced by untrained study participants and there is very little available in terms of specific formal training. Thirdly, we need to facilitate more exchange between “first-person-scientists” in order to enable intersubjective validations of their observations, just as we are used to intersubjectively validating observations of the outside world. While in “Western” academia a variety of efforts such as phenomenology can be credited with the explicit recognition of these challenges and attempts toward overcoming them, in “the East” Buddhism has probably developed the most extensive and institutionalized effort of exploring the mind “from within”, including a strong culture of collective discourse around both methodological and interpretational issues of introspection, and arriving at well tested training procedures and an enormous body of intricate theoretical frameworks. A relatively small number of authors have pointed to the possibilities of modelling the introspective part of the Science of Consciousness after the Buddhist example. I will give a summary of the existing literature, analyze both the problems and promises, and try to spell out the most concrete and realistic proposals for implementation. **P2**

## **66 Three Grades of Internal World Skepticism** Josh Weisberg <jweisberg@uh.edu> (Philosophy, University of Houston, Houston, TX)

Some materialists argue that the problem of consciousness is best attacked by challenging the idea that first-person access gives us an accurate picture of conscious experience (e.g., Churchland 1985, Dennett 2005, Pereboom 2011). It may seem to us from the inside that consciousness is more special than it really is. Consciousness may only seem non-functional or non-physical, even though it is actually analyzable in functional or physical terms, without remainder. Once we grasp this, the hard problem becomes tractable. Opponents of this strategy often see it as bordering on the absurd, as denying what is most obvious and manifest in the desperate hope of saving reductive materialism. It is to claim, paradoxically, that we don’t have experiences at all; rather, we just seem to. Indeed, Galen Strawson contends “This particular denial is the strangest thing that has ever happened in the whole history of human thought, not just the whole history of philosophy. It falls, unfortunately, to philosophy, not religion, to reveal the deepest woo-woo of the human

mind. I find this grievous, but, next to this denial, every known religious belief is only a little less sensible than the belief that grass is green” (2006, 5-6). And even if one allows that the strategy is coherent, it is often equated with global skepticism (or worse), something perhaps remotely possible, but uninteresting, not requiring serious response. Thus, reductive materialism of this stripe can be quickly dismissed and the debate can move on to more pressing issues. In this talk, I will argue that the stratagem of denying the accuracy of first-person access is not so easily dismissed. I will lay out three grades of what Horgan, Tienson, and Graham (2006) call “internal world skepticism.” The first grade involves errors that even present-day Cartesians agree are possible. The third grade includes the seeming absurdity noted by Strawson. The second grade falls somewhere in between. It involves, among other things, just how much we can tell about the intrinsic nature of experience from first-person access alone. I’ll argue that the skeptical strategy employed by Dennett et al. is of grade two, more like doubting certain theistic claims than full-blown global skepticism. And that means that anti-reductivists must actually rebut the strategy with argument and evidence, rather than curt dismissal. And this is not as easy as it might seem, suggesting the skeptical reductive approach is not the “woo-woo” Strawson claims it to be. References: Dennett, D. 2005. *Sweet Dreams: Philosophical Obstacles to a Science of Consciousness*, Cambridge, MA: MIT Press. Churchland, P. M. 1985. Reduction, Qualia, and the Direct Introspection of Brain States, *Journal of Philosophy* 82: 8-28. Horgan, T., Tienson, J., & Graham, G. (2006). Internal-World Skepticism and the Self-Presentational Nature of Phenomenal Consciousness. In U. Kriegel & K. Williford (Eds.), *Self-Representational Approaches to Consciousness* (pp. 41-62). Cambridge, MA: MIT Press. Pereboom, D. 2011. *Consciousness and the Prospects of Physicalism*, New York: Oxford University Press. Strawson, G. 2006. Realistic Monism: Why Physicalism Entails Panpsychism, *Journal of Consciousness Studies*, 13(10-11): 3-31. **C1**

## 1.10 Personal identity and the self

**67 Different Trees Same Fruit: Awakened Sages on the Nature of Mind** Miri Albahari <miri.albahari@uwa.edu.au> (Philosophy, University of Western Australia, Crawley, Western Australia Australia)

It is becoming more commonplace to see contributions to such topics as consciousness and the self being informed by the immensely rich traditions from the East. In a philosophical context, a popular approach is to take an idea, such as that of ‘no-self’ as it appears in traditional texts and scholarly writings, and compare it to similar ideas in Western thought. For example, one may read about no-self in various dialogues (from the Pali Canon) between the Buddha and his disciples, from which one reconstructs a definition of self and consciousness before comparing it to Hume’s writings on no-self in the West. Unsurprisingly, not all the interpretations agree. Most centrally, the dominant interpretation of no-self takes early Buddhist thought to be supposing that our conscious mind, in accordance with Hume’s bundle theory, is comprised completely of impermanent aggregates in flux. My own reading of the Pali Nikayas is the opposite: I think that there are passages which strongly suggest a unifying ‘witnessing’ element to our conscious mind that, while not an individual self, is not in flux. It is this ever-present, unconditioned element of mind that I surmise to be the vehicle to realising nirvana: the goal of Buddhist practice upon which the illusion of a separate self is shattered. The difference in these interpretations is not only academic, but practical. Suppose one is told that when meditating, one’s entire conscious experience should eventually be observed as a bundle of discrete, impermanent aggregates. It may then be discouraging to find a stubbornly persisting element that fails to appear impermanent – namely that part of mind which observes the flux. While I argue elsewhere for the incoherence of observing one’s entire experience to be in flux, I will here take a very different approach to the topic. Rather than working ‘bottom up’ by philosophically reconstructing canonical texts such as those of the Buddhist tradition, I will work ‘top down’ by looking to the teachings and biographies of a few modern, widely acclaimed ‘arahants’ or ‘awakened sages’, those said to be liberated from the illusion of self. If the traditions are likened to a type of tree, the sages are akin to their fruit. I will provide evidence for the hypothesis that the fruit from at least two different types of tree, despite the variation in foliage and root structure, is of the same purported nature. Whether the sages are

rooted in the Advaita Vedanta or Buddhist traditions, there is significant overlap in the descriptions of their character and core teachings. For example, they appear to not identify as a separate self, they are motivated by compassion rather than desire, and they speak of the underlying mind as being inherently pure and unconditioned. As well as favouring a non-bundle interpretation of no-self, the 'sagely' approach could more unambiguously suggest a genuine, tradition-transcendent capacity within the human mind to realise nirvana. **C15**

**68 Personal Consciousness and Conscious Leadership – Implications from an Empirical Study of Corporate Leaders** Purnima Bhatnagar, Shalini Nigam; Rahul Caprihan; Prem Prashant <purnima.bhatnagar@gmail.com> (Management, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

The global business landscape is undergoing a transformation and the factors leading to success are changing at a rapid pace. Corporate leaders today face a complex world – organizations with global footprints; varied country regulations; a need to deliver on shareholder expectations, driving value to the customers responsibly. At the core of every organization functioning are Values – “the operating principles or philosophies that guide an organization’s internal conduct as well as relationship with its customers, partners and shareholders.” Values “establish the forms of conduct that will be rewarded or not tolerated,” and hence impact behaviour, personality and other aspects in the individual, relationship, organizational and community spheres of functioning. Given the environment in which people function, different values may be deemed important over a period of time, as well as across cultures and contexts. In the present digital age when information technology is transforming the way business is conducted, conscious leadership is the need of the hour. This requires leaders to understand what their roles demand and ability to deliver on expectations. The paper posits qualities of conscious leaders, on the basis of a survey of more than 65 Senior Management from 62 organizations in India. The study also seeks to leverage Richard Barrett’s “Seven Levels of Personal Consciousness”, developed by extending concepts in Vedic science to elaborate Maslow’s needs hierarchy into levels of personal consciousness. According to Barrett, “our perceived needs are in reality a reflection of our consciousness, and what we value, consciously or sub-consciously, is reflected in the levels of consciousness from which we operate”. This study aims to understand the following: – Association between personal consciousness, and factors like industry, gender, age profile and work experience profile of respondents. – Important values for leaders in the present age – Qualities of conscious leaders – Association between values and qualities of conscious leaders – Reasons for leadership failure Factor analysis, respondent ranking and correlation analysis among others have been deployed to arrive at the results of the study. The key findings of the study are as follows: – Honesty, positive attitude, accountability, commitment and trust are the top five leadership values in the current era. – Leaders need to possess intellectual and emotional intelligence, as well as what the authors recommend to be awareness and proactive action towards positive impact on social and environmental issues. Further, leaders can improve functioning by adopting a systems orientation – ability to look at the whole, rather than the corporation in isolation. The authors find that higher the personal consciousness level, greater is the percentage of people who have rated systems orientation as an important quality in leaders. – Simultaneously, important barriers to leadership are breakdown of communication channel and ego. This study is exploratory and is unique in being able to empirically capture changing values and leadership qualities in response to evolving global environment. **P1**

**69 Dying All the Time** Susan Blackmore <susan.blackmore@virgin.net> (University of Plymouth, Plymouth, United Kingdom)

Here I sit, looking through my window at a menacing grey sky above wintry trees. I seem to exist; to be aware; to be a conscious perceiver having a stream of experiences. It’s easy to jump from the immediacy of this experience to the conclusion that this ‘me’ is the same one who drove home earlier today, sat down at my desk and will soon get up to make a cup of tea. I suggest the first part may be true but the second is not. That is, something corresponds to this sense of self here now, such as a model of self constructed by an active brain, but this is ephemeral. This is just one in a series of short-lived selves perpetually being born and dying again. Selves are constructed



as needed, for example when planning actions or worrying about the past, but they do not last. Our thoughts and actions soon move on and any particular self fizzles out. Then a new situation arises that requires a self and so one arises. This new self is, to be sure, somewhat similar to the previous one because it was constructed by a brain that has only slightly changed in the interim. Nevertheless it is not the same self. The previous self has died. Life is a series of such births and deaths. Yet for most people the illusion of continuity persists, giving rise to the fear of death. For those who are mindful the same self may carry on for minutes or hours without disappearing, but disappear it will in time, even if only when sleep takes over. But those who see through the illusion get used to the sensation of appearing out of nowhere and then dying again. For them the death of the physical body is just more of the same and not to be feared. What happens in near-death experiences? I have interviewed many people who have come close to death. Some had classic NDEs; many did not. But there is no doubt that NDEs tend to unfold from the tunnel and light, through an out-of-body experience, and on (less often) to other worlds, the decision to return and a personal transformation including loss of the fear of death. Religious believers interpret all this as the soul's journey towards life after death. Yet the science of NDEs shows that the tunnel and light depend on disinhibition in visual cortex, the emotions on endorphins, the life review on activity in temporal lobe, and the OBE on breakdown of the body image at the temporo-parietal junction. In the most profound NDEs the sense of a separate and persisting self breaks down, as it does in many mystical experiences of oneness, and the person returns to ordinary life in the full knowledge that they never were a persisting entity and so physical death is nothing to fear. Being born and dying again is just how it is and always was. **PL10**

**70 First-Personal Ontological Commitment, Self-Body Dualism and Contemporary Psychology** Renee Bleau, Frederique Janssen-Lauret, University of Campinas, Brazil <renee.bleau@glasgow.ac.uk> (School of Education, University of Glasgow, Glasgow, United Kingdom)

David Chalmers has provided a useful set of proposals as to why there has not been more progress in philosophy (Chalmers, 2103), including anti-realism, verbal disputes and sociological factors. We contend that for some questions, for example, the mind-body problem, philosophy alone will not provide answers. Rather philosophy together with psychology is needed to get to the truth of how mind and body are related, that is, a combination of a discipline which deals in the nature of things (philosophy) along with a discipline which deals in how individuals think, feel and behave (psychology). We assert that this working together of philosophy and psychology should be taken as a self-evidently sound way to proceed to investigate the mind-body problem. We hold that the metaphysics of mind and the social psychology of the individual are the relevant domains from each discipline to arrive at the knowledge we are seeking in order to make progress with the mind-body problem. We take seriously the ontological implications of contemporary psychological methodology. Our hypothesis is that the self is posited as an emergent entity in contemporary psychology, contrary to the claims of some prominent psychologists, for example, Hood (2012) who proclaims the self is an illusion. We combine Janssen-Lauret's doctoral work on posits with Bleau's knowledge of the psychology literature to endorse the novel methods used by non-behaviourist psychologists. We argue that they implicitly assume the existence of the self in two distinct ways. Firstly, they make indispensable use of the first person and therefore imply first-personal ontological commitments, presenting a significant challenge to the established third-personal Quinean paradigm. Secondly, psychologists' reliance on mental causation is best explained in terms of E. J. Lowe's self-body dualism, according to which the self is an independent substance with both mental and physical properties, which has a distinctive causal profile incapable of being described in exclusively physical terms (Bleau, 2012, 2013, Lowe 1996, 2008). Since according to classical Quinean ontological commitment, our best scientific theories are concerned with objects only qua playing a particular role in a system, not qua individuals, its canonical language of regimentation is wholly third-personal, proscribing the use of any first-personal, introspective, ostensive or acquaintance-based methods in the sciences. Janssen-Lauret argued in her PhD thesis (Janssen-Lauret, 2014) that Quine's criterion of commitment (Quine, 1948, 1969) is therefore deeply entrenched in his global holist, behaviourist epistemology. Although Quine's criterion of ontological commitment is widely accepted by analytic philosophers, the existing phil-



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osophical literature overlooks the fact that Quine's strictly third-personal methodology entails that he cannot countenance any use of introspective data in science. Introspection yields first-personal beliefs about the subject's own current mental states, usually by immediate privileged access. However, the science of psychology has a need for self-reports which are introspective in that sense. Furthermore, E J Lowe's thesis of self and body as distinctive entities provides a judicious explanation of psychology's commitment to self (Baumeister, 1987). **P1**

**71 The Essence of the Self: A Mathematical Model to Help Us Cheat Death** Daniel Caputi <dannycaputi@optonline.net> (Atmospheric Science, SUNY Stony Brook, Stony Brook, Suffolk)

Many scientists and philosophers would agree that understanding consciousness requires introspection into the nature of the self. Drawing from introspection, there are deducible aspects of the self which may have profound implications for the future of consciousness research. These implications would be important regardless of the discipline one approaches consciousness from, or whether one believes consciousness is local (in the brain) or non-local (in the fabric of the universe). Starting with Damasio's concept of "core consciousness" and a number of common uploading thought experiments, we can derive the existence of indivisible "core awareness's", also known as "selves" or "subjects", that are rooted in conscious perception in every conscious organism. While subjective experience with no attached self may be possible (though quite difficult to imagine), the importance of recognizing our mere perception of this irreducible core self is discussed. A distinction is made between an active subject (a subject that is conscious) and a potential subject (a subject that is unconscious). The concept of a potential subject can be used to index core awareness in a variety of contexts, such as the future awareness of a person under general anesthesia, the past awareness of a deceased person, or even the awareness's that will never exist in the infinite number of potential people that will never be born. We can then explore how this unique indexing approach may be necessary to answer some of the deepest questions about consciousness, including: (1) Why do you feel you are in your body rather than someone else's? (2) Why do we feel an irreducible self that all of our perceptions are linked to? (3) If you upload your brain onto a computer, would it be you? To answer these questions, the two general categories of views on consciousness (local and non-local) are considered, and mathematical concepts are used to show what the model of potential and active subjects would look like under both cases with geometric representation. The non-local case could comprise an infinite number of active subjects residing in universal fabric, each individual brain capturing only an infinitesimal slice of this mass consciousness. If this geometric form could be experimentally demonstrated, this would suggest that we conscious beings have natural immortality. On the other hand, if consciousness is determined to be local and restricted to living brains, our model would show that each brain selects one subject to activate out of an infinite number of potential subjects, and researchers would need to find a mechanism to explain how this selection is made. It may then be possible to use this mechanism to create an infinite number of immortal active subjects, including uploads of ourselves and resurrections of our ancestors, immersed in positive subjective experience. Drawing from the latest research on consciousness, I propose a place to start for making this an attainable reality. Additionally, I argue that with a complete understanding of the nature of the self as depicted in this model, we can transform our lives here and now. **P2**

**72 The Same Consciousness Theory of Personal Identity** Jenny Hung <jennyhungyours@gmail.com> (Department of Physics, The Hong Kong University of Science and Technology, Hong Kong, China)

The presentation offers a new theory of personal identity – the "same consciousness theory" (SCT). SCT, which is a modified simple view, proposes that (1) logically, there are no informative, non-trivial persistent conditions for verifying personal identity; and (2) that personal persistence is ultimately un-analyzable. Nevertheless, (3) persons need not be substances, and (4) SCT is a reductionism of personal identity, because it asserts that the concept of personal identity can be reduced to "the same P-consciousness", whereas the understanding of this consciousness does not contain the concept of a person. In this thesis, I try to modify Brian Garrett's (1998) and E. J. Lowe (2009)'s theories of personal identity. In order to do this, I propose the 'apriority argument'

(AA), which substantiates the same consciousness theory. Furthermore, by demonstrating the contradictory nature of conclusions drawn from first- and third-person perspectives, I advocate for a modified simple view. As such, I have developed the light analogy using a first-person perspective to reveal the determinacy of personal identity. Finally, I initiate the “zombie argument” for personal identity (ZA). I propose that although memory and psychological/physical continuity can act as useful tools in usual practices aimed at justifying being the same person over time from both first- and third-person perspectives, they do not logically guarantee the sameness of personal identity. By drawing on ontological distinctions between psychological functions and consciousness, I assert a pessimistic attitude towards the verification of personal identity. **P2**

### **73 The Importance of the Distinction Between Ownership and Unity in Debates of Consciousness** Jane Lin, Allen Y.Houng <jane820113@gmail.com> (Taichung, Taiwan)

Unity of consciousness plays an important role in the discussions of consciousness and the self. Among those ideas about unity of consciousness, Tim Bayne proposes that schizophrenic disorder of thought insertion is an example of having deficiency in subject unity. However, I will introduce the concept of ownership and argue that patients with schizophrenic disorder of thought insertion have problems with ownership rather than unity. Moreover, these two concepts, ownership and subject unity, should be distinguished and defined precisely, to make those debates become more complete. At any moment, we have a multiplicity of conscious experiences. I can simultaneously see the blue sky and a red car on the street, hear the sound of chatting, feel the sharp stomachache, and have the emotion of being tired. These experiences are tied together and only experienced by me, as if they are unified with each other. We describe this phenomenon as unity of consciousness. There are plenty of ways in which experience can be unified, while we consider only subject unity here. Conscious states are called “subject unified” when they are held by the same subject. Schizophrenia is a kind of psychosis. Patients who have schizophrenic disorder of thought insertion would claim that thoughts are put into their minds by alien agency. They deny that those thoughts are theirs. Bayne took this as an example of the deficiency of subject unity (Bayne, 2009). However, I claim that subject unity in these patients works well, problem lies in the operating of “ownership”. Self-ownership is the concept of properties are fully controlled and used by the person. With deficit in self-ownership, people will have problems attributing properties to themselves. However, those patients are still conscious of those experiences which they claim that are not theirs. That is to say, their subject unities are intact. Those contents of conscious states are still subject unified. The same distinction can be applied to the case of F.B. (Bottini, 2001), who attributes the touch senses on her arms to her children, and people with Cotard’s syndrome (Hans Debruyne et al., 2011), who think they have died and their bodies should not exist at all. **P1**

### **74 The Possibility of Shared Experience** Daniel Munoz <munozdanielb@gmail.com> (Philosophy, The University of Texas at Austin, Austin, TX)

We know that people can share brain matter—craniopagus twins are living proof of this. But might two subjects share an experience? (i.e., could two subjects undergo a numerically identical experience?) I will argue for a view on which shared experience is metaphysically possible, and two subjects who share an experience are not entirely distinct as subjects. This view is a natural extension of reductive views about personal identity and should be interesting in its own right. But it also promises to make the combination problem for panpsychism less troubling and shed light on issues related to the self. There are two main reasons to believe that shared experience is possible. First, this view helps us to make sense of imaginary cases in which two people are gradually changed into one, or one into two. In cases of unzipping, the left and right hemispheres of a person’s brain are slowly separated, neuron by neuron. At the beginning of the procedure, there is clearly only one subject; by the end, there are two. In cases of fusion, the brain of someone with only a left hemisphere is gradually fused with the brain of someone with only a right hemisphere; the number of subjects changes from two to one. In these cases, it is implausible that there is ever a sudden change in the number of subjects. The fusing or unzipping of any two neurons should not be able to make that kind of difference. But this is precisely what we are forced to accept if we deny that shared experience is possible. If experiences cannot be shared, then there is always a

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fact of the matter about how many subjects of experience there are during a case of unzipping or fusion, and the number of subjects is always discrete. If, however, shared experience is possible, there need not be a sudden change in the number of subjects. There could instead be a gradual change in how distinct the two subjects are. This seems like the most natural description of the cases. The second reason to believe in shared experience is that enough shared brain matter (doing the right sort of thing) should entail that the corresponding experience is shared, as well. This is a simple point, but it's enough to put pressure on anyone who accepts token-identity theories, pan-psychism, and other theories that posit a tight correspondence between token brain processes and token experiences. The most serious objection to the possibility of shared experience comes from functionalism. Functionalists can claim that shared brain matter will not correspond to a single shared experience, because the brain matter will be playing different functional roles in the two subjects' systems. There are two responses to this. First, this objection commits the functionalist to an implausible account of what goes on during unzipping and fusion. Second, there may be other kinds of cases in which functional systems share experiences; for example, cases in which one functional system is embedded in another. **P2**

**75 Unity of Consciousness and Virtual Selves** Robert Van Gulick <rvangul@syr.edu> (Philosophy, Syracuse University, Syracuse, NY)

Integration of various sorts – representational, functional or neural – plays a key role in many models and theories of consciousness. However, it is phenomenal unity that corresponds perhaps most closely to the traditional notion of the “unity of consciousness”. As Bayne has recently argued (2010), phenomenal unity seems to involve more than mere unity of content or unity of function. It plausibly requires that all the unified experiences be co-present together to a single conscious self, though questions arise about the nature of the relevant sort of self. What is this self to which these experiences are present together at a moment? Following an idea of Dennett, Bayne advocates a “virtual self” theory. Dennett (1992) described the self as a virtual entity akin to what he called “the center of narrative gravity”. Such a self is a virtual intentional entity defined as the point of view implicit in the stream of consciousness. It is not the author of that stream but merely the perspective from which the experiences of the stream cohere. Bayne argues that Dennett-type virtual selves are all that is required for the unity of consciousness. He concedes some may find his account insufficiently realist, but he replies that virtual selves are as real as selves get to be. To the contrary, I argue a more realist account is possible and required. The alternative view of the self I propose also makes use of the notion of the virtual self, but it does not identify the self with the virtual self. Rather it uses the virtual self as one component in developing a more realist model of the conscious self (2006, 2014). The proposal is to identify the self with the total integrated system of experiences when they cohere “as from the point of view of a single self”. The virtual self is the point of view defined by such a coherent set of experiences, and it is only when a set of experiences within a system defines such a coherent point of view, i.e. only when it defines a virtual self and understands itself as that self, that the system of experiences constitutes a self. The self needs to be constructed, and constructing it is in part of a matter of producing a set of experiences that cohere from the point of view of a virtual self. It becomes a unified self by understanding itself as that virtual self – the intentional self defined as the point of view of that set of experiences. But when the process succeeds, the self that is produced is a real self. Following what Kim (2005) calls “Samuel Alexander’s dictum” the reality of any entity or property depends on its causal status: does it make a causal difference? I argue that selves of the sort defined by my model are indeed causal and thus real – more real than the virtual selves of Bayne’s theory, which are little more than abstract noncausal intentional shadows. **C2**

**76 The Subjective Dimension of Consciousness and Self** Karen Yan <karenyan@ym.edu.tw> (National Yang-Ming University, Institute of Philosophy of Mind and Cognition, Taipei, Taiwan)

This paper concerns the subjective dimension of consciousness. Thomas Nagel (1974) characterizes this subjective dimension in terms of the phrase “something it is like for the organism” (436), and claims that it “is essentially connected with a single point of view”. (437). One way to approach this issue is to ask whether the point of view of consciousness has any connection to

some kind of self. Is it the case that consciousness is necessarily for a self or from the self's point of view? To answer this question, one needs to understand the relation between consciousness and self. In this paper, I analyze possible kinds of self and lay out possible relations between consciousness and self. I show that none of them can be an adequate relation to ground the subjective dimension of consciousness. Having shown that, I argue for an alternative according to which consciousness is necessarily for itself. Moreover, this intrinsic reflexivity (for itself) of consciousness is best explained by treating consciousness as a 'process' in a technical sense. That is, consciousness is a process that is a temporal, but not a developmental, occurrence which constitutes the directionality of time. Finally, I show how kinds of self can be built from this intrinsic reflexivity of consciousness, which can generate an appearance that consciousness is for a self, not for itself. **P1**

## 1.11 Free will and agency

**77 Thought Insertion and a Mental Sense of Agency** Dax Alford <alforddj@hendrix.edu> (Hendrix College, Rogers, AR)

The phenomenon of thought insertion, which is characterized by a subject experiencing thoughts as if they aren't their own and attributing them to another source, has raised many questions about the sense of agency and ownership of one's thoughts. Many people hold the view thought insertion displays a breakdown in the subject's sense of agency known as the standard approach. While this view is widely held, many have still argued that it does not adequately account for the phenomenon. Jean-Remy Martin (2013) claims that the standard approach does not account for the episodic nature of thought insertion – how the subject experiences their thoughts as fragmented – and why they reattribute the thought to another source. Martin says these problems can be avoided by taking an approach that views thought insertion as displaying a breakdown in the subject's sense of ownership over the thought. While Martin's approach does achieve its goal of conquering these issues, I believe that a standard approach can still successfully account for the phenomenon of thought insertion while also covering the questions that Martin says are left unanswered. This can be shown by focusing on an account of mental agency which identifies metacognitive control as being the source through which ones feels a sense of agency over their own thoughts, such as what Glenn Carruthers (2011) proposes. Carruthers takes a standard approach to the issue and proposes a cognitive account that holds many similarities with the one proposed by Martin, such as the necessity for proper contextual information to be integrated for one to completely experience a thought as their own. By identifying these similarities, it can be shown that many of the same conclusions which Martin draws through his approach can be drawn from the standard approach if one views mental agency in this way. By doing this, many of the problems which Martin identifies as keeping the standard approach from being plausible can be avoided. Works Cited: -Glenn Carruthers (2011): A metacognitive model of the sense of agency over thoughts, *Cognitive Neuropsychiatry*, (England: Psychology Press) -Jean-Remy Martin (2013): *Out of nowhere: Thought Insertion, Ownership, and a Context Integration*, (Paris: Institut Jean Nicod) **P2**

**78 Indeterminist Phenomenology is the Source of People's Belief in Indeterminist Freedom** Oisín Deery <oisin@oisindeery.com> (University of Montreal, Montreal, Canada)

Many people both believe in freedom and judge free agency as indeterministic. Libertarianism is the philosophical formalization of this view: freedom is inconsistent with determinism, and we're free. Although a minority philosophical position, libertarianism is strongly implicated in ordinary thinking. A number of empirical studies show that participants tend to regard human choice as indeterministic. Libertarians often cite phenomenology as the source of this belief: people's experience of deliberating and choosing leads them to believe that choice is inconsistent with determinism. Other recent studies indicate that libertarians may well be right about this (Deery et al., "Phenomenal Abilities," in *Oxford Readings in Agency and Responsibility*, 2013). However, Shaun Nichols ("The Indeterminist Intuition: Sources and Status," in *The Monist*, 2012) argues that people's belief in libertarian freedom cannot have its source in experience.

Nichols argues that agents believe they possess such freedom because they think the psychological factors that are introspectively accessible don't determine choice. Since people believe they have introspective access to all the psychological factors that influence choice, they infer that choice isn't determined. This inference isn't warranted, though, since people don't have access to all the psychological factors that influence choice. I claim that a shortcoming of Nichols' view is its backward-looking focus: it relies on the idea that people's indeterminist beliefs derive from introspection on the causes of decisions. This criticism also applies to similar views developed by Richard Holton ("The Act of Choice," in *Philosophers' Imprint*, 2006) and Terry Horgan ("The Phenomenology of Agency and Freedom," *Humana.Mente*, 2011). In fact, deliberation and choice are crucially forward-looking. When agents look to the future while deliberating, two aspects of agency become especially salient: the phenomenology of having alternatives, and the experience of being free to choose between them. These are some of the aspects of experience that libertarians most often cite as indeterministic. By contrast with Nichols' approach, Tim Bayne ("The Sense of Agency," in *The Senses*, 2011) embraces a forward-looking model, arguing that experience enables people to distinguish self-generated actions from involuntary bodily movements and the externally caused movements of objects in the environment. Yet Bayne's view fails to explain experiences of indeterminist freedom, or how belief in libertarian agency could derive from such experience. This is because Bayne's view focuses on perceptual experience, and perceptual experience cannot have as content that one is free to do otherwise. That would require a comparison of two or more distinct representations—the alternative possibilities themselves—in the mind, and that isn't a perceptual operation. I explain experiences of indeterminist freedom, and the source of belief in such freedom, by appeal to prospection, which is the mental simulation of future possibilities for the purpose of guiding action. Crucially, prospection can be experienced. Further, because of the way in which prospection models choice from the first-person perspective, it's easy for deliberating agents both to experience and to believe that their choice is indeterministic. Even so, belief in libertarian freedom isn't justified on these grounds. **C18**

## **79 Just Doing What I Do: Expert Bodily Action, Self-Consciousness and the Sense of Agency** James Dow <dow@hendrix.edu> (Philosophy and Neuroscience, Hendrix College, Conway, AR)

An expert second baseman throws a ball to first base. A veteran barista draws an espresso with considerable adeptness. A lifelong mechanic wields a wrench with unparalleled aplomb. These are examples of expert bodily actions (EBA), movements that are in the flow and respond to situations with consummate skill. When experts are asked to describe the sense of agency, the consciousness of one's being the cause of one's bodily movements, in EBAs, they often reply "I was just doing what I do." How do we account for the sense of agency in EBA while in the flow? Are agents engaged in EBAs self-conscious? In recent debates about EBAs, Hubert Dreyfus (2007a; 2007b; 2007c; 2013) has argued, "in absorbed activity the ego is altogether absent and only emerges with reflection" (2007b, 373). According to Dreyfus's maxim of vanishing self-consciousness, EBA what Dreyfus calls "absorbed bodily coping," cannot and does not involve self-consciousness. I will argue in this paper that Dreyfus's arguments for his maxim presuppose implausible assumptions about: 1) the distinction between bodily movements and actions; 2) the nature of intentional action and 3) self-consciousness. I argue that an alternative account of EBA that involves the sense of agency can be articulated. In the first part, I will consider three arguments that Dreyfus presents for his maxim: the argument from expertise, the argument from situation-specificity, and the argument from interference. After the central assumptions of Dreyfus's arguments are critiqued, I move towards a positive elucidation of the kind of sense of agency in EBA. In particular, I suggest that on a telic account of the sense of agency (Bayne 2010; 2011) (inspired by a naturalized interpretation of Anscombe's (1957) account of self-knowledge), self-consciousness can be involved in EBA. In the second part, I develop an account of EBAs independent of Dreyfus's influential account. I discuss how guidance control is involved in EBA (Fischer 2007), how EBA is a form of intentional action (Frankfurt 1978; Stout 2006), and in particular, and how experts are self-aware of EBAs, based in a telic account of the sense of agency. In the third part, I outline the telic account of sense of agency involved in EBA and respond to Michael Brownstein's (2013) recent objection to my account of self-consciousness in EBA. Brownstein argues that if self-consciousness were involved in EBA, then athletes would need to be able to answer Anscombean

questions, “Why” and “What” questions about their actions, but that answering such questions is incompatible with flow experience. I argue that the questions relevant for whether self-consciousness is involved in EBA are “Who” questions, and experts can answer “Who” questions. In the concluding section, I elucidate hypotheses about sense of agency in EBAs in light of empirical literature about expertise and skilled action in cognitive psychology and neuroscience. I conclude that when we consider self-consciousness in terms of a telic sense of agency, then the claim that expert bodily action cannot involve self-consciousness is undermined. **C18**

**80 Reviewing the Situation** Marcela Herdova, Stephen Kearns <marcela.s.herdova@gmail.com> (Department of Philosophy, London, United Kingdom)

According to situationism – which is a thesis based on experiments in social psychology – arbitrary environmental factors have significant influence on how we behave without us being aware of this fact. Given their nature, we would not want these factors to influence our behaviour if we knew about them. It has been argued that because we are not aware of the influence that these situational factors have on our actions, this suggests that (a) one’s (conscious) control over his or her behaviour is greatly reduced and that (b) agents do not know why they act in the way they do. In this paper, we argue that the threat of situationism has been exaggerated and that situationism – if true – does not undermine freedom of action and moral responsibility (both on compatibilist and incompatibilist accounts). After introducing situationism and the different experiments that the situationist thesis builds on, we discern five (alleged) threats to free agency and moral responsibility. These include lack of knowledge or uniformed decision-making; failing to act for reasons; the lack of cross-situationally stable character; diminished control over one’s actions; and the problem of moral luck. We argue against the threat of situationism in two ways. First of all, we challenge the significance of some of the studies typically utilized in support of situationism. Secondly, we tackle the individual concerns listed above and explain why situationism does not give rise to these threats and/or why these threats are not relevant to the question of freedom and responsibility. We argue that just as the knowledge of one’s past mental states and experiences and their influence on present actions is not required for freedom and responsibility, neither is the knowledge of one’s situational factors and their influence. Further, we propose that situationist experiments do not show that we do not act for reasons; explanations of one’s behaviour based on the influence of environmental cues and explanations in terms of agent’s reasons do not compete. With regards to the character concern, we argue that this alleged threat is based on the over-generalisation of the results and is not supported by the pattern and the variety of reactions that subjects exhibit in the experiments. In relation to control, we propose that the situationist experiments fail to show that our deliberative and rational capacities are bypassed. Situationism does not cast doubt on the efficacy of our choices, deliberative capacities, application of our skills or skilful execution of actions. Even though we may not be able to directly moderate the effect of certain situational factors, this does not entail that one or more measures of control over our decisions and our overt actions are diminished. Relatedly, while we are not (most of the time) responsible for what situation we find ourselves in, this is irrelevant with regards to freedom and responsibility given that we retain control over our actions even if we are subject to the influence of the environmental factors that we are not aware of. **C18**

**81 Cognitive Factors Correlating with the Metacognition of Free Will** Ken Mogi <kenmogi@qualia-manifesto.com> (Sony Computer Science Laboratories, Tokyo, Japan)

The feeling of possessing a free will correlates significantly with belief in paranormal worldviews, while that of qualia does not (Mogi, K. 2013). Here I investigate the correlation between the sense of free will and paranormal worldviews. Web-based questionnaires were conducted using the author’s twitter account (@kenichiromogi, with ~522000 followers at the time of investigation). The subjects were asked to give subjective ratings for how much they believed in the existence of free will (theoretical belief), and how freely they actually conducted actions in their daily lives (practical belief). In addition, the subjects were asked to give ratings for belief in four categories of paranormal worldviews (reincarnation, UFO, astrology, and psi.) The subjects were then asked to indicate the number of items they had sufficient knowledge to explain to other people out of 10 keywords given for each paranormal category (for example, “George Adamski”



and “Area 51” for UFO). After filtering and rectifying for irregularities, data for 2076 subjects (978 males, 1087 females, and 11 other genders, with average age of 37.5 and standard deviation of 11.3) were submitted to further analysis. There was a significant correlation between the theoretical belief in free will and belief in paranormal worldviews ( $r=0.164$ ,  $p=5.6 \times 10^{-14}$ ), but not with knowledge in paranormal worldviews ( $p=0.73$ ). There was a significant correlation between the practical belief in free will and belief in paranormal worldviews ( $r=0.123$ ,  $p=1.9 \times 10^{-8}$ ), but not with knowledge in paranormal worldviews ( $p=0.49$ ). Females had more paranormal belief compared to males ( $p=5.0 \times 10^{-54}$ ), while paranormal knowledge was the same between the sexes ( $p=0.37$ ). Free will has been argued to be an illusion generated by the brain’s circuit, “the mind’s best trick” (Wegner 2003). Believers in paranormal worldviews have been shown to be susceptible to suggestions and tend to misinterpret probability (e.g., Wiseman et al. 2003). In this context, belief in free will might correlate, for example, with the tendency of failing to recognize one’s own incompetence (Kruger & Dunning 1999). Keynes (1936) discussed animal spirits – a spontaneous urge to action rather than inaction. The positive correlation with belief in free will might account for the persistence of paranormal worldviews despite the advancement of sciences. I discuss the adaptive values of the cognitive processes related to free will in the evolutionary context. [References ] (1) Keynes, John Maynard, (1936) *The General Theory of Employment, Interest and Money*, London: Macmillan. (2) Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: how difficulties in recognizing one’s own incompetence lead to inflated self-assessments. *Journal of personality and social psychology*, 77(6), 1121. (3) Mogi, K. (2013) Cognitive factors correlating with the metacognition of the phenomenal properties of experience. *Scientific Reports* 3, Article number: 3354. (4) Wegner, D. M. (2003). The mind’s best trick: how we experience conscious will. *Trends in cognitive sciences*, 7, 65-69. (5) Wiseman, R., Greening, E., & Smith, M. (2003). Belief in the paranormal and suggestion in the seance room. *British Journal of Psychology*, 94(3), 285-297. **C18**

**82 Quantum Physics, Free Will, Determinism, Spirituality and Health** Hedaya Robert <rhedayamd@yahoo.com> (National Center for Whole Psychiatry, Chevy Chase, MD)

Does free will exist, or is predetermination the name of the game? Even worse, is all we experience really random? How does the resolution of this debate affect our day to day health? A lesson can be learned from the recent resolution of the nature-nurture dualism. Biomedical scientists have discovered a seamless process in which ones experience and the experience of one’s ancestors actually modifies whether and how genes are expressed. This new science of epigenetics has resolved the nature-nurture dichotomy in favor of unity: nature and nurture are inseparable. Based on the above I wondered whether the debate between determinism and free will is flawed by virtue of the same dualistic mind set. The postulate I have developed is that both determinism and free will exist together and they are mediated through what appears to be randomness. In this session I will provide the basis for my thinking, including data from three fields of human inquiry: quantum physics, neurology and mysticism. I will then explain the effect of this information on our individual and collective consciousness and health. **P2**

**83 Trying to Define Free Will: A Cognitive and Functional Model Proposal** Yann Schrag, Francoise Schenk; Christian Sachse; Christine Mohr <yann.schrag@unil.ch> (Psychology, University of Lausanne, Lausanne, Vaud Switzerland)

Free Will has been for a while now a very popular topic in a broad ranges of disciplines, from philosophy of mind, metaphysics, psychology, cognitive psychology, neurology to biology or even physics. While this generates a whole lot of very interesting data, it also increases the chances to get lost between all the different interpretations that emerges from the process. Here, we will not spend too much time on the ontological problem of the existence of Free Will, because we consider that it cannot be solved yet with our current methodological tools (see dedicated part of the poster), but rather try to propose a cognitive based model of what could be Free Will if it actually exists. The underlying idea of our model is that, instead of thinking about Free Will as an abstract concept and then trying to see if our reality allows this abstract concept to exist, we should rather build our concept of Free Will on something concrete. In order to do this, our model is based on a broad range of results from cognitive psychology studies investigating different topics as per-



ception, agency, decision making, as well as considerations about the dynamics of conscious and unconscious processes and the problem of the causality of conscious processes. **P1**

**84 Cognitively Penetrating the Sense of Mental Agency** George Seli <gseli@gc.cuny.edu> (St. John's University, Long Island City, NY)

Galen Strawson (2002) takes an opposing view to Christopher Peacocke (1999, 2007) on the issue of mental agency, arguing that relatively few of our mental events are actions, what I refer to as the non-agentive thought thesis (NATT). In partial support of NATT, Strawson argues that the \*sense\* of mental agency is very limited in scope, that is, careful introspection does not reveal a feeling that we are intentionally producing many of the mental events we normally think we \*do\* intentionally produce, including judgments and decisions, and even suppositions and imaginations. Rather, what is revealed is a phenomenal passivity, where thoughts are “delivered” to consciousness by the “ballistic” processes of cognition. At most, Strawson urges, one feels agentive in preparing oneself to receive thoughts, which he describes as “catalyzing” or “priming.” I argue that the normal phenomenology of thought is significantly less passive than Strawson claims, and that he effectively weakens the sense of mental agency via questionable beliefs about catalysis and the processes that mediate between catalysis and cognitive result. He implicitly regards catalysis as being of negligible efficacy, and the intervening mental ballistics as not being constitutive of the self. As a consequence, I suggest, his conative phenomenology is “cognitively penetrated,” i.e., qualitatively modulated by belief possession; specifically, it is rendered passive. But given that the beliefs are implausible, the phenomenology they induce does not support NATT. **C18**

**85 Correlates of Free Will in Philosophy, Religion and Science** Rajesh Sinha, Prem Sewak Sudhish <sinharajesh@gmail.com> (DEI Dayalbagh Educational Institute, Agra, India)

Free will or the concept of freedom of will in humans sits at the core of several major world religions as it strikes at the fundamental notion of all knowing omniscient power with divine foreknowledge contrasted with human endeavors wherein the match has to be made between grace and efforts in some way. Major world religions agree at some level of pre-determination of human destiny and have variations in how they handle amount of “real” freedom available to humans to make choices. For several religions with strong moral conduct emphasis, free will plays an important role as it brings in moral responsibilities of choices made by humans during their lives, which leads to subsequent fruits of actions (negative or positive) in accordance to doctrinal faith of the religion. Contrasted with world religions’ views based on scriptures and phenomenology, debates rage in western philosophical world on validity of concept of Free Will. These positions go from treating free will as a myth to a strong belief in free will – incompatibilists to metaphysical libertarianism – and several positions in between based on how it treats determinism and compatibility of free will with determinism. With the advent of quantum physics, the notion of determinism has taken a fall as compared to classical physics. Physical models offered at present are both deterministic and non-deterministic and subject to interpretations of quantum mechanics which themselves are being constrained by ongoing experimentation. Newer experiments in Neuroscience strike at the concept of volition. The laws of physics are yet to solve the “hard problem of consciousness” and according to some the hard problem of free will is intricately linked to the same and represents the core problem of conscious will – “does conscious volition impact the material world”. In this paper, we analyze and demonstrate the correlations between different philosophical schools of world religions, the western philosophical positions and the scientific positions in terms of similarities and dissonance. Also we define which clusters of three correlated viewpoints is showing an increased convergence given rapid advances in physical science and development of philosophical thoughts. **P1**

**86 Do Obsessive-Compulsive Disorder Patients Have Free Will?** Yunn Ueng, Allen Y. Houn, Karen Yan <sophia12315@hotmail.com> (Taipei, Taiwan)

Patients with obsessive-compulsive disorder (OCD) may have an overwhelming urge to wash their hands, to count their footsteps, or to do some other actions. OCD patients often indicate that they wish to get rid of hand-washing or footstep counting behaviors, but cannot stop doing so. They usually feel guilty when they do those actions. Based on such self-report, some people assert

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that OCD people have less free will. In this paper, I will discuss three aspects of free will and explore their relevance to OCD patients. Free will can be analyzed into three dimensions. The first dimension defines free will as being able to act otherwise. There must be some alternative choices open to us. If people cannot choose other possibilities, then they are completely determined and thus have no free will. The second dimension asserts that one acts with free will only when one is deliberating about what is the best choice under the circumstances. In other words, we have free will only when we have an intelligible reason for our choices. The third dimension links free will with the origination of the action. An agent acts with free will only when s/he is the origination of the action. Based on both the first and the third dimensions of free will, people may argue that OCD patients have less free will. However, based on the second dimension, there is still some space to argue that OCD patients have intact free will. Even though OCD patients cannot choose to behave otherwise, they can still make rational judgments based on different conditions. **P1**

### 1.12 Intentionality and representation

**87 Contextual Emergence of Intentional Systems** Peter Beim Graben <peter.beim.graben@hu-berlin.de> (Department of German Studies A, Humboldt-Universität zu Berlin, Berlin, Germany)

Contextual emergence has been proposed as a non-reductive relation between different levels for the description of systems (Bishop and Atmanspacher, 2006). It comprises necessary but not sufficient conditions for a higher-level description in terms of lower-level properties. Sufficient conditions are provided by contingent contexts implementing stability conditions on the system's dynamics. I shall discuss Dennett's Intentional Stance (Dennett, 1989) in the light of contextual emergence, illustrated with an instructive physical example, the so-called "magnetic surface swimmers" (Snezhko et al., 2009) that can be regarded as an instance of "apparent intentionality" (Tschacher and Haken, 2007). The behavior of these systems are perfectly understood at the level of the physical stance (Dennett, 1989, p. 16) in terms of self-organization and the nonlinear laws of hydrodynamics. However, it has been conceded at <http://www.wired.com/wired-science/2009/03/snakes/> that applying the intentional strategy to those objects is almost inevitable. Therefore, physicists are in precisely the situation of the "cleverer observer", Dennett (1989, pp. 23) discusses in order to address the alleged observer-dependence of intentionality. The "magnetic surface swimmer" example thus illustrates firstly that being a "cleverer observer" does not prevent one from employing the intentional strategy. But secondly it also shows that intentionality cannot be reduced to Laplacean physics because the physical stance works actually different: Bishop and Atmanspacher (2006) and Bishop (2012) have demonstrated that the phenomenological laws of, e.g., thermodynamics or hydrodynamics, are contextually emergent upon purposefully and rationally chosen contexts. Thus, I conclude that also intentional systems are contextually emergent. References Bishop, R. C. (2012). Fluid convection, constraint and causation. *Interface Focus*, 2(1):4 – 12. Bishop, R. C. and Atmanspacher, H. (2006). Contextual emergence in the description of properties. *Foundations of Physics*, 36(12):1753 – 1777. Dennett, D. C. (1989). *The Intentional Stance*. MIT Press, Cambridge (MA). Snezhko, A., Belkin, M., Aranson, I. S., and Kwok, W.-K. (2009). Self-assembled magnetic surface swimmers. *Physical Review Letters*, 102:118103. Tschacher, W. and Haken, H. (2007). Intentionality in non-equilibrium systems: The functional aspects of self-organized pattern formation. *New Ideas in Psychology*, 25:1 – 15. **C8**

**88 Unspecificity and Attention** Ned Block <ned.block@nyu.edu> (New York University, New York, NY)

According to the representationist perspective on the nature of consciousness, what it is like to have a perceptual experience is grounded in the representational content of perception – in the sense of ground recently explored by Kit Fine. One consequence is that according to the representationist perspective the phenomenology of perception cannot be more determinate than the representational content that is its source. This talk argues that the kind of determinacy that is increased by attention is not the same as the kind that is relevant to the alleged grounding of perceptual experience in representational content. **PL2**

## 89 Phenomenal Properties as Nonconceptual Representations: A Defense from Autism

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We argue that experiences can have (non-material) phenomenal properties as nonconceptual representations. We start with how David Papineau (2002, 2007) argues against Frank Jackson (1982) with his notion of phenomenal concepts. We will focus on Papineau's distinction between phenomenal concepts and perceptual concepts. Phenomenal concepts are the concepts for thinking about experiences, whereas perceptual concepts are the ones for thinking about the perceived objects or events, not experiences themselves. Papineau holds that the acquisition of phenomenal concepts requires the use of perceptual concepts, and that perceptual concepts can refer independently of phenomenal concepts. Based on these two claims, he infers that perceptual concepts do not refer via the "descriptions which invoke phenomenal properties" (Papineau, 2002, p. 111). We aim to undermine this claim from Papineau. We show that even if his distinction between phenomenal concepts and perceptual concepts is correct, the possibility that there are phenomenal properties is still open. We concretize this possibility based on nonconceptual representations. We show that perceptual concepts can refer via nonconceptual representations based on the case of autistic people (see Grandin, 2002). If this is the case, it implies that the existence of phenomenal properties is still compatible with Papineau's view. Having shown this, we then provide some reasons to suggest that it is better to identify phenomenal properties with nonconceptual representations. **P1**

## 90 Strange Bedfellows Paula Droege <pdroege@psu.edu> (Philosophy, Pennsylvania State University, University Park, PA)

A consciousness theorist might well puzzle at the collaboration of sensorimotor theorists such as Alva Noe with phenomenologists like Evan Thompson (Noe and Thompson 2004). For the sensorimotor theorist, the defining features of conscious experience are external to that experience. The capacities to perceive and act within an environment constitute the nature of phenomenal consciousness. No representations subserve these capacities; the world represents itself (Noe 2009). For a phenomenologist, the defining features of conscious experience are internal to that experience. Subject and object appear as reciprocal poles of phenomenal consciousness, constituted as the interdependence of representation with represented (Husserl 1913). Contra Thompson (2008), I argue that a representational realist account shows how these two apparently incompatible views fit well together to provide a description of consciousness as internal while maintaining its objects as external. Consciousness is not out of our heads; it represents an environment that is. **C17**

## 91 Teleosemantics and Generation Zero Jason Ford <jford@d.umn.edu> (Philosophy, University of Minnesota, Duluth, MN)

I present two problems for teleosemantics that appear when we consider how to account for a trait when it first appears in a creature's lineage. On the standard accounts of biological function used by advocates of teleosemantics, a biological trait only gains a function after it has been selected for, by providing some benefit to the possessors of the trait over their competitors who lack it. Consider the first creature in a lineage to gain the ability to see the color red. In that very first creature, wherein the trait first appears (I call this generation zero, since the next generation is the first generation where that trait can have a biological function), the trait does not yet have a function. And since it has no function, it does not represent anything – not even red. In the first generation, what accounts for the ability to respond to red items in the environment, if there is no representation? Is it possible for the creature in generation zero to make any errors with respect to this new ability? Those are the facets of the first problem. The second problem builds on the first: a form of the inverted spectrum problem. In this scenario, imagine that two creatures of the same species both develop, at the same time, the ability to see red. One of these creatures uses the sort of neural processes that would cause, in us, the experience of phenomenal red, and the other creature uses the sort of neural processes that would cause us to see phenomenal green. Can teleosemantics distinguish between the representations in their offspring? Several possible solutions to each problem will be considered, and their respective theoretical costs evaluated. **P1**

**92 No Pain, No gain (in Evolutionary Fitness): Finally, a Representum for Hedonic Experience** Benjamin Kozuch <bigben@email.arizona.edu> (Philosophy, Cognitive Science, The University of Arizona, Tucson, AZ)

Reductive representationalist theories of consciousness (such as those due to Fred Dretske and Michael Tye) attempt to assimilate all phenomenal properties to representational properties. While such theories show much promise, one thing that they have thus far lacked is a satisfying account of pain experiences. The problem here does not concern many of the aspects that pain experiences have: Pains are typically experienced as having things like a location, volume, and shape, all properties appearing amenable to representational analysis. However, pain experiences also have a hedonic component, the part of pain experiences that make them hurt. Chief among the problems the representationalist faces here is that it is not clear what, if anything, the hedonic component could represent. Similar observations can be made about the positive hedonic component that pleasurable experiences possess. This paper attempts to shed light on this issue, arguing that hedonic experiences represent fitness effects (i.e., the effects that an event has on an organism's chances of successfully passing on its genes). Here is the argument: Hedonic experience has some intrinsic connection to motivation, in that whatever causes a positive or negative hedonic experience is something that one is motivated to avoid or pursue (respectively) in the future. We can further observe that the more intense the hedonic experience is, the stronger the ensuing motivation will be. The ability of hedonic experience to motivate means that evolution will exert selective pressure in an attempt to make the polarity (i.e., positive or negative) and intensity of hedonic experiences covary with the average fitness effects of the event-types causing them. This selective pressure explains why a bite of cereal tends to bring about a positive hedonic experience of but modest strength; why the act of copulation tends to bring about a positive hedonic experience of much greater strength; and why both events tend to bring about a hedonic experience that is positive rather than negative. Now consider the teleological theories of intentionality that the reductive representationalist relies upon, which fix the content of a representational state according to what that state has been designed to covary with. Assuming such a theory of intentionality is correct, and given that natural selection exerts selective pressure to bring about covariance between hedonic experiences and the average fitness effects of events, it seems that hedonic experiences must represent these fitness effects; or, more conservatively, that they must represent these fitness effects, or not represent at all. **P2**

**93 Emotions: Driving a Wedge Between Intentionality and Consciousness** Cecilea Mun <cecilea@gmail.com> (Philosophy, Clemson University, Greenville, SC)

The question of what emotions are has become increasingly significant to questions about consciousness. Yet, exactly how research and theorizing about emotions can contribute to such concerns may not be too clear. One way that such research and theorizing, especially interdisciplinary research and theorizing about emotions, can contribute to the discourse on consciousness is to challenge the traditional notion of intentionality, and thereby clarify the relation and importance of the notion of intentionality to the notion of consciousness. Within the philosophical discourse on emotion, cognitive theorists typically account for the intentionality of emotions by referencing some form of thought, defined in terms of judgments, propositional attitudes, seeing-as-es, construals, appraisals, etc. Such identifications give cognitive theorists a *prima facie* explanation for how emotions are intentional. In contrast, contemporary noncognitive theorists typically offer causal-functional accounts, which explain the intentionality of emotions in terms of perceptions of bodily responses. Both approaches assume a traditional notion of intentionality, which regards intentionality as the mark of the mental, and both approaches aim to explain how emotions are or can be intentional. What defines the intentionality of emotions, however, is not how emotions can be intentional, but why emotions are intentional or what makes emotions intentional. What makes emotions intentional is that they involve relations between aspects of the world and the subject's well-being. Thus, the intentionality of emotions consists in this relation alone. Given this conclusion, many psychological theories of emotion challenge the claim that intentionality is the mark of the mental, and thereby drive a wedge between the notion of intentionality and the notion of consciousness. Many psychological theories of emotion, such as basic emotion theories,

appraisal theories, and psychological constructionist theories, regard emotions to be processes or episodes, which are constituted by a series of either causally related, or psychologically related, mental or physical events (inclusive disjunctions used throughout). Yet, emotions, nevertheless, involve relations between aspects of the world and a subject's well-being. Emotions are intentional as complex mind or body processes that relate aspects of the world to aspects of a self. This way of understanding emotions and their intentionality does not strain standard intuitions about what emotions are and how they are intentional, including talk of emotions as having "intrinsic" or "original" intentionality, while also allowing the same notion of intentionality to be applied to complex, and perhaps amalgamated, processes as unified events or episodes of experience. By doing so, this conclusion calls into question a central assumption about the traditional notion of intentionality assumed by some theories of consciousness—that intentionality is a sufficient condition for conscious mental states. It blocks the appeal to distinctions between original, or intrinsic, intentionality and derived intentionality, which certain theories of consciousness rely on in order to bridge the gap between intentionality and consciousness. However, this conclusion also successfully maintains the intended distinctions between intrinsically intentional states and states with derived intentionality, which strengthened the intuitive appeal of the notion of original, or intrinsic, intentionality and theories of consciousness that rely on such notions. **P2**

**94 There is No Such Thing as Derived Intentionality** David Pitt <dalanpitt@yahoo.com> (Philosophy, California State University Los Angeles, Los Angeles, CA)

I argue in this paper that intentionality is an essentially experiential phenomenon, and, hence, that only mental states can have it. All intentionality is "original"; there is no such thing as "derived" intentionality. Intentionality cannot be conferred upon anything, because experience cannot be conferred upon anything. Consequently, things like signs, sentences and symbols cannot have it, even derivatively. They are not the kinds of things that could have it, since they are not experiences. It is, rather, only our perceptual experiences of, and thoughts about, such things that have intentionality. Moreover, if all intentionality is experiential, then the mind – that which thinks and perceives – extends only as far as experience does. In particular, it does not extend to non-experiential states of the brain, to the non-conscious body, to artificial devices external to the body, or to the external environment. Such things are, at best, only causally relevant to what goes on in the mind. **C3**

**95 Information, Q-bits, and Natural Reference: A Bridge From Bit to It to Autopoiesis to Mind** Laura Weed <weedl@strose.edu> (Philosophy, The College of St. Rose, Albany, NY)

This paper argues that the traditional matter/mind or mechanism/intentional system dichotomies are false dichotomies, and that the traditionally understood mental attributes, such as intentionality, and being meaningful can be understood as complex constructions of simpler mental and quasi-mental properties of nature such as self-organization and choice of directionality. I show that a wide variety of such quasi-mental properties occur in degrees throughout nature. This argument will rely on replacing the traditional western substance/properties metaphysics with a metaphysics of fields and processes. Since fields and processes are dynamic, interactive and open ended, they do not suffer from the static status and boundary limitations that restrict substances and properties, and so they can act and perform in ways that substances and properties could not. The argument will show how a fields and processes metaphysics is also more compatible with contemporary physics, cosmology, biology, ecology, and computer science, than is the Aristotelian and Newtonian substance and properties analysis of reality. The argument will incorporate recent work by Paul Davies, Terrence Deacon, David Deutsch and others on information theory. This body of recent work has claimed that information should be considered more basic to the nature of reality than matter is. Deacon also stresses the relational nature of what he calls 'Shannon entropy' and the centrality of relational entropy states in the nature of reality, which suggests that a fields and processes view of reality will be more productive than a substances and properties view in Philosophy of Science. I will describe how a basic ontology of intentional information relations can explain all of reality from quantum physics and mechanistic physics, through self-organizing systems and ecological systems, to autopoietic organic systems and ultimately to minds that are

embedded in ecological and organic systems. The resulting view of nature will be of a panpsychic, information-based natural world consisting of dynamic fields of relations, processes and systems that are self-organizing and inherently intentional. Intentionality may become most focused in organic systems, but even there, it is embedded within larger ecological systems with which it is dynamically interactive. The argument will agree with authors such as Deacon, Evan Thompson and Francisco Varela that autopoietic systems achieve the highest level of teleonomic activity, but will insist, in opposition to their theories, that intentionality is not limited to autopoietic systems. Using ecological analysis by JJ Gibson and Holmes Ralston III, I will insist instead that all of nature exhibits information-based intentionality. For if all of reality consists of fields of entropic relations, grounded in an information-based reality, even systems of dynamic relations that do not feature DNA and membranes, as Thompson specifies the criteria for autopoiesis, may still exhibit relations that are not traditionally designated as mechanical. The argument will claim that these relations are sufficient to supply a bridge from bit to it to autopoiesis to mind. **P2**

**96 Computation, Non-natural Semantic Information, and Representationalism** Rex Welshon, Mikhail Luzov <rwelshon@uccs.edu> (Philosophy, University of Colorado at Colorado Springs, Colorado Springs, CO)

Representationalism remains a fundamental theoretical posit of many species of cognitive science, in large part because most contemporary cognitive scientific theories spell out the nature and function of psychological processes in terms of representations and representations in terms of computations realized by the nervous system. Computationalism takes the brain to be analogous to a computer in which representational processes are inputs to, transformations on, and outputs of computational processes. And, just as representationalism supports computationalism, computationalism in turn supports representationalism, for representational processes, like computer programs, are semantically evaluable. Piccinini and Bahar (2013) have recently argued that while the central nervous system is computational and while the kinds of computations it performs are relevant for explaining psychological processes, these computations are neither analog nor digital, but neural, a *sui generis* kind of computation. If successful, these arguments undermine prominent species of computationalism, and, as a result, the explanatory category of representation as motivated by digital or analog computationalism appears threatened. If so, then computationalists must provide a revised defense of the role and relevance of representations in their theories. In this paper, we take up a part of this challenge. We introduce Piccinini and Bahar's distinctions between generic, digital, and analog computation and between non-natural and natural semantic information. They put these distinctions to use in an argument for the conclusion that neural processes, while instances of generic computation, are instances of neither digital nor analog computation, but instead comprise a distinct kind of computation, viz., neural computation. A crucial claim in this argument is that information processing entails computation but not vice versa. Piccinini and Bahar use the consistency of computation without information processing and the denial that neural computation is digital computation to warrant a neutral stand on the necessity of representations in neural computation. We then analyze some of the necessary conditions that must be satisfied if non-natural semantic information is to be realized by and processed through neural computations. We focus in particular on the misrepresentational capacities of non-natural semantic information. Using Peirce's distinction between indices and symbols and Grush's (2007) distinction between presentation and representation, we argue that indices and natural semantic information are presentational and that symbols and non-natural semantic information are representational. We further argue that only those representational processes that can be causally decoupled from their causal sources can misrepresent. One question for the computationalist is thus whether causally decoupled neural computational processes can host non-natural semantic information. Supposing they can, it is another question whether explanations of at least some cognitive capacities must rely on decoupled, non-natural semantic information processing. If they must, then representations and misrepresentations do after all play a required role in some cognitive scientific explanations. **P2**



**97 Naturalising Representational Content Using the Free-energy Principle** Michael Zehetleitner <mzehetleitner@psy.lmu.de> (Department of Psychology, Ludwig-Maximilians-Universität München, Munich, Germany)

How can one physical state be about another physical states, and potentially be wrong at that? How should such an 'about'-relation go beyond causal, probabilistic, or information theoretic relations? Especially, how could 'aboutness' be defined without reference to intentional agents or terms? This set of questions would be marginal or irrelevant, if 'aboutness' were not a fundamental construct in the central paradigms to explain human and animal behaviour, of cognitive psychology, neuroscience and philosophy of mind. Especially theories of consciousness rely heavily on the concepts of representation and 'aboutness' in the sense of intentionality. Consequently, consciousness can only be naturalised, if also representational content can be naturalised. The present work first defines five benchmark properties any naturalisation of representational content has to meet: (i) expression the about relation as an asymmetric, domain- and element-specific mapping, (ii) a natural operation to specify this mapping, (iii) the possibility of content to diverge from the true state of the target domain, (iv) normativity which allows true content to be 'more valuable' than false content, and (v) semantic complementarity, i.e., capturing both indicative as well as imperative content within one account. Second, it demonstrates that existing accounts such as information theory, causal theories, signalling games, and teleo-semantic accounts each fail on at least one of these benchmarks. Finally, it applies Karl Friston's free-energy principle to formally derive a definition of representational content. The core idea is that representational content derives its specificity and its normativity from evolutionary adaptivity, i.e., the appropriateness of an organism's behaviour in relation to those aspects of an organism's environment, which causally affect its structural integrity. Adaptive behaviour within the free-energy framework is defined as a causal structure, within which actions decouple the negative log-likelihood of a structurally intact organism (i.e., surprise) from causally relevant changes in the environment, in other words, adaptive actions maintain a surprise-homeostasis. From control theory (especially, the good-regulator theorem), it can be derived that a system which maintains surprise-homeostasis must have a specific causal topology and that specific information theoretic restrictions must hold. Specifically, in such a surprise-homeostatic system, there must exist internal states which have a maximally possible amount of mutual information with surprise-relevant aspects of the environment. The representational content of internal states in surprise-homeostatic systems then is that state of the surprise-relevant environment, for which the action, the internal states causes would be most adaptive. This mathematically formulated 'about'-relation satisfies all five benchmark conditions mentioned above. Finally, the naturalisation of representational content is beneficial for the conceptualisation and future naturalisation of phenomenal content. **P2**

## 1.13 Philosophy of perception

**98 How to Unify Theories of Sensory Affect: An Adverbialist Proposal** Murat Aydede <maydede@mail.ubc.ca> (Philosophy, University of British Columbia, Vancouver, BC Canada)

A lot of qualitatively very different sensations can be pleasant or unpleasant. I like tasting slightly chilled ripe strawberries on a hot summer day. I like the smell of a warm Ciabatta loaf just taken out of the oven. I like stroking the hair of my cat peacefully purring on my lap. I like hearing the laughter of my son. What, phenomenologically, unites these otherwise very different sensory episodes when I categorize them as pleasant? Similarly, I intensely dislike the sound and the feel of my fingernails scraping the chalkboard. I dislike the smell of rotten fish in my garbage. I dislike the taste of spoiled milk. I dislike pains. Again, what unites these qualitatively quite different sensory experiences when I find them unpleasant? A similar question naturally arises even within a single sensory modality such as pain when, for instance, we reflect on all the different kinds of sensory pain we can experience: qualitatively, a pinprick on my toe has almost nothing in common with the gnawing ache I feel in my abdomen when I overeat. Yet they are all painful (unpleasant). What makes them so? Insightfully answering these questions turns out to be difficult. The enormous variety and diversity in the qualitative phenomenology of all pleasant experiences (as well as unpleasant ones) is striking, and many theorists have taken this to be a

decisive reason to think that if some experiences are pleasant/unpleasant, they are so not because of their qualitative phenomenology. This is sometimes known as the “heterogeneity problem” for any intuitively phenomenological conception of pleasure (and, generally, of positive and negative affect). Part of the problem is the lack of a model on the basis of which we can understand the phenomenology of sensory episodes with positive or negative affect. I will start by critically examining some traditional theories of pleasure (as developed more or less within the tradition of value theory) and note their strengths and weaknesses. There are basically two groups of theories. The Felt-Quality Views that conceive of sensory affect as having an introspectively available common phenomenology or qualitative character face the “heterogeneity problem” of specifying what this common phenomenology is. In contrast, according to the Attitudinal Views, what is common to all pleasant or unpleasant sensations is that they are all “wanted” or “unwanted” in a certain sort of way. The commonality is explained not on the basis of phenomenology but by a common mental, usually some sort of conative, attitude toward the sensation. I will criticize both views and offer an alternative framework that combines what is right in both while avoiding their unintuitive commitments. The result is the reductive (psychofunctionalist) adverbial sensory modification view of pleasure and displeasure according to which affective phenomenology can be identified with a form of adverbial modification of sensory quality space. One of the interesting consequences of my proposal is that, if successful, it has the potential of unifying these apparently diverse theories that are thought to be in competition with each other. **C20**

**99 The Dominance of the Visual** Stephen Biggs, Dustin Stokes <biggs@iastate.edu> (Iowa State University, Philoso, Ames, IA)

Theorizing about perception should be based on extensive studies of each sense, not exclusively, or even primarily, on studies of vision. Vision, nonetheless, is special. But what makes vision special? One can approach this question in many ways. One might imagine losing senses, or investigate actual losses, considering which loss would-be, or is, most destructive – although people may say they care most about vision, losing proprioception would surely be more destructive. One might imagine building a creature from the ground up, asking which sense would be needed first in order for the others to develop qua senses, Martin (1992) uses this strategy to argue that touch is especially important. One might consider whether vision has intrinsic properties that no other sense has, and whether any such properties are significant, Strawson (1959) uses this strategy to argue that vision is special because it alone is intrinsically spatial. We pursue a different, complementary path, starting from an extrinsic property of the visual: its dominance of other senses. Quite roughly, the visual dominates another sense S, say audition, with respect to property P if the visual asymmetrically affects how auditory stimuli that are relevant to identifying P are processed, where the effect is asymmetric in that the auditory has no comparable effect on how visual stimuli that are relevant to identifying P are processed. We find that the visual dominates with respect to a wide range of properties in psychologically and epistemically significant ways, such that the dominance of the visual partly explains why we can rightly say that vision is special. We first identify three levels at which a sense can be dominant, the levels of experience, experience-based judgment, and all-things-considered judgment. Then, taking touch as our test case, we argue that vision exercises two kinds of dominance, perception-perception dominance, in which visual perception affects how we interpret non-visual stimuli, and imagery-perception dominance, in which visual imagery affects how we interpret non-visual stimuli. We then consider why vision exercises these kinds of dominance over touch, and how this makes vision both psychologically and epistemically special. This allows speculation about the conditions in which vision dominates touch. We close with a rough generalization to the relation between vision and other senses. **C17**

**100 Phenomenological Bias and the Zombie Quarantine Problem** Craig DeLancey <craig.delancey@oswego.edu> (Philosophy, SUNY Oswego, Oswego, NY)

For several years, and in several publications, the author has argued that the canonical arguments for anti-physicalism with respect to consciousness (i.e., the modal, zombie, and knowledge arguments) would appear valid if paradigmatically mysterious phenomenal experiences were either (1) not physical phenomena or (2) extremely complex representational events. (Here the

notion of complexity used is descriptive complexity, also known as Kolmogorov complexity.) Position (2) has the following consequence. If paradigmatically mysterious phenomenal experiences are extremely complex representational phenomena, and if this alone explained their apparent mysteriousness, then we can predict that phenomenal experiences that are simple would fail to appear mysterious. I argue that this is so. We are not inclined to believe there is any explanatory gap between having the representations involved in reasoning out that  $2+2=4$  and the experience of reasoning out that  $2+2=4$ . The experience just is the reasoning out of the problem. But many philosophers treat such simpler phenomenal experiences to eliminativism, arguing that they do not exist. That is, many philosophers argue that there is no experience of what it is like to reason out that  $2+2=4$ . In this paper, I argue that this eliminativism leads to a fundamental problem for the anti-physicalist. This eliminativism makes zombies of those of us who claim to have a phenomenal experience of adding 2 and 2. We claim to have an experience where we have none, just like zombies claim to experience red but do not. But this means the zombies have escaped quarantine: they are in the actual world, not some distant possible world. And this would have catastrophic epistemic consequences, since all phenomenal judgments made in the actual world would be dubious. For example, if this world is a zombie world, then it is possible that no one has phenomenal experience. To avoid such a consequence, the eliminativist needs an error theory. The most plausible error theory is that there is a bias among those who claim to have an experience of reasoning out that  $2+2=4$ . After all, such philosophers include many physicalists who see the benefit to their theory if there exist such experiences (namely, a representational theory of consciousness will be more parsimonious if all subjectively conscious representations constitute phenomenal experiences). But that is the same accusation that the author has made of the anti-physicalist eliminativist: I claim that some anti-physicalists deny that reasoning out  $2+2=4$  results in an experience because that would be a problem for their anti-physicalist arguments. We now have a position of symmetry: the physicalist and the anti-physicalist assert the other side has a bias in their phenomenology. But that then means that phenomenology has no claim to being mere observation. It is theory laden or theory-influenced. And so to decide between opposing phenomenological views, we need to evaluate the theories of the phenomenologists. The criteria for theory evaluation include productivity, coherence with other mature theories, and parsimony. By the measure of all such criteria, physicalism is the victor. C1

**101 Expect Surprises: Prediction in Perception of Absence** Anya Farennikova <anya.farennikova@gmail.com> (School of Philosophy, UNC Chapel Hill, Irvine, CA)

Experiences of absence are conscious recognitions that an object is missing from a location or a scene. For instance, you may notice that your blazer is missing a button, that this word is missing a letter, or that a child is missing a front tooth. Even more strikingly, you may see that your car is absent from the place where you had parked it. Cases like these point to a close connection between experiences of absence and expectations. The reason you see the absence of the car is because you expected to see the car at the place where you had left it. This leads to a generalization: we experience absences of objects when we form expectations to see those objects, and our expectations are violated. This claim about expectations, if true, has two important consequences. First, it underscores the role of metacognitive feelings (Flavell 1979; Koriart & Levy-Sadot 2000) in perception: if experiences of absence essentially involve expectancy violations, absence detection will be manifested in one's conscious phenomenology via feelings of novelty or surprise. Moreover, the claim would lend further support to the anti-modularist thesis about cognitive penetrability of perception (Fodor 1983, 1984, 1988, 2000; Churchland 1988; Pylyshyn 1999; Siegel 2012). Violation of expectation is expressed via various forms of perceptual modulation in deviance-, error- or novelty- processing: expectations affect one's looking time, gaze patterns, detection speed, and the appearance of perceptual attributes (Summerfield & Egner 2009 for review). In addition to these variables, in perception of absence, expectations affect what one sees. It is because we expect presences that we see absences. Absence perception therefore presents a case in which cognition influences what we see. I defend two claims in this paper. First, I argue that there is only a contingent link between absence perception and expectations. We may see absences without expecting anything about presences. This constrains the anti-modularist

conclusions one might wish to draw from experiences of absence. Second, I use this conclusion to argue for a distinction between expectational states and other kinds of psychological states whose functional role may be confused with that of expectations. This distinction has implications for the predictive coding approaches to perception (Rao & Ballard 1997; Friston 2005; Howhy 2014), which extensively appeal to expectations as determinants of perceptual content, as well as expectancy paradigms in animal and human cognition. I conclude by showing that perception of absence raises new questions about metacognitive feelings of unfamiliarity and surprise, and allows us to further distinguish the novel from the unpredictable. **C17**

### **102 Personalizing the Objective World by Subjectivizing, Somaticizing, Mentalizing and Flavorizing It** Bill Faw <bfaw@bpc.edu> (Psychology, Brewton-Parker College, Mount Vernon, GA)

Subjectivize: Because we have some brain states with conscious content, our perceptual systems subjectivize the objective-world: converting it into the-world-as-we-perceive-it. Even in our first year, we created a vast knowledge of objects and developed intuitive concepts like object permanence, personal agency, and folk physics. Every moment of our waking life, we create almost non-stop first-person experiences with profound causal effects on our interaction with the world. Somaticize: In the process of creating our perceived-world, we began to somaticize it: carving out a sense of self and body in distinction to the rest of the world-as-perceived. As a baby, we responded differently to objects that we ourselves moved, and turned around to get candy spotted in a mirror. At about 18 months, we could wipe our forehead smudge, after spotting it in the mirror. Via exteroceptors, interoceptors, and proprioceptors our body-as-perceived is constantly created from-the-outside and from-within. Mentalize: We mentalize the objective-world by creating an inner mental world. Object-permanency at about 7 months may signify the development of mental imagery (Piaget) and the creating of a mental world. Our visual, visuo-spatial, auditory, tactile, smell, and taste perceptual mechanisms feed into wakeful and dream mental imagery, with varying abilities for spontaneous vividness and image control. Our ability to hold perceptions in working memory, allows us to mentally-look at the perception, as well as physically-look at the world. We learned overt-talking before learning covert-talking: inner-speech. The latter activates higher speech circuits, while inhibiting lower circuits. Then most of us learned to run conscious inner-hearing along with our inner-speech. We were able to move from overt motor responding to covert motor imagery; and then to motor-thinking, again activating higher motor circuits while inhibiting lower ones. This motor-thinking may be what brings Aristotle's 'judgment' to thinking, while perceptual/imagery and language/verbal-thinking circuits supply Aristotle's 'imagination' thinking content. Flavorize: The subjectivized world-as-perceived, somatized, and mentalized, still needs to be flavorized\*, by engaging with it emotionally. Flavor includes taste, smell, texture/viscosity, fat content, temperature, visual appearance, pain, degree of hunger, and satiation on that particular food. The brain circuits which bring us literal flavor project to areas for abstract representations of reward and punishment: Flavor\* – the reinforcing circuits for Primary Reinforcers, crucial for most behavioral responses and experience of Emotion. The orbital-frontal circuits of this system morph from rapid emotional responses to nuanced appraisals, responses, and working-memory emotional experience. A lifetime of these flavor\* nuanced appraisals, responses, and experiences, builds a personal system of values and preferred responses – a personality and a moral self. Those lacking in this process tend to impulsivity or sociopathy. We live in the objective-world, but spend much of our waking life subjectivizing it into the world-as-perceived; somaticizing it with our body-as-perceived; mentalizing it by our inner mental world; and flavorizing it with emotional responses, which build our personality and moral self. **C4**

### **103 The Saliency of Pain: A Structural Account of Pain Affect** Sina Fazelpour <sina.fazelpour@gmail.com> (Philosophy, University of British Columbia, Vancouver, British Columbia Canada)

Bodily pain experiences involve a sensory-discriminative aspect that differentiates pain experiences from other experiences and individuates one pain experience from another pain experience with respect to the type of pain, its spatio-temporal characteristics, and intensity. In

addition, bodily pain experiences are typically painful; they are hurtful and unpleasant to the affected organism, and they motivate this organism to display avoidance or protective behaviors. In short, pain experiences typically involve an affective-motivational aspect, or pain affect. In recent years, there has been an increasing effort to account for pain affect in intentionalistic terms. According to intentionalism, broadly construed, the phenomenal character of conscious experiences is determined by a subject bearing intentional attitudes towards contents. In this paper, after discussing the challenges facing current content-based views, such as representationalism and imperativism, and attitude-based views, I argue for an alternative account of pain affect, based on recent empirical findings regarding the relation between pain affect and attention. According to this alternative, “structural view” of pain affect, pain affect is (at least partly) constituted by the phenomenal salience of a sensation representing an object as threatening to one’s bodily integrity, where the phenomenal salience consists in the involuntary capture of the experiencing subject’s attention by the threatening stimulus. In virtue of this phenomenal salience, the sensation of the threatening stimulus interrupts the subject’s prior attentional engagement with other tasks by causing and causally sustaining a new attentional set prioritizing avoidance or protective behavior. The structural view will be clarified by explicating and defending its core claims against a number of possible objections. **C20**

**104 Pain As Enactive Perception** Alice Kyburg <kyburg@uwosh.edu> (Philosophy, University of Wisconsin Oshkosh, Oshkosh, WI)

Pain is mysterious in many ways. I believe that some of its mystery is dispelled when one understands it as a perception among many competing for representational space. Whether you feel pain and how it feels is thus a function of what activities you are engaged in and what your high priority goals are. It may also have to do with relevant sensorimotor knowledge. The interface between pain experience, action and goals is explored in this paper. Reference is made to Alva Noe’s enactive perception, Ruth Millikan’s pushme pullu representations, and work by Dana Ballard et al on animate vision. **P2**

**105 The Argument From Hallucination Debunked** Riccardo Manzotti <manzotti@mit.edu> (Communication and Behaviour, MIT, Department of Philosophy, Milan, Italy)

Contrary to a widespread tradition, an argument is presented that considers whether hallucinations, dreams and illusions may all be explained in terms of veridical perception or, at least, in terms of processes sharing a similar causal structure with veridical perception insofar as the relation causal relation between real objects and neural activity is taken into account. What is the object of my experience when I do hallucinate a dagger? Is it a mental object, an internal object, a sense datum, a (mis)representation or is it an actual physical object albeit misplaced. Contrary to the traditional account of the argument from hallucination since Smart’s work (and more or less as it has been later revisited in Valberg 1992, Robinson 1994, Johnston 2004, Fish 2009, Martin 2004, Macpherson and Platchias 2013), here it is questioned whether the traditional premise is true – namely whether it is true that when one hallucinates, one is not aware of any mind-independent, physical object. Is it possible to locate a proper physical real object for any known case of hallucination? Here it is claimed that it is indeed the case. Eventually a theoretical argument against the traditional argument from illusion is presented. Furthermore, the papers fleshes out an optical model that, by taking advantage of a temporal kaleidoscopes and mirrors, shows how it is possible, in principle at least, to reduce every possible instance of hallucination to an actual case of temporally postponed actual perception. The advantages of such an account are that one needs neither to consider an expensive ontological commitment to sense-data nor to buy a disjunctive account. Dreaming and illusions might as well be explained in the same way. It is normally held that naive realism entails disjunctivism: if naive realism is true, then the kind of mental state that is involved in a veridical perception? a mental state that relates the subject to elements of the mind-independent environment – could not be involved in a hallucinatory situation (Fish 2009). However, given the argument presented here, such a conclusion might be resisted insofar as the same mental state would be fixed also by the same external object. Thus, hallucinatory and perceptual state would be phenomenally akin because they would be fixed in their content by the

## 1.0 Philosophy

same actual object (or by otherwise indistinguishable actual physical objects). This strong perceptual nature of hallucination would be consistent with psychological and neurological evidence that shows how hallucinatory content is, to a great extent if not always, constrained by one's previous experience. As far as is known, hallucinatory content is totally derived from the external world. Furthermore, hallucinations of both complex and elementary features (attributes/objects) are based on the same neurological mechanisms and pick up features. More importantly, activity associated with a (veridical) percept is located within the cortical area specialized for the attribute perceived and that area is the same that is activated for the corresponding hallucinatory content (ffychte 2005; 2013). In short, neural evidence suggests that perception and hallucination may indeed be much closer than usually assumed. **C17**

**106 The Intramodal Experience of Eye Contact** Axel Seemann <aseemann@bentley.edu> (Philosophy, Bentley University, Waltham, MA)

There is a specific phenomenal quality to eye contact with another person. We look 'at' inanimate objects but 'into' someone's eyes. Looking into someone's eyes gives you the experience, rightly or wrongly, of a privileged access to that person's state of mind. Some developmental psychologists (Trevarthen, Hobson, Reddy) seek to characterise the experience of eye contact, and more generally of face-to-face encounters, in terms of some kind of attunement or harmonization of the involved persons' mental lives. However, not all eye contact leads to such attunement. It is easy to think of scenarios in which eye contact plays an important functional role but in which the states of mind of the involved persons are not attuned to each other at all. Just think of a mugger glaring at his terrified victim, or two drivers exchanging looks in an attempt to determine who gets to cross the intersection first. The question of this paper is how to characterise the common phenomenal characteristic of face-to-face encounters as diverse as these. The question is important for a variety of reasons. It matters because eye contact plays an important communicative role, and because a grip on its phenomenal dimension is necessary for an adequate account of joint attention. It is, however, not easy to address the question. As the above examples show, the content of experiences of eye contact can vary greatly. So it is the structure, rather than the content, of such experiences towards which this paper turns in search of an answer. The claim is that the experience of eye contact comprises both perceptual and proprioceptive elements, which can only be individuated relative to each other. The experience of eye contact is intramodal in that sense. It bridges the gap between 'inner' and 'outer'. The argument for this claim turns on Meltzoff's and Moore's work on facial imitation. They suggest that imitation, construed as an intentional rather than a transductive phenomenon, requires a framework that makes the matching of perceived with proprioceptively felt facial expressions possible. The present paper argues that if imitation is to be thought of as intentional, this framework has to have a phenomenal dimension. Only if we stipulate a kind of experience that has both proprioceptive and perceptual elements, can we explain how intentional imitation is possible. This kind of experience, so the argument continues, occurs in episodes of eye contact. It is because humans are capable of social experiences which present both a perceptual 'outer' and a proprioceptive 'inner' domain that intentional imitation is possible. The implications of the claim are potentially far-reaching. If it is correct, it opens up a new way of thinking about the 'joint' element in joint attention and (some forms of) collective action. That element is, if the present account is on the right track, not best thought of as a 'sharing' or 'attunement' of states of mind. Rather, it is to be explained in terms of an experience that presents the perceiver and the other person in relation to each other. **C3**

**107 What is the Scope of Aesthetic Experience?** Nicholas Silins <ns338@cornell.edu> (Philosophy, Cornell University / Yale-NUS College, Ithaca, NY)

In the first half of the talk, I examine Blindspot, the thesis that you experience a part of a work of art only if you attend to that part. I critically examine support for Blindspot one might draw from discussions of inattentional blindness. I also discuss whether some artistic practice presupposes that Blindspot is false. In the second half of the talk, I examine Surface, the thesis that if you can't tell two works of art or experiences of art apart, then they have the same value for you. Surface applies to experiences as well as works of art and other entities. I review how one might support Surface, and then reject Surface in light of discussions of change blindness. **C10**



**108 Perceiving the Link between Cognitive Science and Buddhism** Victor Swift <victor.swift@mail.utoronto.ca> (Psychology, University of Toronto, Toronto, Ontario Canada)

The author argues that the emerging model of perception in the cognitive sciences is an active model in which deliberate perceptual engagement gives rise to refined perception. The author goes on to illustrate that this same active model forms the foundation of the Buddha-Dharma. Consequently, this shared model of perception provides a means to integrate the projects of cognitive science and Buddhism. The manner in which cognitive science and Buddhism can refine one another via said perceptual model is discussed. **P2**

## 1.14 Miscellaneous

**109 Consciousness and the Novel** Rebecca N. Goldstein <rebegolds@gmail.com> (New York, NY)

It's sometimes argued that the hard problem of consciousness provides the very subject matter of literature, with poetry aiming to capture the particularity of qualia and novels aiming for the particularity of the inner world of an individual. Though I don't quite buy this, I do think that the novel has some light to shed, not so much on the hard problem itself, but rather on the problem of why we bring such starkly different intuitions to it. **PL4**

**110 DNA Consciousness, Human Consciousness and Posthuman Consciousness** John Grandy <khyber\_john@yahoo.com> (Orchard Park, NY)

The Theory of DNA consciousness was originally proposed in 2005 and was first published in the literature in 2006 [1]. Since then a vast amount of scientific data has been organized to support the two main proposals of this theory which are: 1) that DNA molecules possesses various degrees of consciousness, and that 2) DNA (along with RNA and proteins) can give rise to higher degrees of consciousness e.g. cellular consciousness and human consciousness. Previous works have demonstrated that DNA is autopoietic and behaves in a manner consistent with a degree of consciousness [2]. More recent research has demonstrated that DNA consciousness can be objectified on three dynamic levels [3]. These three dynamic levels of DNA consciousness are: 1) gene-gene interactions (epistasis) 2) interactions with other nucleic entities (e.g. the nuclear DNA with the mitochondrial DNA) 3) interactions with DNA and the external environment. Collectively this supports the first proposal of DNA consciousness- that DNA is a degree of consciousness. When DNA consciousness gives rise to human consciousness this has been proposed to take place in three neurogenetic phases: 1) the emergence of neuron-based consciousness 2) the continuum of neuron-based consciousness 3) neurodegeneration. These three neurogenetic phases of human consciousness have been established in two current publications [4, 5]. With the advent of genetic engineering, this technology may be capable of further driving the evolution of consciousness beyond the boundaries of human consciousness ushering in a new era of posthuman consciousness [6]. This can be supported when evaluating neurogenetic techniques that attempt to reverse neurodegenerative disorders e.g. Alzheimer disease [7]. However, in the future can these neurogenetic treatments be used on individuals without neurodegenerative disorders? Will the opening of this door propel the evolution of posthuman consciousness i.e. the era of selected genetic destination [8]. This presentation explores the journey from DNA consciousness to human consciousness to the possibility of posthuman consciousness. 1. Grandy, John (2006). Consciousness. In: The Encyclopedia of Anthropology. Vol. 2 pp 563-566. Sage Publications, Inc. Thousand Oaks, California. 2. Grandy, John (2011). The DNA molecule is autopoietic, dynamic, evolving, and a form of consciousness. The International Journal of Arts and Sciences 4: 20: 7-28. 3. Grandy, John (2013). The Three Dynamic Levels of DNA Consciousness. Forthcoming: Oct 2013. 4. Grandy, John (2013). The Neurogenetic Correlates of Consciousness. In: The Physics of Reality: Space, Time, Matter, Cosmos, 8th Symposium in honor of Jean-Pierre Vigié Edited by: R.L. Amoroso, L.H. Kauffman, & P. Rowlands: 479-483. 5. Grandy, John (2013). Three Neurogenetic Phases of Human Consciousness. The Journal of Conscious Evolution 9: 2013. 6. Grandy, John (2013). The Three Neurogenetic Phases of Human Consciousness and Posthumanism. Forthcoming from the proceedings of the 5th Beyond Humanism Conference: Rome 2013. 7. Grandy, John (2012). Alzheimer Disease and DNA Consciousness Academic Journal of Science 1: 3; 169-184. 8. Gran-

dy, John (2010). Selected Genetic Destination and the Rise of Homo Sapiens Genomicus. *The International Journal of Arts and Sciences* 3; 9: 166-190. **P2**

**111 De/constructing Consciousness** Paul Kulchenko <paul@kulchenko.com> (Computer Science, University of Washington, Kirkland, WA)

I present a definition of consciousness and put forward a theory of consciousness based on synthesis of “enactivism” (Ellis and Newton, 2010), the supramodular interaction theory (Morsella, 2005), the anticipatory approach (Pezzulo and Castelfranchi, 2007), and the emulation theory of representation (Grush, 2004). First, I deconstruct consciousness by reviewing mechanisms that need to be in place to support it. I consider how consciousness could have emerged to resolve conflicts for skeletal muscles between plans triggered by future needs and immediate action tendencies generated by encapsulated systems. I then review how the proposed theory can be used to answer questions like “why short-term memory capacity is limited”, “why experience is unified?”, “why we cannot experience two things at the same time?”, “what phenomenal states are for?”, “why some tasks become automatically executed routines and some require consciousness?”, and “what exactly zombies are missing?” Finally, I discuss implications of the theory for machine consciousness. – Ellis, R. & Newton, N. (2010). *How the Mind uses the Brain*. – Grush, R. (2004). *The emulation theory of representation: motor control, imagery, and perception*. *Behavioral and Brain Sciences* 27:377-442. – Morsella, E. (2005). *The function of phenomenal states: Supramodular interaction theory*. *Psychological Review*, 112, 1000-1021. – Pezzulo, G. & Castelfranchi, C. (2007). *The Symbol Detachment Problem*. *Cognitive Processing*, 8(2), 115-131. **P1**

**112 How to Explain Subjective Temporality** Joseph Neisser <neisserj@grinnell.edu> (Philosophy, Grinnell College, Grinnell, IA)

One of the most persistent problems about consciousness is to understand how anything like a first-person perspective could arise in the world (Levine, 2001). This has come to be called the ‘subjective’ dimension of experience (Kriegel, 2009). The first-person perspective consists in an identification free form of situated cognition (Ismael, 2007; Cassam, 1997; Shoemaker, 1996; Evans, 1982). One phenomenological dimension of this first-person perspective is temporality (Gallagher & Zahavi, 2012). Husserl called this dimension of experience ‘inner time consciousness’ and analyzed it as a continuous structure of protention and retention partly constitutive of the first person perspective. Any science of consciousness should strive to be phenomenologically valid. It should not only identify the neural correlates of consciousness, but also begin to make intelligible why experience should be as it is, e.g., why it should take the form of an identification free first-person perspective with a temporal dimension. So, temporality is an explanandum for any putative science of experience. I argue that we are beginning to explain not only how animals navigate the environment (a functional account), but also why first-person coping should be as it is. Evolutionary developmental biology depicts animal mental life as a matter of ‘embodiment’ – that is, as caused by the particulars of neural development and morphology. The evo-devo framework treats organisms as developmental systems composed of homologues. Thus, to explain an embodied mind would be to show how and why the activity and dynamic interaction of homologues form the causal basis of the first-person perspective. Biologists often explain a given character by citing its history, not its function (Ereshefsky, 2012). This homology thinking about subjectivity promises a fine-grained causal explanation of particular forms of embodiment. Subjectivity arises as a historically conditioned moment within a developmental system composed of homologues and their interactions. This compositional approach to embodiment, in turn, promises a naturalized and explanatory form of neurophenomenology, continuous with affective neuroscience and evolutionary developmental biology. I contrast this historical approach with enactive neurophenomenology, arguing that the latter is insufficiently naturalistic. Neurophenomenological research should focus on the comparative and developmental basis of the first-person perspective; i.e. on homology thinking about subjectivity. To test this claim, I apply homology thinking to temporality. I argue that temporality is the affectively valenced ‘slope’ that results from the particular way animals like us navigate our world. The neural mechanisms of temporality therefore lie in the

ML-DA system, wherein cognitive maps are governed by affective systems. I conclude with a call for future research into the links between the ventral striatum and the hippocampus. C19

**113 Conceptual Topologies and Models of Consciousness** Robert Prentner <robert.prentner@phil.gess.ethz.ch> (ETH Zuerich, Zuerich, Switzerland)

In this contribution we wish to present a basic model describing conscious experience. It consists of a number of processual or process-related concepts, that is, concepts whose instances are processes that exhibit some particular feature of consciousness. The main hypothesis of this contribution is that any conceptual notion of consciousness is best understood as sufficiently complex structure that embodies the model. In a first step, the processual concepts making up the model are described by their phenomenology. In a second step, the notions of conceptual space and conceptual topology are defined in a mathematical scheme, which shall account for the hypothesis that consciousness is (i) holistic and (ii) a processual unity. Eventually the interrelations and mutual dependencies between different concepts are discussed on a phenomenological level and with respect to some scientific and philosophical theories of consciousness. The basic idea is to start with a thin description of concepts, enrich the model by the mathematical notion of concept topology, and arrive at the typical assertions made by phenomenological and theoretical accounts of consciousness. Instead of identifying a particular 'mark of consciousness' and building up a theory around it, our model regards consciousness as sum of integrated processes, resting on a plurality of different experiential modes. A corollary of this is the overall inseparability of consciousness into independent components ('atoms of experience'). Still, the conceptual space of the model may be divided such that so called complexes are identified on a reduced conceptual space. A complex might give rise to an 'emergent concept' working within the larger context of the model. Some examples of emergent concepts shall be discussed. Our model is not particularly committed to any metaphysical thesis. Its aim is to integrate several empirical or philosophical theories and assess their explanatory reach. P2

## 2.0 Neuroscience

### 2.01 Neural correlates of consciousness (general)

**114 Global Workspace Dynamics** Bernard J. Baars <bbaars@comcast.net> (The Neurosciences Institute, Berkeley, CA)

A global workspace (GW) is a functional hub of binding and propagation in a population of loosely coupled signaling elements. GW architectures can mobilize numerous knowledge sources to resolve focal uncertainties. Since the natural world is full of unpredictable dangers and opportunities, there may be a general adaptive pressure for brains to resolve focal ambiguities quickly and accurately. In humans and related species the cortico-thalamic (C-T) core is believed to underlie conscious perception, thinking, learning, feelings of knowing (FOKs), felt emotions, visual imagery, working memory, and executive control. The C-T core has many anatomical hubs, but conscious percepts are unitary and internally consistent at any given moment. This suggests that a brain-based GW capacity cannot be localized in a single anatomical hub. Rather, it should be sought in a functional hub – a dynamic capacity for binding and propagating neural signals over multiple task-related networks, a kind of neural cloud computing. Over time, conscious contents constitute a very large, open set. It seems that conscious contents can arise in any region of the C-T core when multiple input streams settle on a winner-take-all equilibrium. The resulting conscious gestalt may ignite any-to-many broadcasting, lasting ?100-200?ms, and trigger wide-spread adaptation in previously established networks. To account for the great range of conscious contents over time, the theory suggests an open repertoire of binding coalitions that can broadcast via theta/gamma or alpha/gamma phase coupling, like radio channels competing for a narrow frequency band. The 100-ms "binding time" for conscious contents may themselves be embedded in a longer cognitive cycle ~600 ms, as shown in the event-related potential. Consciously-mediated learning typically takes many repeated exposures to novel information. Conscious moments

are thought to hold only 1-4 random items; this small focal capacity may be the biological price to pay for global access. Visuotopical maps in cortex specialize in features like color, retinal size, motion, object identity, and egocentric/allocentric framing, so that a binding coalition for the sight of a red billiard ball in nearby space may resonate among activity maps of LGN, V1-V4, MT, IT, as well as the dorsal stream. Such spatiotopical activity maps can bind into coherent gestalts using adaptive resonance (reentry). Sensory percepts may bind and broadcast from posterior cortex, while non-sensory FOKs may involve prefrontal and frontotemporal areas. In the intact brain the hippocampal complex may support conscious event organization as well as episodic memory storage. Dynamic GW theory can also explain the distinctive fact that conscious contents are reportable, either by words or by pointing acts, like matching-to-sample responding. In the brain, high-accuracy reportability of conscious stimuli depends upon long-range phase locking between a coalition of active sensory maps, and similar maps in prefrontal cortex, the executive regions for motor control. Since accurate reportability is the most widely used behavioral index of conscious contents, dynamic GWT can also explain its own most commonly used observational index. Publications: <http://www.nsi.edu/users/baars> – Baars BJ, Franklin S, Ramsay TZ. (2013) Global workspace dynamics: cortical “binding and propagation” enables conscious contents. *Front Psychol.* 2013 May 28;4:200. doi: 10.3389/fpsyg.2013.00200. eCollection 2013. Scientific affiliations: The Neurosciences Institute, La Jolla; The Krasnow Institute; George Mason University, Cognitive Computing Research Group; University of Memphis; website: <http://www.nsi.edu/users/baars>; Publications: Baars & Gage (2012) *Fundamentals of Cognitive Neuroscience: A Beginner’s Guide*. Elsevier/AP; Baars & Gage (2010) *Cognition, Brain and Consciousness: An Introduction to Cognitive Neuroscience*. Elsevier/AP. 2nd Ed. **PL5**

**115 Transcranial Ultrasound (TUS) Stimulation at the Scalp Vertex Increases Self-Ratings on a Buddhist-Based Nonattachment Scale** Michael Goldstein, Sanguinetti, JL; Tyler, WJ; Hameroff, S; Allen, JJB <[mgoldstein@email.arizona.edu](mailto:mgoldstein@email.arizona.edu)> (Psychology, The University of Arizona, Tucson, AZ)

Ultrasound can be used to stimulate brain activity. Recently, Sanguinetti et al. [1] found that transcranial ultrasound (TUS) targeting the frontal cortex affected mood in healthy undergrad participants. Some participants reported varying levels of “nonattachment” to current mental states in post experiment questioning. The current study examined the effects of TUS stimulation with varying cortical targets and stimulation parameters on self-ratings with a Buddhist-based nonattachment scale. Methods: Data from 130 participants (mean age 18.8 / 1.3 years; 49.2% female) who were randomized to one of five conditions using two scalp locations (right frontal, overlying site F8 in the 10-20 EEG system, or vertex at Cz), two time lengths of stimulation (30 seconds or 10 minutes), and a sham condition, were included for analysis. Participants completed a modified version of the Nonattachment Scale (NAS) proposed by Sahdra et al. [2] during TUS stimulation and again 20 minutes after stimulation. Results: Internal reliability analysis of the modified NAS for this sample yielded a Cronbach’s value of .825. Neuroanatomical estimates of cortical TUS targets suggested primary stimulation locations of ventrolateral prefrontal cortex for the right side and dorsal anterior cingulate cortex for the vertex condition. A 2 (time) x 5 (condition) mixed model ANOVA of NAS total score demonstrated a trend for time x condition interaction,  $F(4,123) = 2.13, p = .082$ , while no main effects were observed. Follow-up tests showed that only the 30-second vertex stimulation, targeting the vertex, yielded a significant change in NAS rating (during: 18.2 / 4.8, post: 20.2 / 4.4,  $p = .025$  with Bonferroni correction). Conclusion: These results suggest a selective increase in nonattachment self-ratings via brief (30 second) TUS stimulation administered at the scalp vertex. Prior research has demonstrated associations between meditation training, adaptive patterns of nonattachment (e.g. response to adverse stimuli), and activation of the anterior cingulate cortex (ACC), an area located below the vertex and involved in attention regulation and affective processes. In pain research studies, for example, meditation training led to comparable or even reduced levels of pain intensity and reduced levels of unpleasantness, which was correlated with increased ACC activation during stimulus presentation [3,4]. Although there is no evidence to confirm that the current study specifically stimulated the ACC, modeling data of the ultrasound parameters (30 s) suggest the ultrasound energy could reach the ACC, although

preferentially the dorsal sub-region that is primarily associated with cognitive rather than affective processes. Further research is indicated to examine the effects of TUS stimulation on constructs related to nonattachment (e.g. mindfulness and acceptance), to delineate the temporal pattern of these effects, and to evaluate the potential benefit for clinical conditions (e.g. depression and anxiety). Support: This research was supported by a grant from Neurotrek and the National Science Foundation Graduate Research Fellowship Program (to MRG). [1] Sanguinetti et al. (2013), *Psychophysiology*, 50(S1), S36. [2] Sahdra et al. (2010). *J Pers Assess*, 92(2), 116–27. [3] Lutz, et al. (2013). *NeuroImage*, 64, 538–46. [4] Zeidan, et al. (2011). *J Neurosci*, 31(14), 5540–8. C7

**116 Consciousness and the Connectome: How Brain Circuits Encode Self** Kenneth Hayworth <kenneth.hayworth@gmail.com> (Ashburn, VA)

In recent years scientifically-minded materialist philosophers have provided a set of conceptual tools for how to avoid logical mistakes when discussing the mind-brain problem. Dennett: It is an ill-posed question to ask exactly where and when a neural representation becomes conscious in the brain; the consciousness of a representation can only be judged by its causal influences on subsequent representations. Metzinger: There is no “true” self in the colloquial sense, only a Phenomenal Self Model (PSM) which the brain maintains to help organize its long-term planning. Within the PSM, qualia are represented to have been experienced, and decisions are represented to have been made by a self, but these representations are not secondary records of “actual” consciousness, they are themselves primary and carry full explanatory power for conscious behavior. Parfit and Kolak: There is no “further fact” about personal identity beyond the elements which make up a person’s unique psychology (memories, skills, personality traits, etc.). These conceptual tools have served to shrink our inflated folk-psychology views of self and consciousness down to size, and have cleared a path for a true science of consciousness based on neuroscience and cognitive models explaining exactly how the brain might compute and use a PSM. In this talk I will first discuss how our best computational model of human cognition (the ACT-R cognitive architecture) might be capable of supporting a PSM through production rules tailored to generating and processing self-modeling declarative memory structures. I will then detail how these parts of the ACT-R architecture are likely mapped onto the brain’s neural circuitry. Symbolic representations involved in memory and perception are encoded as stable attractor states within autoassociative brain networks, and production rules are implemented as feedforward pattern recognition networks. Such a model implies that all that is unique about an individual’s mind boils down to a set of discrete attractor states and pattern associations which are robustly written into the synaptic connections among cortical neurons. As the neuroscientist Sebastian Seung succinctly puts it: “I am my connectome”. If true, then there are some startling implications, the most important of which may literally be a cure for death. We are now on the verge of having the technology to preserve an individual person’s unique brain wiring using chemical fixation in a manner which is compatible with today’s 3D electron microscopic imaging technologies. This feat has already been demonstrated for a laboratory mouse’s brain. If developed into a medical procedure, such precision brain preservation will give us a scientifically verifiable way to preserve all that is unique about an individual in a static form which could last millennia -time enough for humanity to develop the technology to upload that person’s connectome into a computer simulation thus reconstituting all that is uniquely them. PL11

**117 Investigating pristine inner experience: Implications for consciousness science, developmental psychology, neuroscience, and self-understanding** Russell Hurlburt <russ@unlv.nevada.edu> (Psychology, University of Nevada, Las Vegas, Las Vegas, NV)

(1) Pristine inner experiences are thoughts, sensations, feelings, seeings, and so on, phenomena that occur before the footlights of consciousness in everyday environments. You spend nearly your entire waking day (\*except\* when you intentionally introspect) immersed in your pristine experiences. Perhaps surprisingly given their ubiquity, many (probably most) people, including (probably most) psychologists and consciousness scientists, are unaware of the features of their own pristine experiences or of the experiences of others. (2) My colleagues and I have claimed that it is possible to provide high-fidelity descriptions of inner experience and have advanced

Descriptive Experience Sampling (DES) as a method that can do so. DES uses a random beeper in natural environments to signal participants to attend to the experience that is ongoing at the moment of the beep, to jot down or otherwise record notes about that experience, and then with the help of an interviewer to describe that experience. I will provide an overview of some results of DES investigations. (3) I will describe a study that used DES in an fMRI scanner and show that the DES/fMRI combination may open new opportunities for neuroscience. (4) I will present provocative speculations about inner experience, discussing for example how the inner experience of left-handers may differ from that of right-handers; how the inner experience of adolescents may differ from that of adults; how the inner experience of the elderly may differ from that of younger adults; whether obsessive individuals actually think about their obsessions all the time or mistakenly believe that they do so; what are the characteristics of experience in schizophrenia, depression, or multiple personality; and so on. Some of these speculations are diametrically opposed to commonly held scientific views, illustrating the potential that high-fidelity first-person apprehensions can contribute to scientific understanding. (5) But I will also discuss why the exploration of pristine experience is difficult and whether it is possible for science to overcome those difficulties. **PL7**

**118 Introducing Impulsing: A New Way of following Impulse Activity – in the Form of Lightning-like Impulse Trails – That Shows How Energizing Areas of the Nervous System Forms the Conscious Stream** Denise Ingebo <12treetop@gmail.com> (Impulsing LLC, The Dalles, Oregon)

This model/theory outlines the result of a study based on the hypothesis that it is possible to define conscious experience in terms of activity in the Nervous System. The model is made up of a core concept (and set of corollaries) that proposes the presence of lightning-like, self-sustaining impulse trails—called impulsing—in the Nervous System. This activity gives insight into the formation of the conscious stream. It also explains what it takes to restore and maintain healthy functioning throughout the system. The personal conscious stream was looked introspectively as a reel of film (on which each discrete instant, e.g. thought or specialized sensation like emotion) was considered to be a frame on the reel. A thorough review of particular experiences (of conscious instants) was then associated with the areas of the System identified as being related to conscious work (e.g. the cortex is involved in memory). The identification of activity in the system that leads from one frame to the next resulted in the core concept, the presence of evolving, converging impulse trails. An impulse trail begins as sensory neurons embedded in the body absorb the energy they are exposed to and immediately translate it into another form (electrochemical energy or impulses) of energy. They then generate a pattern of impulses to the circuitry's next group, and so on, through the system's linked neuron groups—forming a lightning-like impulse trail. As evolving incoming trails converge and overlap on a common pattern in more central groups, the reinforced pattern propels a stronger self-sustaining impulse trail forward. From this, it can be inferred that the system's general work is to monitor and resolve the simultaneous states the body is exposed to, to maintain balance or homeostasis. Impulsing can then be used to propose corollaries that show the specific work done as four areas (simplified) of an inner circuitry (the conscious pathways) are energized to form the conscious stream. In the first area, from sensory neurons to the thalamus, an evolving impulse trail puts an intangible sensation into consciousness. At this point, the model proposes each trail that passes and energizes the thalamus puts a single conscious instant into the evolving conscious stream. As the trail continues to the cortex (second area) a record of the conscious instant just experienced is formed, as a pattern of fused neurons, which fits into a network of records. The trail goes on to energize related records. In the third area (cortex to thalamus) when energized areas gather and overlap on a common pattern, a reinforced trail is generated back to the thalamus—entering a thought—into consciousness. In the fourth area (a sub-circuit, from cortex, to body tissue, back to thalamus) the emotions inherent in muscle tensions are formed and released. This corollary meets the original goal of identifying the activity in the Nervous System responsible for maintaining emotional balance. In short, impulsing may be as fundamental to understanding how the Nervous System works, as electricity is to understanding how an electrical device works. **P1**



**119 The Unified Context of Consciousness** Zoran Josipovic <zoran@nyu.edu> (Contemplative Neuroscience Lab, New York University, New York, NY)

The phenomenal unity of consciousness has been a much-debated topic. Many disparate processes in the brain appear to be unified in moments of conscious experience. But this unity does not seem to be a fixed property. Our conscious experiences can be more or less fragmented, so that on one end of the spectrum we can have dissociative states with a relatively low level of unity, while on the other end we can have states of consciousness such as those experienced through contemplative practices, which appear to have a very high degree of unity. I will present new findings from our lab that point to the network in the brain that may facilitate these enhanced states of unity, and is, perhaps, involved in all unified conscious experience. **C14**

**120 Consciousness: Here, There But Not Everywhere** Christof Koch, Giulio Tononi <koch.christof@gmail.com> (Allen Institute for Brain Science, Seattle, WA)

The science of consciousness has made great strides by focusing on the behavioral and neuronal correlates of consciousness. However, these correlates cannot explain even basic facts, for example why the cerebral cortex can give rise to consciousness but the cerebellum does not, though it has even more neurons and appears just as complicated. Moreover, they are of little help in many instances where we would like to know if consciousness is present: patients with a few islands of functioning cortex, pre-term infants, non-mammalian species, and machines that are rapidly outperforming people at driving, recognizing faces and objects, and answering difficult questions. To address these issues, we need not only more data, but also a theory of consciousness – one that says what experience is and what type of physical systems have it. Integrated Information Theory (IIT) does so by starting from experience itself via five phenomenological axioms of existence, composition, information, integration and exclusion. From these it derives five postulates about the properties required of physical mechanisms to support consciousness. The theory provides a principled account of both the quantity and the quality of an individual experience (a quale), and a calculus to evaluate whether a not a particular system of mechanisms is conscious and of what. Moreover, IIT can explain a range of clinical and laboratory findings, makes a number of testable predictions, and extrapolates to a number of unusual conditions. The theory vindicates some intuitions often associated with panpsychism – that consciousness is an intrinsic, fundamental property, is graded, is common among biological organisms, and even some very simple systems may have some of it. However, unlike panpsychism, IIT implies that not everything is conscious, for example aggregates such as heaps of sand, a group of individuals, and most likely the internet. Also, in sharp contrast with widespread functionalist beliefs, IIT implies that digital computers, even if their behavior were to be functionally equivalent to ours, and even if they were to run faithful simulations of the human brain, would experience very little. **PL8**

**121 The Neuro-Integrative Account of Consciousness** Lukasz Kurowski <luxterek@yorku.ca> (Philosophy, York University, Toronto, Ontario Canada)

In the last couple of decades the search for neural correlates of consciousness (NCC) has been intense (Tononi and Koch, 2008). The science of consciousness is divided as to where we should look for consciousness in the brain. There are various recent proposals: some emphasize the cortex (Koch, 2012; Lamme, 2006); some stress the thalamo-cortical feedback loops as substrates of consciousness (Edelman, 2003; Llinas, 2008); and some the role of the brain stem and the thalamus (Damasio, 1999; Penfield, 1975). I consider the role of the thalamo-cortical loops coupled with the integrative work performed by the thalamus as the substrates of consciousness. I will be defending a position that stresses integration between brain parts responsible for specific cognitive functions and their activities as opposed to specific brain regions or neural activities. Such accounts seem to fail in showing how specific brain regions or neural activities give rise to whole subjects of experience. On this account, what we experience subjectively as a unified state of consciousness is supported firstly by a wakeful state (“state consciousness”) sustained by the thalamus; secondly by the integration of information, within this state, performed by rich thalamo-cortical feedback loops, and thirdly by the cortex, which is responsible for processing the contents of consciousness (the “phenomenal character” of consciousness). This way of addressing

consciousness is not a way of tackling head on the “hard problem” (Chalmers, 1995), but a way of locating the subjective elements of experience in a whole subject that is compatible with the science of consciousness. My aim is to address the wholistic feature of consciousness by stressing integration of information. I call this position “the neuro-integrative account” of consciousness.

**P2**

**122 (Neural) Activity and Consciousness** Crystal L'Hote <clhote@smcvt.edu> (Philosophy, St. Michael's College, Vermont, Burlington, VT)

On the face of it, different brain imaging technologies register different sorts of brain changes, thereby delivering conflicting results about the location of brain activity and, consequently, about the constituents or correlates of consciousness and other mental phenomena. Most notably, for example, fMRI measures changes in blood oxygen level, while other technologies (EEG, PET, and so on) register different kinds of changes in more-or-less different brain locations. The first part of this talk will evaluate the merits and demerits of philosophic strategies that have been employed in the face of apparent disagreement. I identify three strategy-types: monistic, instrumentalist, and pluralistic. Briefly: what I call “monistic strategies” locate the constituents and correlates of consciousness and other mental phenomena where imaging technologies converge. Monists use these technologies to verify one another. By contrast, instrumentalist strategies do not commit to the thesis that constituents or correlates have any real location in the brain; any conflict between results is not a conflict about real location. Finally, pluralists take literally the matter of the location of the constituents and correlates of consciousness (as does the monist) but affirm that these locations are relative (as does the instrumentalist, in a fashion). I offer a limited defense of pluralism in this first part, a pluralism that I extend in the second part. The brain imaging methods that I reference in the first part assume that the location of mental phenomena is determined by neural activity of some variety. In the second part, I challenge this assumption, extending a paper delivered in by Molyneux at a TSC conference, “Consciousness in an Inactive Brain.” In this paper, Molyneux challenged the prevailing assumption that consciousness is constituted by or depends upon activity by showing how, “for any neural net and for any stream of inputs, of whatever length, there exists a functionally equivalent net that can intelligently respond to the stipulated input stream using only passive causation – i.e., using only timely non-activations of its neurons.” Noting that “the digit 0 (implemented using a timely non-firing) can in principle carry any information that any other digit (implemented by a firing) can carry,” Molyneux defended the thesis that consciousness-so-understood might be present in the absence of neural firing. I endorse Molyneux's general challenge to the activist orthodoxy, examine the metaphysical roots of what I call “activist ontologies of mind,” and offer a pluralist critique of their limitations. **C11**

**123 The Use and Abuse of Neuroplasticity in Constructivist Accounts of Consciousness**

Charles D. Laughlin, Adam Rock, PhD <cldlaughlin@gmail.com> (Retired, Carleton University, Dewey, Arizona)

Constructivist theorists in both anthropology and cognitive science recently have had recourse to studies of plasticity in neurophysiological systems. Constructivists wish to support the notion that enculturation and learning determine the organization of knowledge and consciousness. As often as not, however, constructivist uses of neuroplasticity are inaccurate and distort the implications of plasticity for an understanding of neuropsychological development. In this presentation the authors review the literature on neuroplasticity and isolate some of the more egregious errors made by constructivists' abuse of such findings. Important differences between the notion of “construction” as used by neuroscience and anthropologists (and some cognitive scientists) are revealed. Anthropologists have historically treated the brain as if it were either a black box, or as a tabula rasa, a “blank slate” upon which culture is somehow troweled on the mind through the magic of neuroplasticity. Neurodevelopment does not happen this way. Rather, neuroscience research supports the view that neuropsychological development is a dynamic interaction between a self-organizing brain and its social/physical environment – what psychologist Paul Baltes and his colleagues call a “biocultural co-constructive” process, a position held for decades by biogenetic structuralists in anthropology and by genetic epistemologists in developmental psychology.

Recent research in ethnology has shifted away from the constructivist bias and toward an experiential approach to consciousness, a position more consonant with how we know the brain actually develops and functions to mediate consciousness. **P1**

**124 Emergent States from High Fidelity Brain Models** Henry Markram <henry.markram@epfl.ch> (Swiss Federal Institute for Technology (EPFL), Lausanne, Switzerland)

The detailed biological reconstruction of a prototypical neocortical microcircuit will be presented together with in silico experiments exploring its emergent states. In silico experiments on a mini-column, a column, a brain slice and a brain region suggest that network activity is fundamentally based on a spectrum of synchrony; ranging from complete synchrony to complete asynchrony (SA spectrum). This spectrum however merely serves as a foundation from which a spectra of other network properties and states emerge. Modulating synapses, neurons and layers shift the network along the SA spectrum allowing new properties and states to emerge. **PL5**

**125 Consciousness and Information Flow in Complex Brain Networks** Joon-Young Moon, Uncheol Lee; Stefanie Moraes; Dinesh Pal; George Mashour <moonjy@med.umich.edu> (Department of Anesthesia, University of Michigan Medical School, Ann Arbor, MI)

Previous data from our laboratory suggest that selective inhibition of frontal-to-parietal recurrent processing may be a common metric of anesthetic-induced unconsciousness. However, the mechanism of such selective inhibition has not been elucidated. In this study, we 1) study global brain network dynamics with simple and general neural mass models, informed by anatomic brain networks, 2) apply graph theoretical network analysis to high-density EEG from conscious and anesthetized humans, and 3) compare the results from the model and the experimental data. Using directed phase lag index as the measure of directional connectivity, we identify a general relationship between network topology and information flow: a node of larger degree attracts the information flow. During consciousness, the hub nodes that have a higher degree relative to the rest of the brain (such as the posterior parietal region) serve as a causal “sink” for information flow. Experimentally, we demonstrate that anesthetics perturb and disrupt such parietal hub structure, causing the hub nodes to lose the capacity to receive information. The preferential disruption of parietal hub structure may account for the appearance of selectively impaired frontal-to-parietal information flow and may inhibit the information processing necessary for consciousness. Our theoretical framework regarding node degree and information flow may be useful for understanding other states of consciousness and unconsciousness. **P2**

**126 Brain Imaging and Electroencephalograph Confirmation of the Global Workspace Theory of Consciousness** Nathan Munn, Bernard J. Baars (Society For Mind-Brain Sciences) <nathan.munn@umhelenia.edu> (General Education, Helena College University of Montana, Helena, MT)

First developed in 1988 the Global Workspace Theory (GWT) postulated a diffuse convergence of brain activation coalescing into a spotlight of conscious awareness. This presentation offers a comprehensive review of the theory and supporting data for the components of the GWT including but not limited to GW as a local-global theory, feature and frame binding, conscious access, any-to-any signaling, any-to-many broadcasting, feelings of knowing, and the reporting of conscious events. Since this theory’s initial presentation a plethora of data ranging from anatomical cortico-thalamic and cortico-cortical tracts to functional brain imaging in both human and animal studies have provided support. Using techniques such as masking and binocular rivalry functional brain imaging studies consistently demonstrate subliminal stimuli activate primary sensory cortices only while reportable conscious events activate distributed activity within the prefrontal, parietal, cingulate, and temporal association cortices. Visual, auditory, and somatosensory primary sensory cortices all display this process of conscious stimuli requiring broadcasting from the specific primary sensory cortex to distributed association cortices. Event-related potentials studies provide confirmation of the GW in the electrical activity of the brain. Subliminal stimuli activate the various primary sensory cortex for times <200ms. Broadly distributed electrical activity occurring after 300-500ms with phase synchronization within the theta, alpha, beta and

gamma band frequencies correlate with verbally reported conscious event. Excessive epileptiform EEG synchronization in the associative cortical regions results in loss of consciousness. Auditory stimulation of sleeping subjects activate primary auditory sensory cortex without generalized broadcasting. Recent transcranial magnetic stimulation studies of cortical regions that result in conscious reports versus areas that are not reported as conscious provides further experimental support. Considerations for further research are also addressed. **P2**

**127 A Turing Test for Visual Qualia: An Experimental Method to Test Various Hypotheses on Consciousness** Masataka Watanabe <masataka.watanabe@tuebingen.mpg.de> (Logothetis, Max Planck Institute for Biological Cybernetics, Tuebingen, Germany)

I propose an experimental method to test various hypotheses on consciousness. Inspired by Sperry's observation that split-brain patients possess two independent streams of consciousness, the idea is to implement candidate neural mechanisms of visual consciousness onto an artificial hemisphere and test whether subjective experience is evoked in the device's visual field. In contrast to modern neurosynthetic devices, I show that mimicking interhemispheric connectivity assures that authentic and fine grained subjective experience arises only when a stream of consciousness is generated within the device. It is valid under a widely believed assumption regarding interhemispheric connectivity and neuronal stimulus-invariance, as described below. Interhemispheric connectivity in low/mid-level visual areas is restricted in the sense that cross-hemispheric neuronal projection is observed only in neurons that retinotopically correspond to the vertical meridian. We may say that the retinotopic representation is only stitched together at the boundary of two visual hemifields. Interhemispheric connectivity beyond the parafovea exists only in high-level cortical areas. On the other hand, granularity of visual information decreases in higher visual areas in the form of increased stimulus-invariance. The critical question is whether the informational content in high-level areas is sufficient to support conscious vision. The "Intermediate Level Theory of Consciousness" by Jackendoff states otherwise and claims that it does not play a central role in conscious vision. If this is true, in combination with the hierarchical properties of interhemispheric connectivity, we need to acknowledge that subjective experience and verbal report of bilateral vision arise, not because all necessary information for conscious vision is inter-exchanged between the hemispheres, but because two potentially independent intra-hemispheric streams of consciousness are interlinked. The former scenario is denied because extra-parafoveal visual information represented in low/mid-level visual areas cannot be transmitted over to the other hemisphere in its original resolution. Likewise, under the above assumption, the only possible way we may subjectively experience authentic objects in the device's visual field is that a stream of consciousness is generated within the artificial hemisphere and is interlinked to our own. Simple influx of information from the artificial to the biological hemisphere would not be sufficient. Hence, we may construct a valid test for machine consciousness and use it to explore the neural correlate of consciousness by means of analysis by synthesis. Interestingly, although fully replacing a cortical hemisphere is something of the far future, a minimal experiment can be conducted with today's technology, for example, by establishing a brain-machine interface solely between populations of high-level face neurons. If a stream of consciousness is generated within a device, we should be able to construct a case where two objects presented in the device's visual field are distinguishable by visual experience, but not distinguishable by what is communicated through the brain-machine interface. Finally, I discuss the alternative assumption where high-level visual information is sufficient for conscious vision and show that the proposed test of consciousness can be adapted to cover this case by incorporating knock-out paradigms. Together, I provide an exemplar neural mechanism of subjective bilateral vision that passes the proposed test. **C6**

**128 A Percolation Theory of Consciousness** Yan Xu, David Zhou; David Mowrey <xuy@anes.upmc.edu> (Anesthesiology, Pharmacology, University of Pittsburgh, School of Medicine, Pittsburgh, PA)

A theoretical model of loss of consciousness (LOC) was developed using the percolation theory to understand the principles governing the flow of sensory information through a thalamocortical network and to define the criticality controlling the emergence of cognition. The neural activities are treated as a time series of sensory information percolating through a three-dimensional

network of nodes and edges, where each node represents a cluster of neurons having an activity value and each edge corresponds to a probability of information transmission. The network expands from an input node, representing a locus in the thalamus, and ascends into cortical nodes in a fractal fashion. The ascending layers are further distinguished by anterior and posterior rows with each row connected as a small-world network. The information content at the cortical nodes relative to the thalamic node was calculated. As the percolation edge probability was decreased, the model exhibited the four stereotypical features observed in the clinical electroencephalograph (EEG) recordings under general anesthesia, namely, burst suppression, power shift to the lower frequency range, synchronization of cortical nodes, and anteriorization of activities in the alpha and delta waves. More importantly, the model shows that the frequency shift is an emergent phenomenon, which occurs in a specific range of edge probabilities independent of the input signal. Corresponding to this shift is a loss of information content. Three important observations require future experimental validation: (1) loss of information transmission coincides with the appearance of dominant power in the delta frequency band; (2) anteriorization of EEG power depends on greater feedback connectivity relative to feed-forward connectivity, consistent with the significantly denser feedback connections in the visual system and their role in consciousness and attention; and (3) the clinical EEG features and successive spectral shifts to lower frequency bands under anesthesia require a pace-making activity among all nodes, suggesting the possibility of brain pace-making for the maintenance of consciousness. (Funded in part by a MERIT award from the National Institute of General Medical Sciences, NIH, R37GM049202.) **C21**

## 2.02 Neuroscience of Vision

**129 Quantized Visual Awareness** W. Alex Escobar <alexander.escobar@emory.edu> (Biology, Emory University, Atlanta, GA)

The proposed model holds that, at its most fundamental level, visual awareness is quantized. That is to say that visual awareness arises as individual bits of awareness through the action of neural circuits with hundreds to thousands of neurons in at least the human striate cortex. Circuits with specific topologies will reproducibly result in visual awareness that correspond to basic aspects of vision like color, motion, and depth. These quanta of awareness (qualia) are produced by the feedforward sweep that occurs through the geniculocortical pathway but are not integrated into a conscious experience until recurrent processing from centers like V4 or V5 select the appropriate qualia being produced in V1 to create a percept. The model proposed here has the potential to shift the focus of the search for visual awareness to the level of microcircuits and these likely exist across the kingdom Animalia. Thus establishing qualia as the fundamental nature of visual awareness will not only provide a deeper understanding of awareness, but also allow for a more quantitative understanding of the evolution of visual awareness throughout the animal kingdom. **P1**

**130 Connecting Visual Qualia to Their Neural Correlates** Stanley Klein <sklein@berkeley.edu> (Optometry, UC Berkeley, Berkeley, CA)

How does simulation of a single neuron in ones visual system produce the richness of subjective color perception? This is the topic of connecting qualia to neural activity. The capability for achieving that connection has only become available in the past six months, because of a new instrument developed at UC Berkeley. But before getting to the recent experiments a comment is appropriate in the context of this 20th anniversary of the Tucson "Toward a Science of Consciousness" (TSC) meetings. Who can forget Chalmers' presentation of the "Hard Problem" at TSCII in 1996. The 764 page book of papers from that meeting is a treasure and is unequalled in capturing the state of the field at that point. The challenge of connecting the hard problem of qualia to the neural correlates of the brain is still with us and I'll argue that advances in technology may enable substantial progress. My article in the Vision and Consciousness section of the TSCII book was titled "Double Judgment Psychophysics for Research on Consciousness: Applications to Blindsight" (cornea.berkeley.edu/pubs/120.pdf). My present title could have been the same as the old title but replacing "Double" to "Triple", and "Blindsight" to "Color" as I now discuss. A new in-

strument that enables single neuron brain stimulation has been developed by Austin Roorda of UC Berkeley. The new technology that combines adaptive optics and super precise image stabilization enables one to do careful psychophysics on individual cones and ganglion cells. Retinal ganglion cells (RGC) are special since they are the bottleneck for vision, carrying information to the brain along the optic nerve. Roorda's lab is next to mine and we have been developing new approaches for single and double RGC stimulation. One of the big surprises is that activation of single retinal neurons can produce a wide variety of color percepts. It had previously been thought that single RGC stimulation would produce limited color percepts (red, green, yellow, blue) based on the opponent color mechanisms found in RGCs and the brain's lateral geniculate nucleus (LGN). But a much greater diversity of colors were found. In our experiments for every single RGC stimulation we make a triple judgment on the perceived hue, saturation and intensity of the stimulus. We also do that with different background colors. Several competing hypotheses regarding the mechanisms that produce the surprisingly diverse color percepts are now being tested and will be discussed. We are especially interested in the neural basis for what is called "unique hues". There is, for example, surprising general agreement on "unique yellow" a color that is neither reddish nor greenish. Unfortunately the wavelength of unique yellow differs from what would be predicted from the tuning of RGCs and LGN cells. By paired stimulation of adjacent reddish and greenish RGCs we hope to gain an understanding of what causes the agreement on the unique hues. The new instrument opens up a great variety of experiments linking neural activity to perception. C11

**131 Neural Networks in the Early Visual System May Create What They Cannot Compute: Time-Series of Connected Open Sets of Neurons with Non-Empty Intersections as Visual Objects** Raymond Pavloski <pavloski@iup.edu> (Psychology, Indiana University of Pennsylvania, Indiana, PA)

The conscious experience of a unitary visual object occurs even as its size, shape, and detailed features change over time. Topological properties are invariant over changes in metric properties, and there is considerable empirical support for the claim that topological properties are visual primitives that are made available by early stages of visual processing. Indeed, Chen (2005) has suggested that the topological property of connectedness underlies the phenomenal property of being a visual object. However, extracting the topological properties of a retinal image is a complex computational task, and it is not likely that the networks of the early visual system perform such computations. The work reported here implies that, rather than computing topological properties of retinal images, early visual processes may create connected open sets of neurons in response to retinal input. The key to this previously-overlooked capability is tolerance, a concept used implicitly by Poincaré – in response to his reading of Fechner's work on just noticeable differences, developed mathematically by Zeeman, and currently studied in the context of tolerance spaces. In the computer simulations reported here, retinotopically-arranged recurrent neural network (RNN) integrate-and-fire model neurons receive input from retinal model neurons having an antagonistic concentric receptive field organization, and interact through excitatory and inhibitory connections. The activity of each excitatory RNN neuron produces a vector of ionic conductance values across network neurons, and a pair of neurons producing indistinguishable conductance vectors is an element of the tolerance relation. With the tolerance relation as a basis, the RNN responds to a simulated object image by creating a time series of topological connected open sets of RNN neurons with non-empty intersections: RNN neurons self-organize into these sets in response to retinal input. Such time series are also produced by closely positioned images (grouping by proximity), by images that change size and shape, by simulations of image motion, by simulating the conditions for apparent motion, and during the appearance and disappearance of a hole. These results suggest that a naturally occurring (i.e., not simulated) time series of connected open sets of RNN neurons with non-empty intersections may constitute the phenomenal property of being a visual object. It is highly significant that: (1) emergent connected sets are a necessary consequence of how the network structures recurrent input, and are not observed from outside the network; (2) time series of connected open sets of RNN neurons play a causal role by structuring network output; (3) simulations yield predictions that can be tested with human participants; and (4) the conditions for emergence of topologies can be specified using the category theory concept of



colimit, which can describe both topological and other visual structures.. Chen, L. (2005). The topological approach to perceptual organization. *Visual Cognition*, 12(4), 553-637. C4

### 132 Subjective Visual Experience as a Reflection Principle by Neural Projection Operators

John Strozier <john.strozierccs@yahoo.com> (Science and Mathematics, Empire State College/SUNY, Sedona, AZ)

Bi-direction flow of information in the brain, a Reflection Principle, is suggested as a possible explanation of visual subjective experience. Information from a visual scene, via reflected/emitted photons, reach the retinal neurons and are converted to neural electro/chemical spikes (in frequency, duration, and amplitude) that progress primarily to the visual center V1 via the thalamus. Signals from V1 go to other areas including the frontal cortex via the dorsal and lateral streams. Eventually this flow of information (first-person visual data) inward can be analytically described (as it is functional) in the form of series/parallel operators at each stage of the visual information stream. On a very simplified scale, digital cameras do this now: The camera lens focuses photons on photoelectric pixels that generate current. These signals are stored in electronic memory to be later readout and displayed in the reverse process in which charges at appropriate memory locations (the 'model') generates photons from again photoelectric pixels. Properly sized and cropped, such a device can be inserted between a visual scene and a conscious observer with no essential change in the subjective experience of that visual scene by the conscious observer. We suggest that a "Reflection Principle" is both the causal and explanatory process that is the visual first-person subjective experience. The inward flow of information from the eyes described above is reversed at the representational level. More-or-less identical neural spikes are created that move outwards from the brain world model(s) along paths spatially/logically similar to the incoming signals. The process is implemented by neural projection operators that generate neural firings from the brain world model(s) (again constructed analytically) and project those outward; creating a subjective 'vision' – information going outward. The explanation of subjective visual experience is that information projected outward creates the illusion of 'touching' the visualized object; the feeling of 'what it is like' (Nagle 1974, Block 2011). It is an illusion in the sense that the information moving outward does not travel out of the brain; perhaps only a few layers or a few modules in the cortex. However certain features of the optical image are preserved (angle, color, intensity) at the layer of world model(s) building. Put another way: The outgoing spikes, reflecting more-or-less the essential characteristics of the incoming spikes, generate a 'real image' at the location of the real object that is the subjective visual experience of that real object. As an adaptive trait; errors in the brain world model between the incoming neural spikes and the outgoing neural spikes are corrected by negative feedback acting on those neurons that create a representation of the real world(s). Areas of attention are made more so by positive feedback. The inverse of the brain model operator acting on incoming reportable first-person visual data approximates the reportability operator acting on subjective visual experience, as our analysis will suggest. Blind-sight, attention vs. awareness, change blindness, and the Sensorimotor approach (O'Regan 2007) will be discussed in light of these ideas. P1

## 2.03 Other sensory modalities

133 Sound Landscape Memory Don Hill <hilldon@telus.net> (Neuroscience Research Group, Laurentian University, Sudbury, Ontario Canada)

How could our ancestors achieve subjective immortality and objectively insure the integrity of their cultural memory over millennia? Sound never ages. A sonic pitch – the note C, for instance – is immutable, if the conditions that give rise to that pure frequency are maintained; it is an ideal carrier wave for cultural memory. Sound never disappears. Like a river that goes underground, it can pop up in unexpected places. Audio recordings made in situ of 'songs in the land' will serve as a potent demonstration of a sonic architecture embedded in a 5,300 year old 'medicine wheel' (an alignment of placed stones spread out over 20 square kilometers on the Canadian prairie). The presenter will also describe how ancient landscape architecture is infused with sonic memory, and how it plays back over time – speaking directly to the human central nervous system. A1

### **134 Experimentally Investigating the Quantitative Electroencephalographic (QEEG) Analogues of Human Consciousness in a Synthetic Three-shell Realistic Head Model Using Electroconductive Dough** Nicolas Rouleau <neuro.logic.nico@gmail.com> (Psychology; Behavioural Neuros, Laurentian University, Sudbury, ONTARIO Canada)

Computational reconstructions of neural sources of electroencephalographic (EEG) activity are under progressive development. It is assumed that artificially generating the complex electrical patterns associated with consciousness will reveal some fundamental property of consciousness itself. However, an experimental investigation into potential iterations of consciousness within abiological systems might also prove to be a fruitful pursuit. A three-shell model of the human head with realistic geometrical dimensions was constructed wherein the inner and outer aspects of a false skull were lined with electroconductive dough. Quantitative electroencephalographic (QEEG) measurements are being obtained over the most distal layer of the experimental model. Preliminary spectral analyses are revealing increased baseline spectral densities within frequency ranges typically associated with human consciousness. If further analysis were to reveal more compelling evidence for a human QEEG analogue in this experimental model, the claim would not be that the apparatus itself is conscious. Instead, the suggestion is that intrinsic electrical patterns that appear to be intimately linked to human consciousness can be represented naturally within alternative physical systems. Planned investigations include quantitative comparisons with human brain activity, attempts to modulate the activity by altering the immediate environment, and potential for brain-to-model non-local signal transmission using rotating electromagnetic fields. Implications for a fundamental consciousness with field like properties are discussed. **P2**

### **135 Remote Viewing: Discrete Profile of Qeeg and Slortea Activation Associated with Increased Accuracy Over Time and the Importance of Concurrent Geomagnetic Activity** Mandy Scott, Michael A. Persinger <mx\_scott@laurentian.ca> (Psychology, Laurentian University, Sudbury, Ontario Canada)

Remote viewing accuracy, measured as independently rated congruence of subjects' drawings and descriptions with the content of affective pictures hidden ~50 m away, was correlated with cerebral quantitative electroencephalography (QEEG) and sLORTEA (Standardized Low Resolution Electromagnetic Tomography) over three weekly trials. Subjects with and without previous experiences of psi phenomena were recruited. Those without previous experience were randomly assigned to control (no training received) and experimental (training received) groups. There were no significant differences in mean accuracy scores between groups however a shift over time for all participants from left prefrontal gamma activity to right caudal hemispheric delta activity was associated with increased accuracy. Increased accuracies for the details for the non-local stimuli during sessions were associated with greater congruence within the high beta (25-30 Hz) and theta (4-7 Hz) range between the left and right parahippocampal regions. Increased theta power also occurred in the left anterior cingulate, fusiform gyrus and midtemporal regions. We suggest that experiences of non-locality involve confluence within the right parahippocampal region and are translated for their personal and linguistic equivalents within specific left hemispheric structures. Subsequent analyses indicated that the accuracies of the experiences were moderately correlated with very quiet (< 8 nT) global geomagnetic activity during the time of the remote viewing. **C23**

## **2.05 Memory and learning**

### **136 Effect of Pattern Consciousness on Visual Sequential Learning: An Event-Related Potential Study** Jerome Daltrozzo, Sam Sims; Julie Trapani; Joanne Deocampo; Christopher M. Conway <jerome.daltrozzo@gmail.com> (Psychology, Georgia State University, Atlanta, GA)

Sequential learning is a cognitive process that involves learning environmental patterns in which some items predict other items with a given likelihood. Sequential learning is thought to occur without consciousness or explicit knowledge of the pattern and thus is frequently considered as an instance of implicit learning. However, there is a strong debate on the relation between sequential learning and consciousness. Brain-based measures, such as event-related potentials (ERPs), may provide additional insight into this issue. Previous research suggests that visual

sequential learning is accompanied by a late positive ERP component (Jost et al., 2011). In the current study, we explore whether the ERP components of sequential learning are affected by the level of consciousness of the pattern in healthy adults. We asked seventeen participants (11 females, 18-49 years) to perform a visual sequential learning task while we recorded ERPs in order to measure their electrical brain activity. Participants were told that they would see different types of stimuli on the screen and were to press a button as fast as possible when they saw a target stimulus. Participants were not told that there were three predictor items in the sequence that predicted the occurrence of the target with high, low, or zero probability. We calculated ERPs by time-locking the recordings for each trial to these predictors. Following the task, participants were assessed on their level of pattern consciousness. Results revealed a late positive event-related component between 400 and 550ms, replicating Jost et al. (2011). This effect did not interact with pattern consciousness. However, the ERPs occurring much later, between 350 and 450ms post-target onset, interacted with pattern consciousness as revealed by a 4-ways interaction between target probability (high, low, or zero), pattern consciousness (none, intermediate, high), and two topographic factors to describe the regions of interest on the scalp [ $F(16,112)=2.26$ ,  $p=.033$ , partial eta squared = .244]. Response time (RT) showed a non-significant trend for faster responses in participants with pattern consciousness (RT=392ms, SEM=13ms) compared to participants unaware of the pattern (RT=407ms, SEM=14ms) [ $t(15)=0.767$ ,  $p=.455$ , two-tailed]. These findings suggest that processing of the target in a sequential learning task may be modulated by participants' consciousness of the patterns, and hence that sequential learning does not occur without consciousness as is commonly thought. **P1**

**137 A Primitive Neural Algorithm May Explain the Speed of Conscious Perception** Walter J Freeman, Giuseppe Vitiello, Department Physics, E.R.Caianiello and INFN, University of Salerno, Salerno, Italy <dfreeman@berkeley.edu> (UC Berkeley, Dept. of Molecular and Cell Biology, Berkeley, CA)

The action-perception cycle uses sensori-motor systems to acquire information about the environment (2), bringing it rapidly to awareness at high cost of energy (1). Each cycle begins with an act of intentional search that delivers raw sensory information to all receptor systems. Three further stages comprise each cycle: Sensation to Perception in sensory cortices where memories are retrieved and up-dated; Perception to Conception in limbic cortices, where space and time are incorporated into integrated Gestalts; and Conception to Action when brief bursts of coherent oscillations integrate activity over the entire neocortex of both cerebral hemispheres (3), updating intention and awareness. Within each stage we identify 4-steps that carry microscopic information through a mesoscopic pattern to macroscopic condensed, integrated information (1), and back to microscopic unit firing. We designate the algorithm as 'primitive' because we first found it in olfaction (2), then in all sensory systems and in three major levels cerebral function. This primitive dynamics in each stage has four steps. 1. Excitation by an input volley (at the microscopic level) of a Hebbian nerve cell assembly (at the mesoscopic level) manifested in 'concept cells' (4). The assembly executes generalization, abstraction and amplification (3). 2. The pulse of energy resulting from ignition of a Hebbian assembly triggers a phase transition (1, 3) in cortical neuropil that condenses a gas-like cloud of random pulses into a dense liquid-like coherence in a narrow frequency band. The gamma or beta oscillation (at the macroscopic level) carries a spatiotemporal pattern of amplitude modulation. 3. The information in the AM pattern is spatially delocalized by a 2-D Fourier transform (1, 3), that combines the information from the assembly with memory retrieved from the mass (also at the macroscopic level). 4. Readout by deep pyramidal cells of the active state maintained by superficial pyramidal cells. The deep cells down-sample the updated memory (at the microscopic level) and transmit it to multiple targets in both sensory and motor systems. Each target receives the same memory at reduced but adequate resolution in the same manner that each piece of a broken hologram has the entire scene (characteristic of distributed associative memory systems). The serial use by brains of this primitive 4-step algorithm can explain how a few odorant molecules (or photons or phonons) galvanize the entire cerebral cortex into an intentional activity pattern within the 100-200 msec required for each cycle of action-perception to create meaning from information in the stream of consciousness, and it incorporates the meso-

scopic 'concept cells' (4) as necessary for the condensation of each memory by a phase transition. (1) Capolupo A, Freeman WJ, Vitiello G (2013) Dissipation of 'dark energy' by cortex in knowledge retrieval. *Phys Life Rev*, 10 (2013) 85-94; DOI:10.1016/j.plev.2013.01.001 <http://authors.elsevier.com/sd/article/S1571064513000134> (2) Freeman WJ (2001) *How Brains Make Up Their Minds* (2001) New York: Columbia UP (3) Freeman WJ, Quian Quiroga R (2013) *Imaging Brain Function with EEG*. New York: Springer (4) Quian Quiroga R. Concept cells: The building blocks of declarative memory functions. *Nature Reviews Neuroscience*. (2012) 13: 587-597. **C21**

### 2.06 Blindsight

**138 Visual Cortical Activation and Qualia** Petra Stoerig <stoerig@hhu.de> (Experimental Psychology, Heinrich-Heine-University Duesseldorf, Duesseldorf D-40225, Germany)

One of the puzzles in consciousness research regards the qualia – why, how, where in the brain are these elements of conscious experience generated? The locationist theory of brain function entrusts particular modules with particular functions, so that all visual cortical areas process visual information, but do so according to their preferences for particular types. Support for this theory comes both from lesion studies that show that destruction of early visual cortex causes cortical blindness whereas destruction of the human colour cortex causes cerebral colour blindness, and from functional neuroimaging of normal-sighted subjects who show activation of these areas when seeing coloured stimuli. Interestingly, visual cortical areas are also activated when synaesthetes who experience visual, often coloured concurrents when they perceive their visual or non-visual inducers. In contrast, neither patients with cortical nor patients with peripheral blindness report any related visual qualia when the same visual cortical areas are activated by visual information in the former and non-visual information in the latter case. However, visual experiences have been reported by several users of sensory substitution systems which convert visual information into a non-visual format. If qualia result from activation of particular brain regions, their activation must differ in some way that distinguishes between with and without-qualia processing. We need to understand this difference before we can know what makes vision conscious. **PL7**

### 2.07 Neurology, neuropsychology and neuropathology

**139 Fetal and Neonatal Consciousness Eastern/Western Perspective** Anjoo Bhatnagar, Phool Chand Bhatnagar; Vijai Kumar <dranjoo@gmail.com> (Theology, DEI Dayalbagh Educational Institute, Agra, UTTAR PRADESH)

Though, the fetus is almost continuously asleep and unconscious, but it reacts to touch, smell, and sound, and shows facial expressions in response to external stimuli. As the fetus can feel pain it must be aware of its body. We do not know when, if at all the fetus becomes conscious. On the other hand, the newborn infant can be awake, exhibit sensory awareness, and process memorized mental representations. It is also able to differentiate between self and not self, feel touch, express emotions, and show signs of shared feelings. Yet, it is unreflective; present oriented, and makes little reference to concept of him/her. When Does this consciousness arise in a sentient entity? Does sentience appear in the womb, at birth or during early childhood? Is it related to soul entering in the body, and is it the life giving principle and related to the higher consciousness? In this paper we have tried to get possible answers to some of these questions by converging eastern and western perspectives on fetal and neonatal consciousness with respect to 1.conception, 2. fetal awareness, 3. birth, 4. neonatal consciousness and 5. neurobehavioral development of child up to 2 yrs of age. According to eastern perspective e.g. Sant Mat "Yatha Samashti Srishti Tatha Vayasthi Srishti" (As is in Macrocosm, so is in Human Microcosm) (Prof.P.S.Satsangi). The Jiva (jivatma or soul) is the Ansha (emanation) of Supreme Being and in the form of particular spirit or Atma or soul gets attached to the fetus in a distant manner around the time of conception. The prenatal condition of spirit is known as 'Chitanya Samadhi' at the level of 'Jyoti Niranjan', experiencing universal consciousness, or bliss. The covers of mind and body develop like envelops around it, which mature gradually and finally at the time of birth the spirit takes its seat at the Ajana chakra

(6th nervous center) in this body and then further descends to the plane of Hridaya chakra (heart center or solar plexus) with age. Thus the universal consciousness develops into individual consciousness by the age of around 2 years and gets associated with material objects and completely disconnects from universal consciousness. While according to Western science there is emerging a consensus in the scientific community about when life begins. This is hardly controversial. "To accept the fact that after fertilization has taken place a new human has come into being is no longer a matter of taste or opinion... It is plain experimental evidence." "Father of Modern Genetics" Dr. Jerome Lejeune, Univ. of Descarte, Paris. The emergence of Human consciousness from fetal to neonatal period to childhood gradually matures with neurodevelopment from initially being reflexive and then with development of frontal inhibition, results in voluntary actions and reactions in response to environmental stimulus and thus gradually the child becomes aware of self and surroundings. The cognitive function matures with age. **P1**

**140 Metacognition and the Frontal Lobes** Leslie Burton <leslie.burton@uconn.edu> (Psychology, University of Connecticut, Stamford, CT)

It has been suggested that the frontal lobes play a special role in an integrated sense of self, including functions of self-monitoring and metacognition. To further investigate this idea, 17 traumatically brain injured (TBI) patients were evaluated on their ability to discriminate their own performance on the Benton Face Recognition task. This task involves viewing a target face and choosing the same person from a set of faces situated below which may vary in terms of lighting and orientation. As an index of metacognition, after each trial, the patients were asked to evaluate their own performance by rating their confidence about their accuracy on a scale of 1 (not very confident) to 3 (very confident). Participants were also administered the Wisconsin Card Sort (WCST), 64 card version, as an index of frontal lobe functioning. The participants were separated into groups of higher (3, 4 or 5 categories on the WCST) and lower (0, 1, or 2 categories) inferred frontal functioning. Correlations between accuracy on the Benton Face Recognition Test and confidence ratings indicated that the group with better frontal functioning showed the expected relationship between higher accuracy and greater confidence, whereas the group with poorer frontal functioning showed no notable relationship between these variables. The 2 groups did not differ on overall scores on the Benton Face Recognition Test. These findings are important because face recognition is a skill typically done by posterior cortical areas, and does not usually require frontal lobe processing. These data add support to the idea that the frontal lobes do have a special role in metacognition. **P1**

**141 A Clinical Case of Dissociative Identity Disorder Treated With Music Integrative Neurotherapy™** Alexander Jon Graur <graur@medicamus.com> (University of Torino, Italy, Pavarolo, Italy)

Dissociative Identity Disorder, formerly known as Multiple Personality Disorder, "reflects a failure to integrate various aspects of identity, memory and consciousness. The essential feature of DID is the presence of two or more distinctive identities that recurrently take control of behavior; there is an inability to recall important personal information; the disturbance is not due to the direct physiological effects of a substance or a general medical condition." (DSM IV TM). The clinical case presented in this work is one of my patients (private practice) in Northern New Jersey, USA, between May 2001 and November 2004. The method applied in helping to cure the patient was Music Integrative Neurotherapy TM, a method I developed since 1978, a registered trademark in New Jersey, USA. An applied neuroscience therapy, Music Integrative Neurotherapy TM is an interdisciplinary method involving Music as a Science, Medicine (Anatomy and Physiology, Pharmacology and Neuro-pharmacology, Psychiatry), Molecular Biology (the non-linear transmission of the information) and Quantum Mechanics (the basic quantum model elaborated for this neurotherapy). The basic principle of Music Integrative Neurotherapy TM is that in order to really heal, the music used for therapy must be composed based on the medical data of each patient and must act beyond the psychological conditioning and cultural background of the patient. The ultimate goal of the therapy is to transmit to the mind pre-determined information to be stored in the long term memory banks for to be used as reference for future decisions. (Rewiring the mind

to rewire the brain and organism). (Graur, 1998,2003) The presentation will feature: the case, the specific therapy composed and applied; the results and a written statement of the patient regarding the results, with audio examples of the therapy material. **A1**

### 2.08 Anesthesia

**142 Consciousness and the Dying Brain** George A. Mashour <gmashour@med.umich.edu> (Department of Anesthesiology, University of Michigan, Department of Anesthesiology, Ann Arbor, MI)

The brain is often assumed to be globally hypoactive during cardiac arrest. However, the neurophysiological state immediately following cardiac arrest has not been systematically investigated. In this study, we performed continuous electroencephalography in rats undergoing experimental cardiac arrest and analyzed changes in spectral power, coherence, directed connectivity, and cross-frequency coupling. We identified a transient surge of synchronous theta and gamma oscillations that occurred within the first 30 seconds after cardiac arrest and preceded an isoelectric electroencephalogram. The oscillations after cardiac arrest were global and highly coherent; increased power and coherence were also confirmed in a model of asphyxiation. Furthermore, gamma demonstrated a striking increase in anterior-posterior directed connectivity and tight phase coupling to both theta and alpha waves. High-frequency neurophysiological activity in the near-death state was highly organized and exceeded that found during wakefulness. These data provide a neuroscientific framework for explaining heightened conscious experience after cardiac and respiratory arrest. **PL10**

**143 Neural Correlates of Sevoflurane-Induced Unconsciousness** Stefanie Moraes, George Mashour <sblain@med.umich.edu> (University of Michigan, Ann Arbor, MI)

Background: Anesthetics can be used to deliberately modulate an individual's level of consciousness, and thus are powerful tools for probing the underlying neural mechanisms of consciousness. To date, studies of anesthetic-induced unconsciousness have focused on the intravenous drug propofol. However, it is unclear whether the neural basis and neurophysiologic markers of propofol-induced unconsciousness are generalizable to inhaled anesthetics, which have a more diverse set of molecular targets and which are used more commonly in clinical practice. Objective: To identify the neural correlates of sevoflurane-induced unconsciousness using high-density EEG. Methods: We recorded 64-channel EEG in eight healthy participants (6 male, 2 female) during gradual induction of and emergence from unconsciousness with sevoflurane. The participants performed a motor task in response to commands issued at 30-second intervals to identify loss and recovery of consciousness. Sevoflurane was administered by face-mask at an initial concentration of 0.4% and increased by increments of 0.2% (at steady-state concentrations) until loss of consciousness was achieved. After a 10-minute period of unresponsiveness, the protocol was reversed until participants regained consciousness. EEG was bandpass filtered between 0.1 and 50 Hz, and visually inspected to reject epochs with non-physiological artifact. From this pre-processed data, EEG characteristics were computed as follows. Spectral analysis was performed on the EEG from 5-minute epochs selected throughout the experiment, with spectrograms computed using the multitaper method. To mirror past analyses of propofol, scalp distributions of low-frequency (1 Hz) and alpha (10 Hz) power were visualized, and phase-amplitude modulation between these two frequencies were calculated. Furthermore, independent component analysis was performed on the scalp EEG and source localized equivalent dipoles of the resulting component were found. Granger causality was used to measure the causal information flow between brain sources. Results: Sevoflurane-induced unconsciousness was marked by an increase in low-frequency EEG power, which shifted from a frontal to a more diffuse distribution across the scalp. Unlike propofol, sevoflurane did not result in an increase in anterior alpha power, which remained most prominent over the occipital region throughout the experiment. Additionally, the relationship between low-frequency phase and alpha amplitude remained constant throughout the experiment, and did not demonstrate the modulation previously observed with propofol. However, changes in patterns of communication between brain sources were consistent with those reported in propo-



fol-induced unconsciousness. Information flowed from frontal sources to posterior sinks during periods of consciousness, whereas this pattern was reversed during unconsciousness. Conclusion: Sevoflurane-induced unconsciousness has distinct spectral, topographic and phase-amplitude coupling EEG characteristics from propofol-induced unconsciousness. However, both anesthetic agents result in a shift from frontal to posterior sources of information flow between brain regions. These results are important in distinguishing drug-specific from state-specific characteristics that mark transitions in consciousness. **C21**

**144 Awareness During Resuscitation – A Prospective Case Study** Sam Parnia <sam.parnia@stonybrookmedicine.edu> (Medicine, Stony Brook University, Stony Brook, NY)

Awareness during anesthesia is characterized by auditory perceptions, pain, and dream like states and associated with post-traumatic stress disorder (PTSD). Little is known about awareness during cardiac arrest (CA). Although, these phenomena share similarities, there are differences. In particular during CA, patients may report visual perceptions ('seeing' and recalling events). Furthermore, some experiences are associated with the scientifically imprecise entity of 'near death experiences'(NDE). Methods: A prospective cohort study across 15 US, UK and Austrian hospitals to determine the incidence of awareness (visual or auditory) during CA as well as the characteristics of patients' recollections was conducted. We further examined the feasibility of testing the accuracy of visual and auditory recollections using standardized tests by pre-installing shelves containing images as well as instructing research staff to provide set auditory cues during resuscitation where possible. Survivors underwent a structured interview which included questions on visual and auditory impressions as well as the Greyson questionnaire to quantify experiences typically classified as NDE (score >7) Results: 2060 cardiac arrest events were recorded with a reported survival of 16%. A total of 142 patients met inclusion criteria and were interviewed. Of these 38% perceived having memories from their time of CA and 8.9% had a Greyson score >7, consistent with a conventionally defined NDE. Two experienced visual recollections of being able to 'see' events, and one accurately described details corresponding with a verifiable period that may be up to 3-5 minutes of CA in which cerebral function would ordinarily not be expected. Placement of images corresponded with 22% of all CA locations. The two patients did not have CA in areas with images. Auditory testing for implicit learning during resuscitation was impractical. Conclusions: Awareness during CA may be more common than previously thought. These experiences may not reflect the conventionally defined NDE, yet indicate that consciousness may not cease as expected with cessation of heartbeat during CA. Studies are needed to assess the accuracy of claims of visual and auditory perception and their relationship with the quality of cerebral resuscitation. Claims of visual awareness consistent with so called out of body experiences during CA are unlikely to be hallucinatory. Studies are also needed to delineate the role of explicit and implicit recall following CA which may impact on the occurrence of PTSD and other life adjustments post CA. Also by: Parnia S, Spearpoint K, De Vos G, Goldberg G, Yang J, Zhu J, Baker K, Killingbeck H, McLean P, Wood M, Zafari M, Dickert N, Beisteiner R, Sterz F, Berger M, Warlow C, O'Donoghue S, Lovett S, Metcalfe Smith R, Navarette S, Cushing S, Wills P, Pink S; Harris K, Sutton J, Walmsley H, Deakin C, Little P, Farber M, Greyson B, Fenwick P. **PL10**

## 2.09 Cellular and sub-neural processes

**145 The Cellular Mechanisms Underlying Subjective Feeling** Norman Cook, Harry T. Hunt; Gil B. Carvalho; Antonio R. Damasio <nc\_876@usc.edu> (Brain and Creativity Institute, University of Southern California, Los Angeles, CA)

We argue that the membrane processes that make neurons "excitable" underlie all forms of animal sentience, in general, and human consciousness, in particular. The molecular biology that distinguishes excitable from non-excitable cells has been clarified over the past decade, and the related evolutionary genetics are now largely known. Although the significance of membrane neurophysiology is well understood with regard to synaptic transmission and neuronal information-processing, there have been few discussions of neuronal excitability in relation to

consciousness (Hunt, 1995; Cook, 2008; Damasio, 2010). Membrane excitability is characteristic of primarily the (i) sensory receptor cells, (ii) neurons and (iii) muscle cells found in metazoa. The unusual psychological properties of animals with nervous systems indicate that specifically these excitable cells are responsible for, respectively, perception, cognition and motor activity – i.e., the three properties that most unambiguously distinguish animal life from plant life. From that highly conventional starting-point, we show that neuronal excitability is the physiological foundation underlying all aspects of metazoan sentience, animal awareness and, most notably, subjective consciousness. In other words, “mind” is a function of not simply living cells, but, more precisely, excitable cells – and is not a function of (organic or inorganic) information-processing circuitry. The unique mechanism of homeostasis employed by excitable cells entails the transient influx of positively-charged ions into the alkaline cellular interior – an electrical impulse that powers a motor response (neurotransmitter/hormone release and muscle fiber contraction). Neurotransmission is of course known to be the basis for cognition, but what has not previously received attention in consciousness studies is the fact that, during the process of neurotransmission, the participating neurons undergo drastic biochemical changes in the cytoplasm from the “physiological condition” of mild alkalinity (that is favorable for the normal functioning of nucleic acids and protein) to the “unphysiological state” of relative acidity/salinity due to the influx of cations. We maintain that this unique form of electrostatic “shock” is the physicochemical process underlying the feeling experienced during neuronal information-processing, but is both mechanistically and experientially distinct from cognition. The evolutionary genetics of membrane channel proteins indicates that excitability emerged several billion years ago in protozoa, but is today expressed most robustly in metazoa. Although the fundamental concepts of protozoan “irritability” and “sentience” emerged during Darwin’s lifetime, the molecular mechanisms of channel proteins and the detailed stereochemistry of ion influx/efflux were not elucidated until recently. It is noteworthy that the mechanism of cellular excitability (common to metazoa, protozoa and the rare excitable cells in plant organisms, e.g., the Venus Flytrap) entails the influx of cations ( $\text{Na}^+$  and/or  $\text{Ca}^{++}$ ), which drives a cellular-level motor response. This type of transmembrane “feeling” of the extracellular world occurs in parallel with the cognition of neurons, allowing organisms to respond to environmental changes within several milliseconds, and to re-establish the cellular homeostasis that was transiently lost during cation influx, but that is essential for biological survival. Cook, N.D. (2008) *Neuroscience* 153, 556-570. Damasio, A. (2010) *Self Comes to Mind*, Vintage, New York. Hunt, H.T. (1995) *On the Nature of Consciousness*. Yale, New Haven. **C24**

### **146 Low-Intensity Ultrasound Promotes Neurite Outgrowth in Cultured Cortical Neurons**

Uma Raman, Uma Raman, Sara Parker, Chris Duffield, Sourav Ghosh, Stuart Hameroff <uraman@email.arizona.edu> (Tucson, AZ)

Ultrasound (US) consists of pressure oscillations above human hearing threshold, e.g. megahertz (MHz, 10<sup>6</sup> Hz). In human volunteers, low-intensity (non-thermal) transcranial ultrasound (TUS) applied to the brain from the scalp at 2 or 8 MHz improves mood compared to sham exposure (1,2). Transcranial magnetic and electrical stimulation have been used to treat traumatic brain injury (TBI) and other disorders. Neuronal growth, synaptic plasticity and cognitive function depend on microtubules, components of the neuronal cytoskeleton with resonance effects in MHz (3). To investigate US effects on neuronal development, we exposed cortical neuron cultures from E18 rats to 90 secs of 2 MHz US and 1 Volt, or sham controls, and measured neurite outgrowth 4 hours after exposure by counting the number of neurons with or without neurites by a blinded observer. At 4 hours, the percentage of neurons that had sprouted neurites in the US-treated group was ~12% greater than untreated controls ( $p < 0.007$  for all trials). Our results suggest TUS could be beneficial in TBI, Alzheimers disease and other brain disorders. We hope to clarify and tune US mechanisms by further studies on neurons, and directly on microtubule assembly. References: Hameroff et al (2013) *Brain Stimulation* 3(6):409-15; Sanguinetti et al (2013) *SPR Proceedings*, Milan, 2013; Sahu et al (2013) *Biosens Bioelectron* 47:141-8. **C13**

## 2.10 Quantum brain processes

**147 Fractal Meets Sentyon: Information Fractalization in Conscious Particle States (“Sentyons”) and Potential Detection by Bright Matter Radiation** Erhard Bieberich <ebieberich@gru.edu> (Instit.of Molecular Medicine, Georgia Regents University, Augusta, GA)

The only logically consistent representation of consciousness in a biological substrate is by step-wise convergence of neural activity from larger to smaller entities: from parts of the brain to individual cells to single molecules. Unity of consciousness without convergence is possible, but requires coherence of separate units similar to that known from quantum physics (1). Quantum physical coherence, however, still requires convergence of information to prepare an entangled state (1). Therefore, convergence is a critical requirement for consciousness regardless of which model, classical or quantum physical is invoked. Convergent information such as that encoded in neural or molecular activity will need to be integrated in order to generate unity in consciousness (2-4). This information integration requires an all-onto-one mapping transformation, and therefore, fractal representation of the whole in each of its parts. I have proposed that iterative linear affine transformation is the simplest downscaling operation that will cope with information integration in consciousness (1-5). I have shown that this “information fractalization” converges onto a molecular entity with internal fractal structure. Information fractalization convergence (IFC) attaches consciousness to matter. This so-called “bright matter” consists of “sentyons” that have physical properties such as mass and energy (5). Based on the Kullback-Leibler theorem that allows for the calculation of information gain by fractalization and the Landauer erasure principle that converts this gain into energy I calculated the energy and mass of one sentyon to be 10-20 J or 10-35 g (5). Since this energy is in the range of biological substrate activation by ATP hydrolysis several biological substrates are candidate correlates for sentyons. Fractalization of a planar substrate (similar to fractons) by the interaction of ion channels with membrane lipids could generate sentyons (1-5). Recent advances in understanding the biology underlying the Hameroff/Penrose “Orch OR” theory suggest that microtubules can also adopt a fractal structure (6). A sentyon is not a permanent structure but it is generated when the information gain by IFC surpasses a particular energy threshold. Accordingly, this energy is preserved when a sentyon decays and it may be used to drive neural activity. However, since each energy transfer will have some “entropic” loss, there will be radiation when sentyons decay (i.e., infrared at 6 kJ/mole sentyons). Most importantly, sentyon decay and bright matter radiation should be measurable by physical detection devices and therefore, allow for an experimental analysis of the radiation signature of consciousness. This will be useful to detect consciousness in brain or synthetic devices. References: 1. Bieberich, E. (1999) arXiv:quant-ph/9906011v2; 2. Bieberich, E. (1998) <http://cogprints.org/79/1/struc2.htm>; 3. Bieberich, E. (1999) <http://cogprints.org/1210/2/liarfin3.html> and <http://arxiv.org/html/quant-ph/0101062>; 4. Bieberich, E. (2002) Biosystems 66, 145-64. PMID 12413746; 5. Bieberich, E. (2012) Cogn. Comp. 4, 13-28. PMC 3741678; 6. Hameroff S., Penrose, R. (2013) Physics of Life Reviews. Online. PMID 24070914 **C16**

**148 Consciousness: Down The Rabbit Hole – Just How Deep in Physics do the Roots of Consciousness Go?** John Hagelin <hagelinj@aol.com> (Fairfield, IA)

We present further evidence, using cutting-edge developments in physics and neuroscience, that the core phenomenon of consciousness originates deep within the physical realm—in nonrelativistic quantum mechanics, relativistic quantum mechanics (quantum field theory), and perhaps ultimately quantum gravity (unified field theory). Other authors (Penrose, Hameroff) have already proposed Planck-scale mechanisms rooted in quantum gravity as the ultimate origin of consciousness. We bolster that hypothesis and associated calculations using today's mathematically self-consistent, fully calculable quantum gravity theories. We also illuminate how these core, quantum-scale phenomena of consciousness relate to brain-scale cognitive functioning: First, we distinguish content-free consciousness (a.k.a. samadhi) from awareness of content. We identify in the EEG this content-free consciousness (the observer) as global-alpha1-coherence; the content of consciousness (the observed) as higher frequency harmonics of this alpha1; and the observer-observed relationship that is needed to support awareness-of-content as the stable, phase-

locked relationship been the alpha1 and its higher-frequency harmonics. (Publication in press.) Second, we discuss the interesting relationship between the EEG and the much higher frequencies associated with the quantum origins of consciousness—e.g., megahertz frequencies characteristic of microtubule vibrations. A clearer bridge is needed between these high frequency dynamics and the human EEG. A natural bridge would arise if elements of the EEG were continuously scalable, i.e., frequency independent, as some recent evidence suggests. We present an explicit, novel quantum-field-theoretic mechanism for such scale invariant behavior—a mechanism that simultaneously sheds light on numerous other mind-body enigmas. **C8**

### **149 Musha's Theorem That an Evanescent Photon in the Microtubule Is a Superluminal Particle Is Not Valid** Syamala Hari <murty\_hari@yahoo.com> (Edison, NJ)

In Takaaki Musha's talk on Quantum Computation in the Brain, during the TSC conference in 2011, he claims to have made use of the theories of Penrose and Hameroff that microtubules in the brain function as quantum computers. However, he also assumes that the evanescent photons in the brain described by Jibu, Yasue, and collaborators are superluminal particles and that they are tachyons defined and discussed by well-known physicists such as Sudarshan, Feinberg and Recami. In the quantum brain theory of Jibu and Yasue, quantum states of microtubules depend upon boson condensates of evanescent photons but Jibu and Yasue specifically stated that the evanescent photons have transmission speeds smaller than that of light and that their effective mass is real and momentum is imaginary whereas a tachyon's mass is imaginary and momentum is real. We show here that Musha's theorem that the evanescent photon is a superluminal particle is not correct and therefore all the conclusions based on this theorem may not be correct. **P2**

### **150 The Paradox of Information Channel Capacity, Congenital Programs of the Behavior and Mechanisms of Quantum Information Processing in Neurons** Alexey Melkikh <melkikh2008@rambler.ru> (Institute of Physics and Techn, Ural Federal University, Yekaterinburg, Sverdlovskaya Reg. Russian Federation)

The ability to acquire knowledge is one of the distinguishing characteristics of intelligence and consciousness. However, the mechanisms of knowledge acquisition remain largely unclear. Previously (Melkikh, 2005, 2011) the hypothesis that all animal behavior is completely innate was proposed. As a possible physical implementation of the storage of congenital programs quantum properties of biologically important molecules were considered. On the other hand, intracellular channel of information transmission was analyzed from the point of view of complexity (Melkikh, 2013a, b). The most important steps in the transfer of information within a cell are the folding, transport and recognition of proteins. It was shown that the large number of conformational degrees of freedom that proteins possess can paradoxically lead to an information channel with an exponentially small capacity. To resolve this paradox, a model, which assumes a quantum collective behavior of biologically important molecules, was proposed (Melkikh, 2013a, b). In this paper I propose the model of intraneuronal quantum information processing, which is based on the assumption that most of the degrees of freedom of the macromolecules are prohibited. These additional quantum rules become effective under the certain spatial configurations of the particles. As a result the movement of the majority of biologically important molecules at a microscopic level is directed. This allows, on the one hand, resolve paradox of small capacity of information channel, and on the other hand, to organize additional storage of aprioristic information for innate programs of behavior. This directional movement leads to the formation of synaptic connections between neurons, and, as a result, to run of innate programs of behavior. References 1. Melkikh A.V. Biological complexity, quantum coherent states and the problem of efficient transmission of information inside a cell. *BioSystems*. 2013. 111. 190-198. 2. Melkikh A.V. Quantum information and the problem of mechanisms of biological evolution. *BioSystems*. 2013. 10.1016/j.biosystems.2013.10.005. 3. Melkikh A.V. Congenital programs of the behavior as the unique basis of the brain activity. *NeuroQuantology*. 2005. 2. 134-148. 4. Melkikh A.V. First principles of probability theory and some paradoxes in modern biology (comment on "21st century: what is life from the perspective of physics?" by G.R.Ivanitskii). 2011.*Phys.Usp.* 54(4). 449-451. **P2**

**151 Fermions and Quantum Neurodynamics** Donald Mender <dona1d.mender@yale.edu> (Psychiatry, Yale University, Rhinebeck, NY)

Thermofield and OrchOR neurodynamics, the two major current candidates for a quantum substrate of consciousness in the human brain, depend upon Bose-Einstein coherence within biological systems for their thermodynamic viability. This approach has allowed Tegmark's thermal decoherence argument to define the relevant terms of debate, even if Engel's quantum-photo-synthetic discovery has recently moved the score in that contest in considerably enhanced favor of macro/mesoscopically coherent quantum neurodynamics. However, there may be no need to fight the Tegmark battle at all if one considers a possible quantum neurodynamical role for the anticorrelative skew-symmetry of fermions, to which the Pauli Exclusion Principle applies across the board. If it were not for Pauli exclusion, all the orbiting negatively charged electrons in material bodies would spiral into their nearest positively charged atomic nuclei and our everyday existence as embodied consciousness would implode. Less dramatically, without Pauli exclusion, common lodestone (as opposed to electro-) magnets would not be possible; Pauli exclusion and its energetics are required to configure the spontaneous alignment of magnetic moments among outer electrons in neighboring lodestone atoms. Generally speaking, non-trivial macroscopic room-temperature quantum effects occur naturally all around us in quotidian manifestations, but the unambiguously documented phenomena among them are overwhelmingly fermionic as in the above examples, not bosonic. In this regard, it may be useful for future quantum neurodynamical models to address the potential neurocognitive relevance of Fermi-Dirac-statistical phase-anticorrelation and the irreducibly quantum half integer spin of non-Cooper-paired electrons rather than Bose-Einstein condensates within the living brain. Such considerations might extend beyond mere analogies between non-quantum neural network structure and classical abstractions from spin glasses; Fermi-Dirac statistics operating within actual aggregates of neurobiologically germane electrons might be profitably investigated. **C8**

**152 Tubulin Hydrophobic Pockets and Dynamical States are Essential to Consciousness**

Pushpa Sahni <deipushpasahni@gmail.com> (Chemistry, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The human brain is a complex mass of tissue endowed with extraordinary capabilities. Activities in living cells are performed by protein conformational dynamics which in turn are governed by quantum mechanical van der Waals London forces in intra-protein "hydrophobic pockets". There are some evidences which support quantum effects in hydrophobic pockets which play functional roles in determining protein conformation. Roitberg et al., showed functional protein vibrations which depend on quantum effects centered in two hydrophobic phenylalanine side groups. Tejada et al have evidence to suggest quantum coherent states exist in the protein ferritin. Theoretical physicists Sir Roger Penrose and anaesthesiologist Stuart Hameroff collaborated to produce the theory known as Orchestrated Objective Reduction (Orch-OR). Microtubules turn out to be a common target of neurotransmitter action and play a significant role in learning and memory. Memory and consciousness are interrelated, thus, microtubules could be the link between these two phenomena. Microtubules are composed of tubulin protein dimer subunits. The tubulin dimers each have hydrophobic pockets that contain delocalised pi electron-rich indole rings separated by only about 2 nm. Hameroff proposed that these electrons are close enough to become quantum entangled. Anesthetic gas molecules which reversibly ablate consciousness exert their effects in hydrophobic pockets of neural proteins (Franks and Lieb, 1982; 1985). Anesthetics bind in hydrophobic pockets by weak, physical interactions called London dispersion forces, a type of van der Waals force. Why are these weak, localized interactions so important to protein function and consciousness? This paper presents nature of hydrophobic pockets present in a tubulin heterodimer and also reflects interaction between microtubules and anesthetic (propofol) – an in-vitro spectrophotometric study. Propofol strongly affects polymerization of tubulin or self-organization of microtubules. It is inferred that binding of anesthetics to tubulin alters the conformational states of the tubulin/microtubulin. Each hydrophobic pocket in the tubulin is suggested to be composed of four such aromatic rings (tryptophan and phenylalanine) with hydrophobic pockets being arranged in channels. Van der Waals London forces operate in the hydrophobic pockets in

tubulin, based on the electron rings of tryptophan and phenylalanine (Hameroff, 2006). Anaesthetics are similarly suggested to work through their action on aromatic amino acids in hydrophobic pockets in neuronal proteins, including membrane proteins. This loss of quantum fluctuation of hydrophobic pockets when propofol binds to tubulin hydrophobic pockets is thus likened to a loss of consciousness. Microtubule population in presence of propofol is not capable of carrying out collective action. Microtubules do not self-organise by a reaction-diffusion process in presence of propofol and do not communicate indirectly with each other. Self-organizing patterns suggesting the potential for MTs to process information (Smith, 1984; Campbell, 2002; Tabony, 2007; Tuszynski, 2007) do not form in the presence of anaesthetic. Our future efforts include the determination of the nature of hydrophobic pockets and number of dynamical states existing in tubulin protein with Femtosecond-resolved fluorescence up-conversion non-linear technique and Fluorescence resonance energy transfer techniques (FRET). **C13**

### **153 Searching for the Entangled Mind Using Functional Magnetic Resonance Imaging Technology** Leanna Standish, Todd Richards; L. Clark Johnson <ljs@bastyr.edu> (School of Naturopathy, Bastyr University, Kenmore, WA)

**Background:** Using functional magnetic resonance imaging (fMRI) our lab demonstrated changes in brain activity correlated with brain events in a distant person (Standish 2003, Richards et al 2005), which we reported at TSC a decade ago. Our results were predicted by Bell's theorem (1964). Bell used quantum mechanical mathematics to 'prove' that subatomic particles are causally interlinked in a non-local manner that is outside of space and time. Since 2005, local entanglement predicted by Bell's theorem has been shown in pairs of photons, electrons, atoms and in larger macro-systems such as microchips, photosynthesis, and microtubules. **Purpose:** To replicate previous experimental evidence using improved imaging and statistical technologies to confirm the existence of non-local linkage between conscious individuals. We used 3 Tesla brain fMRI to detect time-locked, event-locked correlated events between two human brains that are isolated from one another physically, sensorially and electromagnetically. **Methods:** Two previously acquainted pairs (4 total) of adult volunteers consented to participate in a 60-minute study at the University of Washington Integrative Brain Imaging Center. Before scanning, each pair was escorted to a private room to spend 15 minutes together in meditation to enhance their interconnectedness. One member of the pair was randomly assigned as the 'receiver', and entered the brain scanner. The receiver viewed a gray field with a central fixation point for the entire experiment. The other member (the 'sender') was seated before a video screen in an isolated room 10 meters outside and away from the MR-shielded scan room. The sender also viewed a gray video screen with a central fixation point. Over 300 seconds the sender's video screen presented five randomized blocks of a flickering black and white checkerboard stimulus (ON blocks). Blood oxygen level dependent (BOLD) signal in the brain was measured in the receiver while the visual system of the sender was stimulated by the flickering video screen. Changes in BOLD signal intensity in the receiver's brain were detected by comparing brain activity during the sender's ON (flickering checkerboard) to OFF (gray homogenous field) blocks using FSL's fMRI expert analysis tool (FEAT). To ensure that brain signal changes observed in the subjects were not related to default resting state, network activity BOLD signal changes were compared to resting state fMRI data from 604 unrelated human brains. The risk of false positives in fMRI research is high. Therefore advanced statistical methods and control data were used. **Results:** BOLD signal decreased in occipital cortex, with other changes in the parietal cortex, in all four subjects when the sender was viewing a strong visual stimulus. Group analyses showed a statistically significant decreased brain activity correlated with the sender's ON time blocks ( $p < 0.01$ ). The detected change in BOLD activity observed in the four subjects in this study did not co-vary with resting state fMRI data from 604 other brains studied. **Conclusion:** Using fMRI brain scan methods we detected correlated visual cortex activity associated with mental events in another distant and isolated person. Non-local macroentanglement is one possible underlying mechanism for these neurophysiological observations. **C23**



**154 Consciousness as a State of Matter** Max Tegmark <tegmark@mit.edu> (Physics, MIT, Department of Physics, Cambridge, MA)

I examine the hypothesis that consciousness can be understood as a state of matter, 'perceptro-nium', with distinctive information processing abilities. I explore five basic principles that may distinguish conscious matter from other physical systems such as solids, liquids and gases. This approach generalizes Giulio Tononi's integrated information framework for neural-network-based consciousness to arbitrary quantum systems, with interesting links to error-correcting codes, thermodynamics and many open problems in fundamental physics. For example, why do we perceive the world around us as a dynamic hierarchy of objects that are strongly integrated and relatively independent? **PL9**

**155 Substrate-Diverse Persons by Design** Natasha Vita-More <natasha@natasha.cc> (Design, Technology, Science, Faculty | University of Advancing Technology, Scottsdale, AZ)

Technology undoubtedly alters human nature. Computer-based interfaces and augmentations improve physical performance and molecular technologies propose to generate enhanced cognitive characteristics. The more intimate and transparent these interfaces become, the more diverse and expansive human nature becomes. This expansion requires a perceptual system closely intertwined through our cognition and interactions with the world. Its embodied mind would be a means for prolonging personhood, yet it would not rely exclusively on biology. One method to achieve this system would employ a cross-platform, substrate-diverse, whole-body prosthetic. To allow for new functions and capacities, this system would evolve continually and integrate persons across substrates and their varied actual material and virtual matter. Streamlined and adaptive, this new body could meet the needs of users who enjoy the physical world and virtual environments. For example, persons might desire a whole body prosthetic for enabling a longer biological lifespan as well as a docking system for transferring or uploading cognitive properties into digital platforms. As humans live longer and become more immersed with virtual worlds, we will need a better means to transfer presence back and forth between the biosphere and cybersphere. Because of its multi-level usability, this substrate-diverse body design specifies a smooth interface by adjusting to diverse social behaviors and safeguarding moment-to-moment experiences that form our human narratives and behavioral patterns. **PL11**

**156 Dark Energy Dissipation By Cortex In Knowledge Retrieval and Scale-free Neurodynamics in The Dissipative Many-body Model of Brain** Giuseppe Vitiello, Walter J. Freeman, UC Berkeley, Dept. of Molecular and Cell Biology; Antonio Capolupo, Dept. Physics, University of Salerno, Italy; <vitiello@sa.infn.it> (Department of Mathematics and, Dept. Physics E.R. Caianiello and INFN, University of Salerno, Salerno, Italy, Fisciano (SA), Italy)

The thermodynamic Carnot cycle, the derivative Rankine cycle, and the dissipative many-body model of brain have been used in modeling the energy storage and dissipation in brain activity, thus incorporating the mechanism and necessity for so-called dark energy in knowledge retrieval. By resorting to the theorem relating self-similarity and coherent states, the dissipative many-body model also predicts the observed scale-free, fractal-like neurodynamics features. The patterns observed in trained animals by using arrays of electrodes to record the electroencephalogram (EEG) from the surfaces of the visual, auditory, somatic and olfactory cortices as the animals respond to conditioned stimuli show that the brain is repeatedly and rapidly moved out from its ground state activity entering a non-stationary dynamical regime. Well known transmembrane ionic gradients show that a large amount of energy is stored in the brain background activity state. It constitutes the reservoir for the brain energy requirements for criticality and phase transitions. It may be considered to be the reservoir for energy exchanges in the Carnot-like, Rankine-like thermodynamic cycle. Our study is focused on the complexity of associations that brains experience in acts of recognition in recall induced by sensory stimuli. Three structural features of the neuropil may account for such a complexity: i) the high divergence and convergence among axons and dendrites in neuropil, with 1/f distributions of connection distances that facilitate scale-free neurodynamics; ii) the extreme packing density of cells and fibers within the correlation range for synchronization of neuronal activity; iii) the maintenance of the neuropil in a state of readiness (criticality) for abrupt change from expectancy to realization and back again in tracking changes in the environ-

ment. These features can explain the observations of the dark energy at high density and rate of dissipation by neuropil. The thermodynamic Carnot cycle and the dissipative many-body model may account for the extremely high density of energy sequestered briefly in cortical activity patterns which manifest in the vividness, richness of associations, and emotional intensity of memories recalled by stimuli. Our modeling also accounts for scale-free features and mobilization of the myriad microscopic details that are stored in the modified synapses among the interconnected neurons into the macroscopic order that is expressed by the pulse cloud and its controlling field of dendritic currents observed in the EEG, which suggest a role for ephapsis in sustaining the high density of correlated neural firing. [1] W. J. Freeman, R. Quian Quiroga, *Imaging Brain Function with EEG*, Springer, New York, 2013 [2] G. Vitiello, *My Double Unveiled*, John Benjamins, Amsterdam, 2001 [3] W. J. Freeman, G. Vitiello, *Phys. of Life Reviews* 3 (2006) 93-118 A. Capolupo, W. J. Freeman, G. Vitiello, *Physics of Life Reviews* 10 (2013) 85-94 [4] G. Vitiello, *Coherent states, fractals and brain waves*, *New Mathematics and Natural Computing* 5 (2009) 245-264 G. Vitiello, *Fractals, coherent states and self-similarity induced noncommutative geometry*, *Phys. Lett. A* 376 (2012) 2527-2532 **C21**

## 2.11 Pharmacology

**157 The Kappa Opioid Receptor (KOR) System and Consciousness: Findings from *Salvia Divinorum* Research** Peter Addy <peter.addy@yale.edu> (Yale University School of Medicine, West Haven,)

This presentation will describe the results of my recent research with the atypical psychedelic drug salvinorin A (SA), the principle active component of the plant *Salvia divinorum* (SD). SD has been used by the Mazatec people of southern Mexico for unknown hundreds of years for ritual purposes, including physical and spiritual healing. SA is a nonnitrogenous diterpenoid which produces profound and unique psychedelic effects when ingested due its potent and selective activation of the kappa opioid receptor (KOR) system. Of particular note is that SA facilitates psychedelic effects without activating the serotonin system, which distinguishes it from “classical” psychedelics such as psilocybin and LSD. KOR agonists lead to reduced levels of dopamine in striatal regions, which leads to conditioned place aversion, avolition, and immobility in animals. In humans, KOR agonists have been examined to provide analgesia without euphoria and concomitant reinforcing properties, but side effects including “dysphoria” and “psychotomimesis” have limited effectiveness. These unwanted side effects may be due to inhibitory activity in the deep cortical layers and the claustrum. For the past five years I have been studying SD and SA in hopes of understanding the role of the KOR system in consciousness. I began by capturing the subjective effects of SD-facilitated altered consciousness in psychedelic-experienced healthy adults. I am currently helping to investigate the behavioral, cognitive, electrophysiological, and subjective effects of acute SA administration in a pharmacology challenge model. Most recently, I accompanied an expedition to the Sierra Mazateca in order to interview the Mazatec about their ritual use of SD and their understanding of the consciousness-altering effects of SD in a naturalistic setting. Based on my work with SD and SA, I will propose a role of the KOR system in consciousness through the description of subjective accounts of SA-facilitated inebriation and probable neurobiological correlates. My talk will conclude with an overview of possible clinical applications for SD and SA, as well as future research directions to further understand the overlap of the KOR system and consciousness. **C7**

**158 Pharmacology of Consciousness** Seema Bhat, Dr. Laxminarayan Bhat <seemaranibhat@gmail.com> (Chemistry, Reviva Pharmaceuticals, Cupertino, CA)

The scientific evaluation of consciousness phenomena has become one of the thrust areas of biomedical research due to its important role in the spiritual, physical, mental and social wellbeing of mankind. There are several spiritual practices described in the religious literature to achieve higher levels of consciousness but widely practiced methods are prayer, meditation and yoga. The biggest challenge in the scientific evaluation of consciousness phenomena is that the reproducibility of the consciousness effect in individual spiritual practitioners regardless of the spiritual meth-

ods practiced. To date, all literatures related to the scientific studies of consciousness phenomena are focused on the evaluation and measurement of pharmacodynamic effects of spiritual practices, and they can be broadly classified in to the following four groups: (1) environmental correlates, (2) neural correlates, (3) physiological correlates and (4) psychological correlates. It is evident that the magnitude of pharmacodynamic effects of consciousness phenomena is directly proportional to the levels of consciousness attained by the individual spiritual practitioners. However, the pharmacology of consciousness to explain the pharmacodynamics effects has not been reported in any scientific literature. We present the pharmacology of consciousness and provide the scientific rationale for molecular or receptor level interactions between cosmic waves and human body. The receptors that regulate the key neurochemicals/neurotransmitters such as dopamine, serotonin and norepinephrine appear to be the primary interaction sites between the cosmic waves and human body. We discuss in this paper the pharmacological mechanism for consciousness and also, role and expression of the key receptors involved in the consciousness phenomena. **P1**

**159 Depression, Ketamine Treatment and the Reverse Split-Brain** Michael Cerullo <cerullo@hotmail.com> (Psychiatry and Neuroscience, University of Cincinnati, Cincinnati, OH)

Depression is the most common psychiatric illness and occurs in over 15% of the population. The etiology of depression is unknown and depression is defined by a group of symptoms and their time course. Common symptoms include sad mood, anhedonia, insomnia, fatigue, hopelessness, and cognitive problems. In severe depression thoughts of suicide can develop over weeks as the symptoms of depression worsen and are the most common reason for hospital admission. Patients with depression often feel they have two selves: their depressed self and their normal self striving to return. Pharmacologic or psychological treatment takes several weeks before they begin to improve symptoms. Thus the gradual improvements of mood and cognition are consistent with our everyday experience of the self. However, a new treatment, ketamine, a dissociative anesthetic, can alter depressive symptoms within hours or even minutes. Ketamine can stop suicidal thoughts in as little as 20 minutes and is being developed to treat patients in the emergency room and allow them to return home and avoid hospitalization. Rapid changes in a belief as complex as suicide raise new questions about the self and identity. The case of Mr. J helps illustrate the philosophical challenges of this new treatment. Mr. J had heard of a ketamine research study for suicidal thoughts and presented to the emergency room to receive the treatment. He was suffering from significant depression including suicidal thoughts and was deemed to be at high risk for suicide. Mr. J wanted to receive ketamine and then return to work latter that day. Thus before treatment Mr. J seemed to have one aspect of himself that was close to ending his life and another aspect that recognized these thoughts as inconsistent with who he was. Ketamine treatment had the potential to rapidly reverse Mr. J's suicidal thoughts. Typically changes in complicated beliefs are caused by alterations in memory over time (i.e. experience). Identity is believed to be tied to memory but the near instant changes in belief produced by ketamine seem to bypass this process. Ketamine treatment may be better understood by examining parallels with another treatment, corpus callosotomy. Corpus callosotomy is a treatment for intractable epilepsy and leads to the splitting of consciousness into two selves termed split brain syndrome. Ketamine treatment could be viewed as rapidly joining a split self back together, the reverse of what is seen with a corpus callosotomy. On the other hand ketamine treatment may instead be removing one aspect of self. Something similar occurs when one brain hemisphere is destroyed by a stroke or trauma, the difference being that in the ketamine case this self is unwanted by the other self. Certain models of consciousness, including Integrated Information Theory, allow multiple simultaneous overlapping selves to be present in the normal brain. If ketamine treatment is in fact joining two selves it may lend support to these theories. These and other philosophical challenges of ketamine treatment will be explored and in the current paper. **C5**

**160 Did cholesterol-Lowering Drugs Play a Significant Causal Role in the Financial Crisis of 2007-2008?** Mathew Gendle, Alyssa G. Flashburg; Kristi L. Higgins; Kristianne M. Oristian <mgendle@elon.edu> (Psychology, Elon University, Elon, NC)

The use of prescription medication is often conceptualized as a personal medical choice that

produces benefits or consequences that are limited to the individual patient. However, the possibility that the widespread use of certain pharmaceuticals could cause notable changes in emergent behavior in large social groups should not be discounted. Statins are a class of drug that is commonly prescribed to treat elevated cholesterol levels. In the U.S., federal guidelines indicate that a desirable level of blood total cholesterol (TC) is  $< 200$  mg/dL, and many physicians prescribe statins to promote TC levels well below this threshold. However, very low levels of TC have been associated with increases in violence, suicidality, and behavioral impulsivity. It has been speculated (by Goldstein and colleagues) that the prevalent greed, imprudent lending, and the desire for immediate monetary reward that contributed to the worldwide economic crisis in 2007-2008 was caused, in part, by depressed TC levels resulting from the widespread use of statins by individuals in positions to make significant financial decisions. We compared Iowa Gambling Task (IGT) performance in young adult females with TC less than 140 mg/dL or TC greater than or equal to 140 mg/dL. The IGT closely replicates real-life financial decision making by creating contingencies where money can be won or lost within an environment where each individual choice is uncertain and the exact outcomes of each choice cannot be fully predicted. Participants with TC levels  $< 140$  mg/dL preferentially responded to IGT stimuli that resulted in large and immediate monetary gains, despite these gains being yoked to increasingly large, unpredictable, and inevitable monetary losses over time. This pattern of responding closely mirrors the preference for immediate monetary rewards in the face of delayed and probabilistic losses that was a common part of corporate and personal financial leading up to the market crisis in 2007-2008. Given the endemic use of statins amongst white-collar workers, it is reasonable to hypothesize that these drugs may have played a causal role in the recent global financial meltdown. The widespread consumption of statins may serve as an example of how the pervasive use of a single pharmaceutical can dramatically affect collective behavior in large social groups. **C5**

**161 In Silico Studies of CNS Drugs Altering Consciousness Through Blood Brain Barrier Penetration** Minu Maninder <minu.maninder@gmail.com> (Chemistry, Dayalbagh Educational Institute, Agra, UP India)

The brain is protected by a tightly packed lining of cells called the blood-brain barrier with a surface area of approximately 20 m<sup>2</sup>. However, some drugs are able to pass through and influence the operation of the brain. These drugs alter consciousness by facilitating or inhibiting synaptic transmission. Various Consciousness-altering Drugs are: CNS Depressants (Alcohol, Opioids, Barbiturates, and General Anesthetics etc.); CNS Stimulants (Caffeine, Amphetamine, Nicotine etc.); Hallucinogens (LSD, Cannabinoids, MD, MA etc.) With an increase in lifespan, the incidence of CNS diseases is expected to increase significantly. Various Neurodegenerative disorders include the dementias (Alzheimer's disease), movement disorders (Parkinsons, Huntingtons disease), multiple sclerosis etc. However, successful treatment strategies for these diseases have been limited. One of the bottlenecks in the treatment for neurodegenerative disorders is the CNS penetration through the blood brain barrier (BBB). CNS entry is limited to compounds with the correct physicochemical properties and permeability. There has not been much success in the prediction and assessment of the ability of the compounds to cross the BBB and affect consciousness or treat CNS disorders. The quantitative structure-activity relationship (QSAR) is an attempt to remove the element of luck from drug design by establishing a mathematical relationship in the form of an equation between biological activity and measurable physicochemical parameters. The 2D-QSAR models generate descriptors derived from a two dimensional graph representation of a molecule and are pointers to design effective drugs. In this study, a data of log BB values as a measure of brain uptake of 40 CNS compounds has been taken. 2D-QSAR was applied to find out the correlation between log BB and physicochemical descriptors. An excellent statistically significant model using Multiple Linear Regression with  $r^2$  value of 0.8369 has been developed which shows very good internal predictivity 80.27 % ( $q^2=0.8027$ ) and external predictivity 58.57% ( $\text{pred}_r^2=0.5857$ ). The best fit resulted from equation:  $\log BB = -0.023 \times \text{PolarSurfaceAreaExcludingPandS} + 1.02 \times T\_O\_F + 21.23 \times \text{Epsilon3} - 23.22 \times \text{DeltaAlphaA} - 8.30$  The descriptors PolarSurfaceAreaExcludingPandS and DeltaAlphaA have negative contribution, while,  $T\_O\_F$ , 6 and Epsilon3 have positive contribution to the equilibrium distribution of solutes between blood and brain. This study shows that the blood-brain barrier penetration of CNS drugs can be modeled

in terms of structure-based descriptors. The structural information encoded in the descriptors may be useful for new CNS compounds design and predicting/improving their BBB penetration; and for de novo modeling of CNS libraries. **P1**

**162 Characterization of Cortical Directional Connectivity as a Function of Cortical Acetylcholine Across Altered States of Consciousness in Rat** Dinesh Pal, U.C. Lee, PhD,1; H.S. Lee, BS,2; S. Wisidigamage, MS,1; R. Lydic, PhD,1; G. A. Mashour, MD, PhD,1 1Anesthesiology, Univ. of Michigan 2Dept. Physics, Postech, Korea. <dineshp@med.umich.edu> (Dept. of Anesthesiology, University of Michigan, Ann Arbor, MI)

Cortical directional connectivity, reflecting a causal interaction among brain regions, has been implicated in conscious processes [1]. Selective suppression of feedback or recurrent brain connectivity has been shown to be a prominent feature of pharmacological and pathologically induced unconsciousness [2,3,4]. However, the neurochemistry underlying the suppression of feedback connectivity has not been characterized. Cortical acetylcholine (ACh) levels have been shown to be high during waking and are suppressed during slow-wave sleep (SWS) and anesthetic induced unconsciousness [5,6,7,8]. Therefore, we hypothesized that brain connectivity changes as a function of cortical ACh levels. In order to test the hypothesis, male Sprague Dawley rats (N=19, 300-350g, Charles River) were instrumented with i) electrodes to record monopolar electroencephalogram (EEG) from frontal, parietal and occipital cortices and, ii) a guide tube aimed at medial prefrontal cortex (mPFC) for microdialysis and electrochemical measurement of ACh. In addition, 7 out of 22 rats were instrumented with a chronic intravenous catheter in the jugular vein for continuous propofol infusion (800?g/kg/min). Following 7-10 days of post-surgical recovery and habituation to the recording/microdialysis set-up, monopolar EEG along with ACh levels were measured during i) waking, ii) propofol/sevoflurane anesthesia, and iii) post-anesthesia recovery period. Another group of rats (N=7, male Sprague Dawley, 300-350g, Charles River) was surgically prepared for electrophysiological sleep-wake recordings and simultaneous recording of monopolar EEG. The rats were allowed 7-10 days of post-surgical recovery and habituation to the recording chamber, following which 24 h sleep-wake recordings were conducted across light and dark periods (L:D 12:12, lights on at 6am). Repeated measures one way ANOVA showed that both the anesthetics caused a significant decrease in cortical ACh levels as compared to wake ( $p=0.007$  for propofol and  $p<0.0001$  for sevoflurane) and recovery conditions ( $p=0.01$  for propofol and  $p=0.001$  for sevoflurane). A preliminary analysis of the EEG data indicates suppression of directional connectivity in theta band (4-10Hz) during anesthetic induced unconsciousness as compared to the wake and recovery condition. Connectivity in the theta band is also suppressed during SWS as compared to the wake and rapid eye movement sleep state. Further analyses are being conducted to confirm these findings. A detailed understanding of the neurochemistry underlying the changes in cortical connectivity may provide mechanistic insights into the neurochemical substrates of consciousness. References: 1. Ferrarelli F et al., Proc Natl Acad Sci U S A. 2010;107:2681-6. 2. Imas OA et al., Neuroscience Letters 2005;387:145-50. 3. Boly M et al., Science 2011;332:858-62. 4. Lee U et al., Anesthesiology 2013;118:1264-75. 5. Kikuchi T et al., British Journal of Anaesthesia 1998;80:644-48. 6. Shichino T et al., British Journal of Anaesthesia 1998;80:365-70. 7. Lydic R and Baghdoyan HA. Anesthesiology 2005;103:1268-95. 8. Osman NI et al., Anesthesiology 2005;103:779-87. Funding: Supported by Departmental funds and R01 GM098578-02 (GAM), HL40881 (RL), HL65272 (RL). **P1**

## 2.12 Neural synchrony and binding

**163 The Emergence of Information in Mesoscopic Measures of Brain Activity** Gautam Agarwal, Ian Stevenson; Kenji Mizuseki; Antal Berenyi; Gyorgy Buzsaki; Friedrich Sommer <gagarwal@berkeley.edu> (Redwood Ctr for Theoretical Ne, UC Berkeley, Berkeley, CA)

How does the chattering of many billions of neurons within a brain give rise to a steady stream of behaviors and percepts? This question is hard to address because of the large disparity of scale between neurons and organism. One attempt to bridge this gap is to study an intermediate (i.e. mesoscopic) scale of brain activity, the local field potential (LFP), which reports the synchronized

oscillation of thousands of neurons (i.e. brain waves). We present a case study of the LFP's within the hippocampus, a brain region that is involved in memory and navigation, recorded in rats as they move through their world. In the hippocampus, different neurons activate as the rat arrives at different locations; the activity of sufficient neurons can thus serve as a 'place code' to estimate the rat's location. In contrast, the LFP measured at any single point within the hippocampus does not appear to be sensitive to the animal's location, because it averages together the activity of many neurons with diverse location preference. Nonetheless, we find that when observed simultaneously at multiple sites within the hippocampus, the LFP exhibits spatio-temporal patterns that can be used to estimate the rat's location. Somehow, the multi-site LFP preserves information contained in the much larger, and unresolvable, population of neurons from which it arises. The theory of compressed sensing suggests that this is due to the sparse nature of the encoded information: at any moment in time, the activity of the neurons that underlie the LFP is largely determined by a single factor – the rat's position. Based on this insight, we show that the sparse structure underlying the multi-site LFP can be leveraged by statistical learning algorithms to discover the position-based code embedded within the LFP. Since many sensations and actions seem to arise from sparsely occurring causes, our findings may offer general insights into the relation between neurons and behavior. Sparsity may provide a statistical signature that can be exploited by brain circuits to interpret incoming patterns of neuronal activity. Furthermore, sparsity may serve as a principle for the self-organized emergence of integrated behaviors and percepts from neuronal populations. **C21**

### **164 Fundamental, Unifying Order Dynamics in a Phase Synchrony Model of Consciousness**

John Russell Hebert, John Hagelin, Menas Kafatos <tmeeg@aol.com> (Anesthesiology, Mahari-shi University, Houston, Texas)

Deciphering the code of the brain will have a lasting impact on society. Thus far however no unified neuroscience theory of consciousness and cognition has appeared on the horizon. In recent history because of its unprecedented spatio-temporal fidelity phase synchrony EEG analysis has greatly advanced consciousness theory by demonstrating how the brain integrates information through zero-lag gamma (above 30 Hz) oscillations. These findings showing the relation of gamma to object representation support the growing contention that consciousness does not arise from neural firing but through synchronized neural firing. On a cautionary note recent articles suggest that understanding how the brain integrates information is not enough to explain subjective experience. Authors emphasize that the understanding of the neural basis of the "observer" is also necessary for a proper theory of consciousness. Our proposed talk will offer a new principle, that phase synchronized alpha (8-12 Hz.) represents the neural correlate of the self or observer within consciousness theory. In earlier work using phase synchrony analysis we separated out the observer from the object representations within consciousness through experiments with what is classically known as "thoughtless awareness" or turiya avasthya. This experience of what is now commonly known as "transcendence" is associated with global, phase synchronized zero-lag alpha. In line with the above findings, other authors have identified phase synchronized alpha as the "attention" aspect of consciousness and show that alpha oscillations underlie visual, auditory and tactile experience as well as controlled access to stored information. We propose that because the two aspects of subjective consciousness (awareness and attention) have the same EEG signature, then the quiescent self-awareness of turiya avasthya and the active attention aspect of sensori-cognitive states may represent two aspects of the same observer. In addition we point to one anchoring principle that may account for alpha's pervasive role and its high predictive success is the largely overlooked fact that alpha EEG has been defined as the primary resonant frequency (PRF) of the brain. This fact, based on physical parameters of alpha in relation to the dimensions of the cortex also predicts that the brain will form standing waves and also will naturally produce secondary resonance frequencies. We cite recent studies verifying that between-frequency resonant interactions (alpha- gamma 1:3 and 1:4 and alpha-beta 1:2 harmonics) develop in high demand tasks as the basis of sensation, perception and cognition. We show how alpha standing wave oscillations create an isometric oscillatory environment that promotes resonance (N:M) interactions during complex processing. This is compared to a tripod holding the camera still for a



better fidelity of an image. The explanatory power of this theory is being shown in current clinical experiments involving for example schizophrenia, Alzheimer's, autism and bipolar disorder and in performance studies involving reaction time, memory processing and sensori-motor tasks. The results of these studies are explained in relation to alpha's control of precision long-range temporal synchronization and its control of excitation and inhibition and as well through its time-locked and phase reset dynamics of in the evoked potential. **P2**

**165 The Dynamics of Binding and Meditation.** Peter Walling, MD <peterwalling@gmail.com> (Baylor University Medical Center, Dallas, TX)

The Dynamics of Binding and Meditation. Peter T. Walling. FRCA. MD. "One classic question is how these functionally segregated regions coordinate their activities in order to generate the gestalts of ordinary conscious perception." (1). According to Freeman's Mass Action (2), (FMA), a sensory area of the brain, e.g. the olfactory cortex, registers an odor by developing a synaptic configuration which is imprinted by Hebbian reinforcement. Subsequent exposure to the odor stimulates the whole olfactory cortex to generate a signature AM Gamma Burst which spills over into the sensory cortex, joining other sensory data streams to cause a combined sensory experience, or gestalt. We assumed that FMA was essentially correct and decided to investigate the formation of the gestalt from incoming AM Gamma Bursts.. The electroencephalogram (EEG) was recorded from the right frontal region at sampling rates up to 10K s/sec. An analysis of archival Zen meditation is also examined. We showed that binding is associated with; 1. A change in frontal EEG power; from a relaxed alpha rhythm, for example, this may be manifest as a power reduction. 2. Increasing complexity, demonstrated by an increasing dimensional estimate of the EEG attractor as binding progresses. 3. A greater Maximal Lyapunov Exponent, marking an increased rate of separation of the orbital trajectories on the attractor. This is an indicator of increasing chaotic dynamics. 4. Evidence of gamma bursts at specific frequencies up to at least 140 Hz, as predicted by FMA. 5. EEG gamma ascent reminiscent of emergence from anesthesia. We propose mechanisms to explain how different sensory inputs may be bound in a gestalt, but at the same time, retain their individual properties. This is possible when each sensory input is allocated a dimension of its own in perceptual space, and explains why EEG attractors may exist in >3D while being constrained within a 3D brain. This theory is predicated on the supposition that perceptual space is different from ordinary physical space (3), is sometimes multi-dimensional, and is best observed by studying dynamical EEG attractors moving within it. (4). During Meditation, Gestalt deconstruction progresses until only consciousness remains. Scanning a 50 year old EEG demonstrated a powerful, pan-cortical, synchronous 7 Hz. rhythm of remarkable purity. It is curious that this difficult mental activity is associated with the simplest dynamics (Attractor dimension ~1.0). Perhaps by clearing the mental 'lens', the meditator is able to commune with the universe directly, rather than through the senses. References: 1. Bernard J. Baars, Stan Franklin, Thomas Zoega Ramsoy. Global workspace dynamics: cortical 'binding and propagation' enables conscious contents. *Front. Psychol.* 28 May 2013. Vol 4, Article 200 2. Walter J. Freeman and Robert Kozma. (2010), *Scholarpedia*, 5(1):8040. (2001a) 3. Bertrand Russell. (1928), *An Outline of Philosophy*. (Reprinted; London, Routledge, 1996, p109.) 4. Peter T. Walling & Kenneth N Hicks. *Consciousness: Anatomy of the Soul*, 2009. Authorhouse. **C14**

## 2.14 Sleep and waking

**166 H-Reflex Suppression and Autonomic Activation in Laboratory Lucid REM Sleep Lucid Dreaming – Subjective and Objective Value** Andrew Brylowski <abrylowski@sbcglobal.net> (Dallas, TX)

Recent reports in consciousness research identify subject directed research and the need to bridge the gap between objective neurophysiological data and subjective reporting. In this study, the analysis of variable neurophysiologic human data from at least one subject is done with a view to bridge the neurophysiologic data and subjective reports identified in lucid dreaming consciousness research. Lucid dreaming described here occurs in unequivocal (lucid) REM sleep and is supported by multiple neurophysiologic studies. Significantly absent are numerous studies

with subjective reports temporally associated with evidence of “consciousness” in whichever neurophysiologic stage of sleep, wakefulness, and/or brain activation or lack thereof that are being reported, including laboratory lucid dreaming research. This article focuses on laboratory lucid REM sleep lucid dreaming and identifies the subjective reports that correlate with the neurophysiological data. Implications for the relative precision of this approach for human consciousness research is made obvious. Modified Hill epidemiologic injury causation criteria are applied to the data with temporal modification of sleep staging epoch length (5 second versus 30 second). These criteria, developed for the problem of subjectivity in Disability Management are modified and demonstrated to support reference point criteria to anchor laboratory lucid REM sleep lucid dreaming (LLREMLD) research. Criteria are discussed for application to laboratory, individual, pharmacologic, practical applications, epidemiologic study possibilities and more. This approach will narrowly defined this area to allow for comparison/consensus of data/observations from disparate settings. Development of criteria are done with a view to being applicable to human and possibly non-human models of consciousness research. Specifically strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, and analogy. This approach would support reference point framework from which future and past scientific study of consciousness research in this area and experimentation including subject directed, object directed and subject-object directed research can be understood, reconciled, derived, expanded, proposed, hypothesized, etc. Neurophysiologic data are presented as a subject-object directed model with paralleling temporally subjective reporting with objective neurophysiology. Rationale for dissection of the objective and subjective data into a framework that can allow for inter-investigator communication and reliability as well as provide public and private educational value. Subject directed object framed laboratory lucid REM lucid dreaming as the prototype and reference standard for crosscheck of diverse paradigms of human subject-object consciousness research with demonstration of the investigation of the relationship between neurophysiology of brain and subjective properties of global mentation variability including consciousness. Examples of utility of modified Hill criteria for LLREMLD via plug in of various consciousness models including synesthesia, global network theory, various psychotherapies, language, resuscitation medicine etc. will be demonstrated and/or explored. **P1**

**167 Subjective Experience Is a Simulation in the Hippocampal Formation** Matt Faw, Bill Faw, PhD <mattfawfilmmaker@gmail.com> (Stickman Films, Los Angeles, CA)

Recent imaging work has revealed the Hippocampal Formation to be something like “the mind’s eye”, in which imagination, dreams, spatial planning and recalled memories are simulated into experience. We propose that the initial simulation of memories is a similar process of binding reports from around the brain into a something like a virtual reality simulation, which includes the simulation of the self. We propose that subjective experience is better understood as the product of the hippocampal formation; a memory, in the process of being encoded. We demonstrate how many of the greatest mysteries of subjectivity are comprehensible, in context of this Hippocampal Simulation Theory, and we sketch out how the neuroanatomy of the Medial Temporal Lobe “simulator network” supports the creation of such a simulation. **P2**

**168 Sleep and Dissociation: Toward an Integrative Model of Dissociative Symptoms and Experiences** Steven Lynn, Harald Merckelbach; Timo Giesbercht; Dalena Van Der Kloet; Liam Condon; Anne Malaktaris; Peter Lemons <stevenlynn100@gmail.com> (Psychology, Binghamton University (SUNY), Binghamton, New York)

In this presentation we review a growing corpus of evidence that suggests that fragmented sleep may play a role in dissociative experiences and symptoms. We review research conducted in our laboratories and elsewhere that suggests that sleep-related disruptions foster the intrusion of sleep-like mentation in everyday life that are associated with increased dissociative experiences and symptomatology. We review correlational studies that confirm a link between sleep problems and dissociation, as well as research we have conducted with more causal ramifications indicating that sleep deprivation increases dissociative symptoms, whereas sleep hygiene programs decrease dissociative symptoms. Moreover, these changes in dissociative symptoms cannot be

accounted for by changes in depression or anxiety. We contend that a consideration of the role of sleep in dissociation may provide a bridge across theories that variously emphasize trauma in the genesis of dissociation and theories that emphasize fantasy and sociocognitive variables, including suggestion, suggestibility, memory and cognitive failures, and expectancies as determinants of dissociation. **C12**

**169 EEG Coherence and Connectivity Before the Onset of Somnambulistic Episodes** Antonio Zadra, Marie-Eve Desjardins; Jonathan Godbout; Jacques Montplaisir; Julie Carrier <antonio.zadra@umontreal.ca> (Psychology, Université de Montréal, Montréal, Québec Canada)

**Introduction and Objectives:** There has been increased interest in examining sleep EEG data in terms of functional brain connectivity. Sleep is ideally suited for these kinds of analyses because it minimizes between-subject variability that can confound analyses of waking state events. These new investigative tools, however, remain practically unexplored in relation to sleep disorders. We studied the EEG coherence and interdependencies between brain areas before the onset of somnambulistic episodes recorded in the sleep laboratory. **Materials and Methods:** 13 adult sleepwalkers were investigated with polysomnography. Patients were selected on the basis of having experienced a somnambulistic episode in the sleep laboratory during their first period slow-wave sleep (SWS). The 20 seconds immediately preceding the onset of each of the 13 episodes were compared to the 20 seconds occurring two minutes prior to these episodes' onset. Data from the Fp1, Fp2, F3, F4, C3, C4, P3, P4, O1, O2 leads were investigated using two complimentary measures of brain connectivity: standard coherence and imaginary coherence (the latter addressing the problem of spurious correlations due to common sources). **Results:** The largest observed difference between the 20 second periods occurring immediately prior to episode onset versus the 20 second segments occurring 2 min before episode onset was in imaginary coherence with greater connectivity taking place immediately preceding sleepwalking episodes. Furthermore, increased connectivity was strongest between frontal and occipital brain areas. **Conclusion:** These pilot findings suggest that episodes of somnambulism are preceded by temporal changes in brain connectivity and that a direct interdependence between frontal and occipital brain regions may be implicated. The study of EEG connectivity in relation to NREM parasomnias may help elucidate brain processes underlying episode occurrence. As a follow-up to these pilot results, we are currently examining patterns of brain connectivity as a function of episode complexity, select frequency bands, and subsequent to sleep deprivation. **P2**

## 2.15 Specific brain areas

**170 Transcranial Electric Stimulation: A Tool to Manipulate Subjective Experience?** Clemens Frenzel, Jana Speth; Trevor Harley <cfrenzel@uni-bonn.de> (Cupar, United Kingdom)

Transcranial direct current stimulation (tDCS) has been used to successfully manipulate visual perception and to enhance motor task performance in waking as well as memory consolidation in sleep. I shall report results from frontal lobe tDCS application on healthy and awake subjects in a no-stimulus, no-task, no-response design. I shall focus on variables which are very often neglected in experimental psychology and the neurosciences: changes in phenomenology and metacognition during brain stimulation application. Results will be discussed with regard to generalization and application as well as practical applicability in laboratory settings. Limitations in the use of the techniques will also be discussed. **C13**

## 2.16 Miscellaneous

**171 Perspectives from the Standing Wave Theory of Consciousness** Selen Atasoy, Isaac Donnelly; Joel Pearson <s.atasoy@unsw.edu.au> (School of Psychology, University of New South Wales, Sydney, NSW Australia)

Here we present a theoretical model for the neural processes associated with consciousness based on a simple but powerful mechanism common to most natural phenomena. We hypothesise that the neural processes associated with consciousness resemble the self-organization of standing

waves, as observed throughout numerous natural processes ranging from vibrations in solid objects to morphogenesis. Two important observations underlie the formation of our model: first, the remarkable similarity between the characteristics of standing waves and phenomenological features of consciousness, and second, the presence of the necessary pattern forming mechanisms in the thalamo-cortical system. The mathematical models for this type of pattern formation have successfully predicted the visual patterns experienced in drug- and flicker-induced visual hallucinations. However, here we extend these propositions to explain the relationship between patterns of neural activity and both the content and states of consciousness. While in agreement with the key principles of previous theoretical models, our theory further specifies the spatio-temporal dynamics associated with consciousness and thus has the potential to reveal conscious processes and/or systems. Furthermore, the model's conditions exist at multiple levels of biological organization in the nervous system; e.g. microtubules, neurons, thalamo-cortical system, suggesting the possibility that even a single neuron might be conscious, while simultaneously contributing to our global conscious experience. **C16**

**172 Cranial Nerves as a Way of Attitudes Expression: An Approach to the 'Hard Problem' Issue** Sulamita Frohlich, Franco. C.A.; Szklarz, S. <arkambiental@arkambiental.com.br> (Mental Health Department, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil)

Cranial nerves may be an important key to consciousness processes understanding. Our hypothesis is that they have a specific psychological function that is the attitudinal expressions. Attitudes are considered here as a nervous system modulation that allows some behaviors to be expressed whereas others should be suppressed. Our objective, in this study, is to systematize a table where each cranial nerve is related to a specific attitude. This hypothesis limits the role of attitudes in 12 and they can be organized into three groups, as follows: - (A) Group (Autonomic group) is formed by the cranial nerves that are connected to the ANS: the Vagus nerve (X pair); the Facial nerve (VII pair) and; glossopharyngeal nerve (IX pair) each one respectively related to the sexual, affective and feeding attitudes. - (B) Group (Behavior group) is formed by the cranial nerves that stimulate striated muscles and realize corporal and vocal expressions. They activate behavioral attitudes and incite the nervous system in an exogenous way. The Accessory nerve (XI pair) controls specific muscles of the shoulder and neck, regulating the posture; the Trigeminal nerve (V pair) activates the facial muscles that form the aggressive mask and the Hypoglossal nerve (XII pair) that supplies motor fibers for the tongue muscles, allowing the vocal expression. - (C) Group (Cognitive group) is related to sensorial attitudes and has a cognitive function. Cochlear Nerve (VIII pair), Optic Nerve (II pair) and Olfactory nerve (I pair) have adapted terminals with special neurotransmitters. They are responsible for processing sensorial informations captured from the environment and transforming them into electrical impulses. They incite the nervous system in an endogenous way. We give special attention to the cranial nerves that enervate the eye muscles because they are directly responsible for the consciousness states, as they regulate the visual focus. However, they can also be classified in the three groups (A-B-C groups) above described. - The Oculomotor Nerve (III pair) is related to the (A group). It is directly connected to the ASN and is responsible for the images blurring or even for the total disconnection of environmental attention by closing the eyelids. It has an important role in the dream states activating the REM movement of the eyes, when occurs the dreams etc. - The Abducent nerve (VI pair) produces the plain environmental attention through the saccades and following eye movement, preparing the body for action- behavioral attitudes - (B group) attitudes. -The Trochlear nerve (IV pair), makes a small rotation of the eyeball, displacing the focus and allowing just some light to incite the nervous system. It leads to an active conscious state but with no emotional interferences, as it is not connected to the ASN. This builds a proper ambience to cognitive attitudes and so, is related to the (C Group). **P1**

**173 Critical Survey of Impact of Neuroscience on Free Will** Ritu Mishra, Rajesh Sinha, Prem Saran Sudheesh <mishra\_ritu@yaho.com> (DEI Dayalbagh Educational Institute, Agra India, Noida, Uttar Pradesh India)

The debate of free will is centered around the notion of determinism and its compatibility with freedom of choice and will in human behavior. While several different philosophical and theological

positions exist, Neuroscience can help in this debate in major ways by determining which interpretation of free will theory is empirically viable and by adding its own constraints and theories to existing models of free will. In this paper we analyse the last 40 years of Neuro-scientific research and confirm how they have added, enhanced and challenged free-will philosophical positions. In particular we analyze the findings in areas of Volition – how to distinguish the involuntary and voluntary actions and their mechanisms, critical examination of motor-science experiments like Libet, Matsushashi & Mallet which study actions in short time but raise serious concerns for Free Will, and analysis of Free Won't experiments and implications of free will from introspective illusion perspective will also be provided. Cognitive neuroscience has also impacted philosophy of mind by providing empirical models for Intentions, Control Parameters and Control Dilemmas. Intentions represent connection between Volition and individual ability to take action. Apart from these, the research and findings from cognitive neuroscience in areas of morality, values and norms and lastly the impact of Neuro-ethics research and its impact on the same. **P1**

**174 Transcranial Ultrasound (TUS) Brain Stimulation in Humans: Effects on Mood/Mental States in Three Studies** Joseph Sanguinetti, Ezra Smith; William J. Tyler; Stuart Hameroff; John J. B. Allen <sanguine@email.arizona.edu> (Psychology, The University of Arizona, Tucson, AZ)

Noninvasive brain stimulation has potential for improving mental health in humans. Research has shown that ultrasound (acoustic pressure waves above the threshold for human hearing) can both excite and inhibit neural activity, and improve mood in human subjects with chronic pain. Studies with other stimulation technologies (i.e., rTMS, tDCS) have found improved mood following both left and right frontal cortex stimulation. Here we describe results of three studies that targeted right frontal cortex in healthy human volunteers with transcranial ultrasound (TUS). Experiments 1 and 2 used a General Electric LOGIQe ultrasound device commonly used for medical imaging. In Experiment 1, 30 seconds of 2 MHz TUS improved self-reported mood compared to 8 MHz for 15 seconds ( $p < 0.05$ ). Experiment 2 replicated these results: 30 seconds of 2 MHz TUS significantly increased mood relative to sham stimulation. A prototype ultrasound device developed specifically for human brain stimulation was used in experiment 3 (U+; Neurotrek, LLC). Once again, right cortex stimulation improved subjective reports of mood relative to sham (placebo) or vertex stimulation, participants reported more positive mood only in the right side stimulation condition. Taken together, these experiments suggest that TUS can affect mental states and may be useful for improving mental health. **C13**

**175 RAS: A Filter of our Desires and a Tool to Achieve Higher Levels of Consciousness** Indu Shrivastava, Sharma, K.K ; Shrivastava, Vineet <indu123@gmail.com> (Clinical Research, Sharda University, Greater Noida, India)

The Reticular Activating System (RAS) is a network of neuronal pathways located in the core of the brainstem and can be used as a powerful focusing tool, which when trained to activate it clearly and consistently can lead to achieve one's desires. Consciousness is dependent on brain functioning, particularly regulated in an area called the ascending reticular activating system (ARAS). The RAS is the attention center in the brain and is essential to 'turning on' and 'turning off' the higher centers of brain. The functions of RAS are under the control of a number of neurotransmitters/neuromodulators, such as acetylcholine, adrenaline, noradrenaline, dopamine, histamine, glutamate GABA and glycine, to name a few. The RAS is like a filter which could help processing of data obtained through sensory stimuli perceived during the conscious state but also through the subconscious mind- but depends on what one wants. If we can visualize and process the subconscious data, which is in our conscious mind, then we will ultimately be able to focus on achieving the desired goals. Subjective experiences of people with a high level of consciousness may enable people to effectively manipulate their RAS to achieve the desired goal. When one has a clear and focused picture of what one wants to achieve and needs, the brain kicks into action and doesn't stop until the desired goal is found. From the list of tasks one wants to accomplish, we don't strike a task until the task- at- hand is complete. The focus has to be centered on achieving the task. The more one focuses on some task, the more one completely gets the task done. The authors have proposed the following steps to achieve one's goal of achieving a higher level of

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consciousness by following the steps in the given serial order, i.e. (i) setting the goal/intention to be achieved, (ii) filter what is important and what is not, (iii) engaging the subconscious mind, (iv) understanding the nutrients that influence the functioning of neurotransmitters which control functioning of the RAS. **P1**

**176 Mindfulness Meditation Enables Proactive Metacognition of Attention** Stephen Whitmarsh, Jensen, O; Barendregt, H. P. <stephen.whitmarsh@gmail.com> (Computer Science, Karolinska Institutet, National MEG facility, Nijmegen, Netherlands)

The distinguishing practice of mindfulness meditation is the intentional regulation of attention towards the present moment. Mindfulness meditation therefore emphasizes metacognitive functions, in particular the ability to monitor the attentional focus on a moment-by-moment basis. In this study we set out to test whether mindfulness meditation experience is associated with an increased ability to monitor moment-by-moment fluctuation in the attentional state. In response to auditory cues, participants maintained somatosensory attention to either their left or right hand. At random moments, trials were terminated by a probe sound to which participants reported their level of attention at that moment. MEG was recorded during the attention interval preceding probe onset. Using a beamformer approach, alpha activity in contralateral primary somatosensory regions was quantified. Alpha activity for self-reported high versus low attention trials was compared both within and between groups of either highly experienced experienced mindfulness meditators, novice meditators or meditation-naïve participants (controls). As predicted, generally contralateral alpha power was associated with self-reported attention. Novice meditators (<1000hrs of meditation) showed temporal profiles similar to controls, displaying a correspondence between self-report and alpha power preceding probe onset. Expert meditators (>>1000hrs) showed a strikingly different pattern, however. Their self-reported attentional state corresponded with alpha power during a more extended time interval preceding those of controls and novice meditators. In addition, self-reported low attention trials showed a distinctive alpha suppression preceding probe onset, suggesting that the ability for moment-by-moment monitoring of the attentional state permitted greater attentional control. **C14**

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### 3.01 Attention

**177 Role of Meditation in Enhancing Attention Regulation** Himani Anand, Ira Das <anand.himani18@gmail.com> (Psychology, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The concept of meditation is attracting the attention of researchers all over the world. It plays an important role in the maintenance of physical and mental health. The experimental research measures the effects of Meditation (verbal chanting of 'OM') on Attention Regulation of female students. The sample consisted of 60 female subjects in the age range of 18 to 24 years through purposive sampling technique. The daily practice time of Meditation session was 20 minutes for one month. Pre- Post data was recorded before and after intervention of meditation session by using single group pre-post research design. Attention Regulation was measured by Attention Regulation Test constructed by Das (1994). This test has three subtests i.e. Forward- Backward Digit Span Test, Syllable Counting Test and Digit Counting Test. Wilcoxon Signed Rank Test was applied to study the effect of meditation on attention regulation. Results showed that there is a significant difference between the pre and post scores on the measures of attention regulation test. Obtained Z value for forward-backward digit span test, syllable counting test and digit span test was found to be 3.30 ( $p < .01$ ), 4.23 ( $p < .01$ ) and 1.75 ( $p > .05$ ) respectively. Results revealed that there is a significant positive effect of meditation on attention regulation. Spiritual practices, praying, meditation, attending religious services not only reduce the stress among individuals but also strengthen the positive aspects of human personality, enhances the hidden qualities of men and also helps in enhancing concentration, memory and performance of an individual. **P1**



**178 Consciousness and the Social Brain** Michael S.A. Graziano <graziano@princeton.edu> (Psychology, Princeton University, Princeton, NJ)

In my lab we recently proposed the ‘attention schema’ theory to explain the brain basis of awareness. First, we suggest that awareness is something that a brain attributes to itself. The quirky, physically incoherent properties of awareness are parts of a description, an informational model. Accessing internal information, the brain concludes that it has an awareness of things, because that is what its internal information tells it. Second, we suggest that awareness is a crude model or representation of something physically real. The real item is attention, the brain’s data-handling method of focusing resources on a limited set of signals. In this proposal, the relationship between awareness and attention is similar to the relationship between color and wavelength. In the case of white light, which is actually a broadband mixture of visible wavelengths, the brain constructs the physically incoherent model of brightness without any color. Color can even be entirely dissociated from wavelength in many visual illusions. The brain’s model is approximate, quick, lacking in physical accuracy, but good enough to help guide behavior. Just so, we propose that the brain constructs an approximate, physically incoherent, but more-or-less useful model of the physical process of attention. Accessing that model, the brain reports that it has an awareness of things. We also proposed that the brain uses the same process to construct models of other people’s state of attention, in effect attributing awareness to others. In this way, attention, awareness, and social cognition can be understood as interlocking parts of a larger, complex system. **PL2**

**179 Quantum Consciousness and Attention Rescue the Classical Brain** Priti Gupta, C.M. Markan <gupta.priti.84@gmail.com> (Department of Physics, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

The enigma of consciousness (awareness), attention and learning and their interdependencies have baffled neuroscientists and psychologists since time immemorial. Research over the past many years has revealed various discrepancies in our understanding of how attention, consciousness and learning relate with each other. While some interesting experiments [Koch et.al.] show that attention and consciousness are dissociable and we can have consciousness in the absence of attention and vice versa, studies done by other groups [Marchetti et.al.] reveal that if attention is believed to exist in both endogenous and exogenous variants in both focused and diffused forms then consciousness and attention become inseparable like two sides of the same coin. But the question still remains – Does attention drive consciousness or does consciousness drive attention to the salient features in the environment? Additionally, the conventional view about learning, that learning only happens in the presence of attention and consciousness, has been challenged by various studies e.g. [Dienes et.al.] that show that some form of learning is possible even in the absence of attention and consciousness. This implicit learning in contrast to explicit learning, that involves attention and consciousness, raises some philosophical questions about the very existence of attention and consciousness. If learning is possible in the absence of attention and consciousness then why do we need attention? Are there any survival advantages that attention and consciousness give us? Do they enhance our ability to adapt to the threats of our constantly changing environment? In the light of the Global Workspace Theory [Baars et.al.], that clearly defines subliminal, preconscious and conscious processing in the brain, this study aims at exploring a model based on different grades and variants of attention that could explain learning, of both implicit and explicit type. This is an extension of the recent proposal of Quantum Hebbian Learning [Markan et.al.] based on Objective Reduction of quantum brain states [Penrose, Hameroff] and Quantum Zeno Effect instigated by attention [Stapp]. The broader aim of this study is to understand how attention, consciousness and learning are related with each other and to understand how nature employed quantum processing to enhance computational power and speed. **P1**

**180 Consciousness and Attention: Two Sides of the Same Coin** Yaojun Lu <luyaojun.com@gmail.com> (Philosophy, Sun Yat-sen University, Guangzhou, China)

For more than a decade, philosophers have been debating over the causal relation between consciousness and attention, taking for granted that consciousness and attention are two independent processes. But what if they are shadows of the same statue? Consciousness is unique for

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its phenomenal quality, and attention is defined as the exclusive focus among mental processes. Hypothetically, phenomenality and selectivity may belong to one and the same mental process. I argue against two alternatives of the relation between consciousness and attention: that their realizers do not have causal relation, and that their realizers have causal relation. Given the commonsense intimacy between consciousness and attention, the first alternative is miraculous. The second alternative is widely accepted, as attention is considered as the gate to consciousness. However, it introduces many problems if attention precedes consciousness or the other way. (1) It is simply implausible that consciousness precedes attention, since it makes attention redundant. It is conceptually contradictory that my being conscious of the pain occurs before it stands out. (2.1) Top-down attention does not precede consciousness. Top-down attention is voluntarily assigned by the subject which requires knowing the target, therefore it cannot occur before the consciousness of the target. In fact, it is the decision to attend, instead of top-down attention per se that occurs before consciousness. (2.2) The same conclusion also generalizes to bottom-up attention, which is passively directed by the stimuli. If top-down attention and bottom-up attention are disconnected, then the effects of volition must be limited only within top-down attention. But in inattention blindness, bottom-up attention seems to be depleted and the subjects fail to notice things except the target they voluntarily attend to. Among alleged cases of dissociation between consciousness and attention, the case of blindsight is probably the most compelling. Blindsight patients seem to be able to attend toward stimuli but remain unconscious. However, blindsight patients sometimes report visual experience when the stimuli are sharp. If their cortical damage did not recover among trials, it is unintelligible that they could report seeing something and fall back to zombie immediately. The key observation is that ephemeral qualia is proportionate to primitive-level attention. The synchrony suggests that consciousness and attention are not dissociated. Concluding the arguments above, we have good reasons to infer that consciousness and attention are together. They demonstrate different features of the same mental process, and are realized by the same physical process. **C10**

**181 Consciousness and Attention in the Bhagavad-Gita** Keya Maitra <kmaitra@unca.edu> (Philosophy, University of North Carolina at Asheville, Asheville, NC)

It might be argued that while the topic of consciousness has seen some fluctuating fortunes within the confines in Western philosophy, this topic has remained a central one for almost all the major schools in the Indian philosophy. This is because even in the early Upanisads reality is conceived in terms of Brahman or Atman which is typically translated as the Self, and consciousness is conceived as its essential marker. A notable exception however has been the prominent Hindu text Bhagavad-Gita. Since Self is conceived in the Gita not in terms of consciousness but in terms of characteristics like 'unchangeable,' and 'unmanifested', the Gita's treatment of consciousness has rarely been studied. However, the Gita's discussion of consciousness becomes important especially if we are interested in Indian understandings of attention and disciplined redirection of attention. This is because yoga, which is at the heart of the Gita's main message, is understood as a discipline to control one's mind. In this endeavor to control one's mind, focus is placed on states of consciousness, attention and redirection of attention. Indeed, I want to argue that what we get in the Gita is an empirical theory of consciousness, teasing out the different strands of which will be rewarding from the perspectives of both analytic and comparative philosophy. The goal of my paper thus is to determine the nature of attention in the Gita's understanding of yoga and articulate the role of such attention in the Gita's theory of consciousness. My working conclusion is that what differentiates an ordinary person's consciousness from a yogi's consciousness is their respective manner of attending, namely, with attachment or without attachment. **C10**

**182 Attention and Consciousness: Asking the Right Questions** John Taylor <j.h.taylor@dur.ac.uk> (Durham, United Kingdom)

In this paper I shall address the (primarily empirical) debates surrounding the question of whether attention is sufficient for consciousness. Thinkers such as Felipe De Brigard, Jesse Prinz and Declan Smithies support the claim, whilst its main opponent is Robert Kentridge. In this paper I shall review the empirical evidence both in favour of, and against the claim, with a particular focus upon the latter. The data is primarily concerned with attempting to induce attention in

the absence of consciousness in blindsight subjects, and the use of subliminally presented erotic images and meta-contrast masking to induce attention without consciousness in non-neurologically impaired subjects. I argue that none of the data damage the claim that attention is sufficient for consciousness, as thinkers such as Prinz, Smithies and De Brigard understand it. I also argue that no empirical evidence can disprove the claim. However, this is not because I think the claim is correct, rather I think that the interlocutors in the debate are simply talking past each other, as a result of tacitly assuming different understandings of the word 'attention'. Since the problems stem from different understandings of the word 'attention', then we must seemingly decide which account of attention is the better one before we can make progress on the question of whether attention is sufficient for consciousness. I review several ways of doing this. Firstly, I examine the folk psychological use of 'attention' to see whether we can use that as a guide to how 'attention' should be understood in these debates. I then examine the use of 'attention' in empirical psychology. In both cases, I argue that 'attention' is too poorly understood to help resolve the difficulties in the debates. I conclude that we should accept a pluralistic account of 'attention'. My claim is that the word 'attention' refers to several different entities which can have little in common. This has important consequences for the debates over whether attention is sufficient for consciousness. Specifically, I argue that the question of whether attention is sufficient for consciousness most likely does not have one particular answer, but rather can have a range of different answers, depending upon which understanding of 'attention' one uses. We should accept, then, that the question of whether attention is sufficient for consciousness will fragment and not have any one answer. I also argue that (contrary to what some thinkers have claimed) this does not show that the term 'attention' is useless or deficient, nor does it entail anti-realism about attention. **C10**

## 3.02 Vision

### 183 Instruction Manipulation for Discrete Slot/Shared Resources-Strategies in VWM

Sangeeth Jeevan, Nosofsky, Robert <sajeevan@indiana.edu> (Psychological and Brain Scienc, Indiana University-Bloomington, Bloomington, IN)

Visual Working Memory (VWM) is a vital process that is frequently involved in higher states of cognition. For decades, researchers have been trying to further understand the mechanism(s) of VWM. Luck and Vogel (1997) determined that performance decreases as the number of items stored in VWM increases. Researchers have since been developing models of VWM to explain this phenomenon. Two classes of models are now highly debated: the Shared-Resources Model and the Discrete-Slots Model. The former assumes that VWM capacity is a flexible, divisible resource that can be spread over multiple items. The latter claims only a limited number of items can be stored in VWM and a complete loss of information occurs for the items that are not stored. Considerable evidence for each model has been published, but a consensus has yet to be reached. Perhaps shared resources and discrete-slots processing may be strategic choices at the option of the participants. The goal of this experiment, thus, was to test whether a manipulation in the task instructions causes one model to be favored over another. In a standard VWM paradigm based on Luck and Vogel's 1997 experiment, half the participants were instructed spread attention across the entire set of to-be remembered objects, while the other half was instructed to focus attention on only a small subset of items that could be easily remembered. The data was analyzed with Nosofsky and Donkin's VWM model, which involves modeling of response-time data and allows for a diagnostic approach to distinguish the two views apart (2013). It was found that the performance patterns were the same across the two groups and a version of the Discrete-Slot Model provided a good account of the data in both cases. The results suggest that discrete-slots processing is a hardwired constraint of VWM. **P1**

**184 Colour Constancy Without Consciousness** Robert Kentridge, Liam Norman; Kathleen Akins, Charles Heywood <robert.kentridge@durham.ac.uk> (University of Durham, Durham, United Kingdom)

When we see the colour of an object our percept is relatively unaffected by the colour of the light illuminating the object – a phenomenon known as colour constancy. If we see two pieces of

cloth, one in direct sunlight and one in shade, we are very good at judging whether they are cut from the same material – we discount differences in illumination and see the properties of objects in the world. If the two pieces are of the same material, the one in shade will, nevertheless, look different from the one in sunlight. Quantifying these experiences psychophysically shows that even this experience of colour is influenced by some discounting of the illumination. Both our judgements and our experiences show colour constancy, but to differing degrees. How does this come about? Do we start from our raw experiences of colours in a scene and, from them, infer the physical nature of the materials and lights that gave rise to them – something consistent with our intuitions, or could constancy occur independently of experience? The anatomy of colour vision shows a clear progression from ganglion cells in the retina where neural responses are determined primarily by the wavelength composition of light, through striate cortex where cells responding to wavelength contrast are found and extrastriate areas that appear to compute colour constancy. Correlations between neural activity and colour experience are, however, found in even more anterior areas. There is currently controversy over whether any of the earlier of these stages gives rise to colour experience, and so whether constancy might precede experience. We used metacontrast-masked colour priming to both render a coloured prime invisible and measure its influence on a decision about the colour of a subsequently presented mask. Primes speed this decision if they are perceived as having the same colour as the mask and slow the decision if they are a different colour. We determined whether the priming effect was driven by the spectrum of light reflected from the prime or by an estimate of its material properties by changing the apparent illumination falling on the stimulus in the very short interval between presentation of the prime and presentation of the mask. With a suitable choice of lights and materials it is possible to construct primes that were made of the same virtual material as blue masks but reflected the same spectrum of light as green masks under the changed illumination. We found that the prime speeded responses to the blue, material-matched, target and slowed those to the green, spectrum-matched, target. A separate signal detection experiment showed that masking prevented observers from discriminating whether primes were or were not presented. The configuration of the stimuli meant that priming cannot simply be dependent on the chromatic contrast that primes and masks make with their backgrounds. Computing colour constancy is not, therefore, obligatorily linked to experiencing colour and may precede it. **C4**

**185 Beyond the Classical Feed-Forward View of Figure-Ground Segregation** Mary A. Peterson <mapeters@email.arizona.edu> (Chair, School of Mind, Brain,, The University of Arizona, Tucson, AZ)

I will discuss recent research supporting a dynamical interactive view of conscious visual perception. Our experiments show that figure and ground are assigned much later in processing than traditionally believed. We show that representations of structure and meaning can be activated in the course of figure assignment for objects that might be perceived the side of a border that is ultimately determined to be a shapeless ground. Thus, it is not the case that high-level representations are accessed only for figures and only after figure assignment. Instead, we suggest that proto-objects on opposite sides of borders are processed to high levels in an early pass of processing; these proto-objects compete to be perceived as the object shaped by the border. The proto-object that loses the competition is inhibited as is its location, and that side of the border appears shapeless.

**PL7**

**186 Visual Experience vs. Decisional Confidence: Dissociable Measures of Consciousness?**

Manuel Rausch, Zehetleitner, Michael <manuel.rausch@psy.lmu.de> (Psychology, Ludwig-Maximilians-Universität München, Munich, Germany)

Are subjective reports of visual experience and subjective reports of decisional confidence interchangeable measures of consciousness in terms of behavioural patterns, neural correlates, and life time development? In a series of psychophysical, neuroscientific, and developmental experiments, we observed that visual experience was associated with a higher threshold but was less efficient in predicting discrimination performance than decisional confidence. Event-related potentials suggested that neural events associated with reports of confidence regarding the accuracy of a

discrimination decision occurred earlier in time than those neural events associated with reports of a clear visual experience. Injecting noise to the occipital cortex by subthreshold transcranial magnetic stimulation interfered with visual experience during a broad time window, but decisional confidence was modulated only during a focused point in time. Comparing subjective reports between younger and older adults, we observed that older adults were more liberal in reporting confidence in discrimination decisions, and their level of confidence poorly matched the difficulty of the task. However, no substantial differences between age groups were observed with respect to visual experience. Taken together, these studies provide converging evidence that visual experience and confidence are distinct measures of consciousness, and a complete study of consciousness requires the assessment of both. **C4**

### 3.03 Other sensory modalities

**187 Biophilia and Consciousness** Pooja Sahni, Mr. Swami Sharan <poojars@hotmail.com> (DEI Dayalbagh Educational Institute, Agra India, Noida, Uttar Pradesh India)

As popularly believed, the physical world has little or no role to play in the spiritual progress or rather should not have any role in affecting a meditating mind. Yet the physical senses themselves, stimulated by the natural surroundings could lead man to attain higher consciousness. Scientifically proven is the fact that interaction with nature inevitably yields corresponding states of conscious experiences through positively affecting our brain/cognition. Through this research we set to establish that nature uniquely influences the human mind, and has the potential to influence cognition and behaviors. It promotes our inner faculties to connect and reach for higher levels of consciousness consequently realizing the Ultimate Truth and state of Bliss. The study approaches the subject by ascertaining the historic relationship & the religious significance of the nature and consciousness. It also analyzes the scientific research on how body-mind- intellect are it acts as a stimulus to our pursuits for higher levels of consciousness. **P1**

### 3.04 Memory and learning

**188 Do Chimpanzees Have Better Working Memory than Humans in the Limited-Hold Memory Task?** Jasmine Chan, Karen Yan; Allen Houg, Institute of Philosophy of Mind and Cognition, National Yang-Ming University, <minejasmay@gmail.com> (Taipei City, Taiwan)

Inoue and Matsuzawa (2007) use the “limited-hold memory task” to study chimpanzees’ memory. In this task, subjects need to memorize short-appearing numerals on a monitor in the correct order. It shows that chimpanzees outperform humans in both speed and accuracy. Based on the results, Inoue and Matsuzawa infer that chimpanzees have a better working memory capacity than humans do. It means that chimpanzees have better capacity of memorizing in a short duration. However, Peter Cook and Margaret Wilson (2010) disagree with Matsuzawa. They provide another explanation for the result that chimpanzees outperform humans. They argue that the reason lies in that chimpanzees receive more extensive training before the task than humans do, instead of their having a better memory capacity. Cook and Wilson conduct another experiment to support their stance. They apply the same training on both human subjects and chimpanzees before the task. It turns out that humans can perform as well as chimpanzees do. I question that we should focus the discussion on the working memory capacity. I hold that we need to apply the notions of pictorial representations and symbolic representations (Houg, 2013) to explain the results of the above experiments. Symbolic representations and pictorial representations are different kinds of mental representations. They differ in the way of representing. Pictorial representations represent features of objects in a way similar to the way that pictures represent, that is, they represent those features in an isomorphic way. Symbolic representations represent features of objects in an arbitrary way. Symbolic representations are higher-leveled and need more time for brain processing than pictorial representations. The reason why chimpanzees win over humans lies in their different tendency of using pictorial representations or symbolic representations for memorizing. Chimpanzees might have a tendency of using pictorial representations, whereas humans tend to use sym-

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bolic representations. Due to the tendency of using symbolic representations, humans need longer time for memorizing all the numerals. That is the reason why chimpanzees outperform humans in the limited-hold task. Besides, humans are capable of using both pictorial representations and symbolic representations, even though they have a tendency of using symbolic representations. After adequate training, human can use pictorial representations in the limited-hold task. That is the reason why human performance can be equivalent to chimpanzee performance in Cook and Wilson's experiment. **P1**

**189 Lanterns and Spotlights: Childhood Consciousness and Ensemble Coding** Alison Gopnik <gopnik@berkeley.edu> (Philosophy, University of California at Berkeley, Berkeley, CA)

I've argued that children's conscious awareness may have a wider scope than that of typical adults – a lantern rather than a spotlight. I will report on empirical data concerning ensemble coding in preschoolers. Ensemble coding is a form of awareness in which holistic features of an ensemble of individual objects are computed and experienced even when the perceiver fails to attentionally focus on the individual objects themselves. We show that ensemble coding is available to young children, and that they may rely on it more than adults do in some cases. I will also relate children's consciousness to other forms of "lantern-like" consciousness, particularly consciousness induced by psychedelic drugs. **PL2**

**190 Elementary and Memory Perception Versus Cognition with Implications for the Brain-Consciousness Problem** Franz Klaus Jansen <jansen.franz@orange.fr> (Assas, France)

Two kinds of perceptions can be distinguished, elementary perception and memory perception, the first representing the present and the second the past. Elementary perception is limited to the direct contact between perception organs and their specific environment, when photons enter the eye or mechanical waves the ear. Secondary associations of object recognition or categorisation are not included in the definition of elementary perception. As the entry door of all perceptions, elementary perception is primary, self-evident, intense, unmodifiable and incommunicable, only a mirror of the present. In contrast memory perception reminds a prior elementary perception and is in contrast faint, modifiable, communicable and represents the past. A memory perception can be modified, for instance eliminated or recalled into consciousness as well as associated to other memory perceptions. Thus, it becomes an essential starting base for cognitive processes allowing associations, categorisation and abstract structural relations. In contrast to memory perception the properties of elementary perception resemble the properties of conscious experience, when phenomenal consciousness is restricted to the hard problem only, such as it was defined by Chalmers (1995). Consciousness presents three different states, elementary perception, memory perception and cognition. Neurobiological investigations showed that elementary perception with direct contact between perception organs and the exterior world and memory perception, also called mental imagery, activate the same brain regions in fMRI. Thus, perception and memorisation of a colour like red or hearing and imagining a sound like middle C activate almost the same brain regions. However, at the level of cognitive abstraction, when red is only conceived as an electro-magnetic wavelength of 700 nm or the sound of middle C as a mechanical wavelength of 261 Hz, red and middle C would no longer need the brain regions associated to the memory experience (= mental imagery) of colour or sound. Neurobiological investigations on the activity of certain brain regions during memory perception for colour and sound and their absence during cognitive tasks are not yet accessible in the literature, but might be expected in the future. This might help to explain the difference in the phenomenological consciousness between memory perception (= mental imagery) and cognitive abstraction, when colours and sounds are reduced to physical factors only. From a philosophical view point concerning the brain-consciousness problem, Frank Jackson (1982) rejected physicalism, since it excludes any knowledge on qualia, like the absence of the experience of colour or sound during abstract cognition. However, when neuroscience can interpret the lacking experience of colour or sound during cognition by the activation of different brain regions, physicalism could no longer be rejected. Nevertheless, the neurobiological interpretations remain completely neutral with respect to the philosophical problem of materialism, dualism or panpsychism. Instead of using the whole brain as entry path only certain brain regions might be necessary for the physical expression of spirituality. **P2**



## 3.05 Emotion

**191 (e)motion: Towards A Kinetic View of Embodied Valuing** Frances Bottenberg <fbottenberg@gmail.com> (Philosophy, Elon University, Greensboro, NC)

Contemporary approaches to emotion fail to solve the classic puzzle of emotion theory, namely how the felt aspect of emotion is to be linked with its normative salience for action. This is in part due to how little attention has been paid to the role of the first person body in emotional life. I argue that emotional drive is best understood as an intelligent sensitivity that plays out within the first person body. To flesh out this notion, I develop what could be called an animationist account of emotional valuing. Two major suggestions are offered in support of this account. The first of these draws a genetic link between the phenomenon of feedforward proprioception and the pre-reflective experience of emotional feelings. The second suggestion examines emotional drive in light of the intelligent sensitivity at work in emotion. In offering a so-called kinetic-existential analysis of the dynamics of emotional experience, I show how emotions can be grasped as intra-corporeal enactments of the fluctuating agent/world relationship. **P2**

## 3.06 Language

**192 Echo-of-Language Theory of Consciousness: Insights for Evolution and Animal Consciousness** Jay Glass <offlinej@aol.com> (Laguna Beach, CA)

The Echo-of-Language theory (EL) describes consciousness as a fortuitous by-product of frontal-lobe inhibition and the associative conditioning properties of neural systems (Glass, J., 2013). Over time the neural activations that generate vocalization become conditioned to the neural activations produced in the auditory cortex of the person emitting speech. If the initial activation of speech occurs but the output to the motor neurons for speech is blocked by a forebrain inhibitory pathway, the initial activation will create the perception of speech due to previous conditioning, even though no speech is actually emitted. This model is based upon well-known brain structures and processes, no new consciousness centers or processes. Since numerous species, especially our primate ancestors have brains similar to our own, one may then ask what happens when a chimp begins the neural sequence leading to vocalization but it is inhibited. Would the chimp then hear the same “inner speech” of human conscious experience? All mental activity is generated by the brain’s biology, a biology formed over millions of years by the natural selection processes of evolution. Since the EL process is based upon neurobiology, it is therefore accurate to ask if the existence of consciousness played a role in the evolution of a species. Or, did the neurobiology that creates consciousness by happenstance play a role in other ways in the evolution of a species. There are three essential processes in the EL model. One, the perception of sound and a second the interruption of the process that once initiated leads to vocalization. The third is the associative process whereby the neural activity for initiating speech becomes conditioned to the neural activity involved with the perception of speech. Since all three are cortical processes, this sets a bar, the presence of a cortex, below which an organism would not have an “inner speech”. The next question, currently without a definitive answer, is whether there is a certain stage of cortical development that is required for these processes to occur in the form that creates “inner speech”. In terms of survival of the fittest, the ability to inhibit vocalization under certain circumstances, such as when stalking prey or if being stalked as prey, would accrue a survival advantage to the species. Similarly a dense interconnectedness between cortical areas to provide for robust associative conditioning would provide a learning ability that would also enhance a species survival. From an evolutionary standpoint the “inner speech” of consciousness may have only come along for the ride as the evolution of the biology that creates it occurred. Glass, J.D. (2013) A neurobiological model for the “inner speech” of conscious thought, *J. Consc. Stud.*, 20 (9-10), pp. 7-14 **P1**

**193 Holistic Hungarian Can Provide a Language for a Holistic Science of Consciousness** Andris Heks <a.heks@hotmail.com> (Megalong Valley, NSW, Australia)

There is an increasing realization that reality is an all-inclusive, entangled, interconnected, organic whole. In this view, infinite, homogeneous, unmanifested, one-whole, conscious metaphys-

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ics and its finite, heterogeneous, manifested diverse material forms, are seen as causally connected in a reciprocal cause and effect cycle. See, Amit Goswami, Peter Russell and Deepak Chopra. To be able to grasp the meaning of holistic reality we need a language which is holistic and can provide a frame for the development of a holistic science. Currently there is still a conceptual split between a non-holistic, truncated materialistic science language and a language that would reflect the apparently holistic nature of reality. The Hungarian language is perhaps the most holistic surviving language in the world.<sup>1</sup> With its linguistic world record of 68% etymons, <sup>2</sup>, which are ancient, original, primary word roots, Hungarian seems to tap into an ancient holistic scientific perception of reality which seamlessly includes and reconciles the spirit and matter; unmanifested formless consciousness and manifested in-formed consciousness; metaphysics and physics and the whole and its parts. The emergence of Cartesian dualistic science obscured the vision of the world as one integrated whole. Such vision shines through the Hungarian language. The Cartesian view is entrenched in Indo-European languages, which to a large extent lost touch with their holistic roots e.g. English has 4 %, Latin 5%, Tibetan Sanskrit 12% vs Hungarian retaining 68% of such roots!<sup>3</sup> 2. Having spoken Hungarian as my first language exclusively in the first quarter of my life, then English mainly for the next three quarter, I came to the conclusion that it is much easier to see the holistic nature of reality through Hungarian than through English. Hungarian is essentially a language that starts with the whole and its words lead you back to the whole, <sup>3</sup>. English, by contrast is a modern, largely non-organic language, which is patched together from numerous other languages, mainly from Indo-European ones, which themselves have little original wholeness left in them. Hungarian helped me to understand my non-dualistic (oneness) experience of Yoga, which I have practiced for 38 years. English on its own, no matter how completely I grasped it through 50 years of practice, failed to explain such non-dualistic experience. This is because Hungarian is a holistic, non-dualistic language of the one whole reality, <sup>4</sup> whereas English is more dualistic and is largely inorganic. Examples, of how Hungarian could reveal to me literally what God, spirit, consciousness, soul, breath, health and material meant and how they were causally connected. Once I deciphered these from Hungarian I could also see traces of understanding of these in English, and these traces further enriched my understanding. Such multi-lingual approach could also be highly beneficial in developing a holistic scientific language, which, even if it is largely English based, would open itself to the holistic nature of reality as is clearly perceived and expressed through Hungarian. **P2**

**194 Transcending Biological Linguistic Consciousness: The Unfolding of Self-Consciousness through Sat Chit Anand** Gur Pyari Jandial, Ami Kumar <gpj.dei@gmail.com> (English Studies/ Faculty of Art, Dayalbagh Educational Institute, Agra, India)

The journey into the science of consciousness has been intriguing, and there is today no doubt that there are many divergent paths to the destination. To understand the universe and our place in it, we need to put all that we know of human evolution together with new and revised laws of nature. This may include Abiogenesis, biogenesis and theories of evolution. As we delve deeper into the mysteries of consciousness we realize that it is more complex than what can be tackled in neuroscience laboratories. Perhaps we have scratched the surface, but we need to look under the layers of DNA and synapses to reach the core of human consciousness. The evolution of the human race is closely tied up the evolution of the dimensions of human consciousness. One of these is the ability of human beings to use language. The complex combinations of brain structures that facilitate the use of words to think, express, communicate through syntactic constructions and their interconnections comprise the brain's linguistic system. Perhaps there is need to return to a pre-linguistic state of consciousness wherein one can come in contact with one's true self without the distractions of words. This is possible only through sat-chit-ananda or existence 'pure and absolute; consciousness – pure and absolute; and bliss – pure and absolute. Shankracharya states, "No division in consciousness is admissible at any time as it is always one and the same. Even the individuality of the Jiva must be known as false like the delusion of the snake in the rope". (Ap-arokshanubhuti, 43) Our true self is pure existence, knowledge and bliss. This perhaps explains the strange sense of severance man feels towards the transitory pleasures of the world and the inexplicable yearning for eternal happiness. We may settle for less but it is not in our nature to do

so. The terms ‘sat-chit-anand’ identify that part of our consciousness which is eternal. Awakening this part of our consciousness will lead to the realization of the true self. Our consciousness of this life can be known for what it truly is only when we awaken into a higher sublimated state. The Absolute, state of Consciousness, transcends all relational manifestations – causal, subtle and gross. It is neither internally conscious like dream nor externally conscious, like waking. The teachings of Sant Mat or the Religion of Saints centre upon a type of meditation practice known as Surat-Shabd-Yoga. This is the surest way to be part of the universal consciousness – sat-chit-anand. The paper will attempt to trace the three levels of consciousness – the physical (neural correlates of the brain), the mental (psychological-cognitive) and spiritual (spiritual-eternal) – each leading to the other until the first two give way to the third – the one that controls and gives life to all. **P1**

### 3.08 Implicit and explicit processes

**195 Implicit Self-Esteem in Borderline Personality and Depersonalization Disorder** Heather Berlin, Alexis N Hedrick <berlin.heather@gmail.com> (Psychiatry and Neuroscience, Icahn School of Medicine at Mount Sinai, New York, NY)

Self-perception is disrupted in people with borderline personality disorder (BPD) and depersonalization disorder (DPD), fluctuating with sudden shifts in affect in BPD and experienced as detached in DPD. Measures of implicit self-esteem, free from conscious control and presentation biases, may highlight how such disruptions of self-concept differentially affect these two populations on an unconscious level. We examined implicit self-esteem using the Implicit Association Test, along with measures of emotion, behavior, and temperament, in BPD (n=18), DPD (n=18), and healthy control (n=35) participants. DPD participants had significantly higher implicit self-esteem and were more harm avoidant than BPD and control participants, while BPD participants had more ‘frontal’ behaviors and impulsivity and less self-directedness and cooperativeness than DPD and control participants. Thus, while BPD and DPD commonly overlap in terms of dissociative symptoms and emotional irregularities, differences in self-esteem, behavior, and temperament can help identify where they diverge in terms of their cognition, behavior, and ultimately underlying neurobiology. **C5**

### 3.09 Unconscious/conscious processes

**196 The Heart is the Basic, Fundamental, Decisive, Cognitive Organ, Interacts with the Brain in Conscious State to Modulate Conscious Volitional Act, Conscious Behavior and Free Will** Amna Al Faki, MD <amna1952@hotmail.com> (Department of Pediatrics, Omdurman Islamic University, Kharoutm-Omduduman, Sudan)

Global changes had occurred in understanding the role and functions of The Mammalian Heart, since Al Faki, (2009) Hypothesis postulates: (The neurons in the mammalian myocardium have perceptive sensory functions locally in the heart like sensory cortical neurons of the brain) Amna Al Faki (2009, Medical Hypothesis) in which Al Faki describes scientifically the heart as a sensory- perceptive, cognitive organ, and not only a simple mechanical pump. This novel idea or hypothesis on the basic functions of the heart, is substantiated by the genius work and discovery in Neurocardiology (1994) by J. Armour, and J. Ardell, who established the fact that the heart has an endogenous neural intrinsic system independent of central medulla in brain stem that control the heart. This intrinsic system is composed of hierarchy of neurons, afferent, efferent and inter-connected neurons that interact to form loops of circuits within cardiac plexuses where thoughts, memory, decision making and information processing take place. This new discovery in the basic functional anatomy of the heart has led to extensive research in the field of clinical cardiology and neuro-cardiology, which may change and revolutionize the concepts that consider the heart only a mechanical pump. At present time many scientific research centers and organizations focus on the cognitive, neurophysiologic and psycho physiologic functions of the heart. The spiritual-religious role and cultures based upon the heart intelligence, skills, intuition and emotion, may change

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mitigate or shift our contemporary human psychology and neuropsychology to more positive emotions, love, and acceptance of others. The heart is better considered by scientists and others as, sensory motor, and cognitive organ that makes decisions, guidance, and determine the conduct and behavior of the individual. It also acts as substrate for emergence of conscious act, free will, and consciousness. These considerations are based upon Al Faki hypothesis (2011, Philosophy Study) which postulates: (Cardiac neurons firing precedes cortical neurons firing by variable time equivalent to RP, or Libet's Latency period in goal-directed action or behavior in conscious state). The neuro-dynamic and the synergistic feedback interaction between the heart, the brain and the body during conscious state produce, conscious action, conscious behavior, and consciousness which arises and elicits in cardiac ganglia and neural plexuses of the heart. This cardiac consciousness elicits and initiates in cardiac ganglion as unconscious process and the stimulus is signaled to specific motor brain centers which trigger conscious brain stimulation to execute action or behavior through feedback mechanism with specific effector organ. The unconscious cardiac processes in the cardiac plexus elicits consciousness in neuronal ganglia in the heart which precedes and elicits consciousness in the brain. The time consumed in this unconscious cardiac process represents and equivalent to RP in EEG tracing in goal directed action or behavior in conscious state. **C23**

**197 Philosophy, Religion and the New Unconscious** Horace Fairlamb <fairlambh@uhv.edu> (Arts and Sciences, University of Houston-Victoria, Briarcliff, TX)

Religion and philosophy have typically taken a marginal interest in unconscious influences on belief and knowledge. Philosophy famously sought to distinguish epistemology from psychologism, and religion has generally trusted authorities to distinguish the true faith from pathological belief. Freud's influential approach brought attention to unconscious behavior, but was too sexy to be more than a curiosity to mainstream believers. But today's models of unconscious thought processing provide a more scientific view of unconscious factors in belief. Such models combine with the psychology of worldview commitments to explain why both religion and philosophy are subject to personal inclinations, even while philosophy offers more justifiable warrants for belief. **P1**

**198 Consciousness and Personal Death (Un)Awareness** Hector Qirko <qirkoh@cofc.edu> (College of Charleston, Charleston, SC)

There is strong evidence that reminders of one's death influence a number of attitudes and behaviors. However, there is much less support for the typically underlying hypothesis of "death denial," which holds that terror resulting from an awareness of personal mortality that accompanied the evolution of consciousness must be repressed by means of a variety of psychological mechanisms and cultural institutions. In fact, it is much more evolutionarily plausible that humans are, unless primed by experience or experiment, unconsciously death unaware, and so require no psychological and cultural defenses in order to repress death terror. This paper reviews support for and objections to the death denial model, as well as general literature on consciousness and self-awareness, self-deception, and positive illusions. These suggest that a personal death unawareness hypothesis is plausible and worthy of additional theoretical and empirical attention. **P2**

## 3.10 Sleep and dreaming

**199 Dreams of a Bayesian Brain: A Predictive Processing Account of Dreaming** Alessio Bucci <alessio.bucci00@gmail.com> (Philosophy, University of Edinburgh, Edinburgh, United Kingdom)

Dreaming is a prominent feature of our mental life and has recently found a space in cognitive science as a dedicated field of study. However, as it was recently argued in an extensive review of the contemporary debates (Windt & Noreika, 2011) we still face the problem of how to integrate theories about dreaming within a broader theory of cognition and consciousness (the Integration Problem). In response to the Integration Problem, I present Action Oriented Predictive Processing (AOPP) as recently proposed by Clark (2013). According to AOPP, the brain's cognitive archi-

texture is hierarchical and operates through Bayesian inferences and predictive coding: it actively creates hypotheses on the state of the world according to Bayesian inference rules, and it checks those hypotheses against the sensory data. In this perspective, dreaming is strongly linked to both perception and imagination; however, dreamers are almost entirely isolated from the external world and their brain can't check the hypotheses against the sensory data. According to AOPP then, dreams are the results of predictions about the world done by a brain running free from the world itself. After the introduction on AOPP, I focus on some empirical studies on dreaming which are compatible with the AOPP explanation, with particular reference to Hobson & Friston (2012). I subsequently address specific issues within this framework, such as: is there something that we can call "dream consciousness" and what are its specific features? What's the role of action (i.e. interaction with the environment) in the constitution of dreams? In response to the first, I argue that consciousness is better understood as a continuum of different mental states and dreaming is an altered state of consciousness compared to wake, characterized by a lack of constraints for the predictive mechanism usually active during wake. Regarding the role of action, I argue that the bizarre and impoverished simulated environment in which the dreamer is immersed triggers automatic responses and associations rather than constituting actions as performed during wake. I conclude that AOPP is an innovative but also integrative framework from which to shed light on the differences and similarities between dreaming and waking consciousness. Selected references: [1] Clark, A. (2013) "Whatever Next – Predictive brains, situated agents, and the future of cognitive science?". *Behavioral and Brain Sciences*, 36, pp. 181-204. [2] Hobson, J.A. & Friston, K.J. (2012) "Waking and dreaming consciousness: Neurobiological and functional considerations". *Progress in Neurobiology*, Vol. 98, pp. 82-98. [3] Windt, J.M. & Noreika, V. (2011) "How to integrate dreaming into a general theory of consciousness – A critical review of existing positions and suggestions for future research". *Consciousness and Cognition*, 20, pp. 1091-1107. **C12**

**200 Pre-Sleep Treatment with Acetylcholinesterase Inhibitors Enhances Memory, Cognition and Metaconsciousness (Lucidity) During Dreaming** Stephen LaBerge, Kristen LaMarca <stephen.laberge@gmail.com> (LUCIDITY.com, Tucson, AZ)

In most of our dreams we do not notice that they are in fact dreams until after we have awakened. In the significant exception, called lucid dreaming, we become metaconscious of dreaming while we continue to dream. Research has shown that most lucid dreams occur during REM sleep, a hypercholinergic state of inwardly focused attention. Given the strong association of lucid dreaming with intense phasic activation in REM sleep, we reasoned that Acetylcholinesterase Inhibitors (AChEIs) should increase the probability of lucid dreams (LDs) via their cholinomimetic action. Two experiments were conducted to test this hypothesis. Both experiments were randomized, double-blind, placebo-controlled, crossover trials using a sample of volunteers with high dream recall and interest in lucid dreaming. Ten volunteers (7 males, 3 females, ages 22-55) tested the effect of donepezil in the first experiment (Expt 1). Results of the donepezil trial encouraged a second, larger experiment (Expt 2) that examined the effect of galantamine on LD probability in 97 volunteers (53 male, 44 female, ages 19-75); galantamine was chosen for its shorter half-life, milder side effect profile, and over-the-counter availability. Both experiments collected dream content and self-report measures during spontaneous awakenings across three nights with counterbalanced order of three doses. Volunteers in Expt 1 took capsules at bedtime containing 0 (placebo), 5, or 10 mg of donepezil on nights separated by a one-week washout period. Volunteers of Expt 2 took capsules containing 0 (placebo), 4, or 8 mg of galantamine at the beginning of a 30-60 min period of sleep interruption. Expt 2 participants had two nights to learn and practice the reporting procedures and an induction protocol utilizing Mnemonic Induction of Lucid Dreams (MILD), Sleep Interruption (a modified sleep schedule that interrupts sleep for 30-60 min after 2-4 REM periods before returning to sleep for a 60-120 min nap). RESULTS: In Expt 1, nine of 10 participants (90%) reported one or more LDs on the experimental nights while only one participant reported a LD on a placebo night. The odds ratio of reporting a LD was significantly higher with 10 mg donepezil relative to placebo (24.3,  $p < .001$ ), and increases in recall, lucidity, clarity in cognition, control, bizarreness, and vividness were generally dose-related. In Expt 2, 52 of 97 (54%) participants reported one or more LDs on experimental nights compared to 12 of 96

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(12.5%) participants reported a LD on the placebo night. Relative to placebo, the 8 mg dose was 4.54 times more likely to result in a LD ( $p < .001$ , one tailed), and the 4 mg dose was 2.78 times more likely ( $p < .01$ , one tailed). The odds ratio comparing 8 to 4 mg approached significance (1.64,  $p = .08$ , one tailed). In both experiments we found a strong effect of cholinergic enhancement on reported lucid dreaming, supporting the view that lucid dreaming is an intensified REM sleep phenomenon rather than a partial mixture of REM sleep and waking. **C12**

**201 Risk Factors for Frequent Nightmares: Role of Subjective Well-being Measures** Nils Sandman, Katja Valli; Erkki Kronholm; Antti Revonsuo; Tiina Laatikainen; Tiina Paunio <nils.sandman@utu.fi> (Center of Cognitive Neurosciences, University of Turku, Turku, Finland)

**Introduction:** Dreams are altered states of consciousness that can be seen as simulations of waking life, and as such nightmares can be seen as particularly intense simulations of negative events. Occasional nightmares are common and harmless, but frequent nightmares can be a serious clinical problem. Prevalence of frequent nightmares among adults is found to be around 3-5% in many population based studies. In addition to nightmares, these people often report other sleep problems and mental health problems. The current study investigates risk factors for frequent nightmares among the general Finnish adult population. The aim was to investigate several previously unexplored potential contributing factors for nightmares as well as to test whether many already known correlates of nightmares can be replicated in these data. Additionally, the relationship between subjective (e.g. self-reported mood) and objective (e.g. depression diagnose by doctor) nightmare risk factors was studied. **Methods:** Current study utilized two surveys of the Finnish National FINRISK study. FINRISK is large scale health survey collected every 5 years starting from 1972. The surveys consist of random cross sectional population samples from adults aged 25-74 who fill in a comprehensive health questionnaire including items on sleep and mental well-being and participate in a physical examination at local healthcare center. Nightmares were assessed with self-estimated frequency during the last month. In the current study surveys from years 2007 and 2012 were used ( $N=13\ 922$ ). **Results:** Preliminary analyses show that insomnia and depression symptoms as well as the use of hypnotics and antidepressants are major risk factors for frequent nightmares ( $p < 0.001$ ). Strong associations also exist between nightmares and physical pain and the use of painkillers, life dissatisfaction, self-estimated poor physical health and several measures of self-estimated anxiety and stress symptoms ( $p < 0.001$ ). In many cases, subjective measures of well-being have larger effect size when predicting nightmare frequency than objective ones, highlighting the subjective nature of dream experiences. **C12**

**202 Artifacts in Using Mentation Reports in Empirical Consciousness Research: A Discussion of Psychological and Linguistic Translation Effects in Encoding and Decoding Subjective Experience** Jana Speth, Clemens Frenzel; Trevor Harley <j.speth@dundee.ac.uk> (School of Psychology, University of Dundee, Scotland, Dundee, United Kingdom)

In order to arrive at a multi-dimensional model of subjective parameters of different states of consciousness, we seek to analyse physiological data in combination with 1st person and 3rd person data. Mentation reports have been used successfully over the past fifty years of sleep and dream science to empirically differentiate between phenomenological characteristics of different sleep phases. Such mentation or dream reports are generally collected immediately after awakening, and formal or content analysis is later conducted by blind raters (Hall & Van de Castle, 1966; Merriitt et al., 1994; Revonsuo, 2000; Speth, Frenzel & Voss, 2013). As recent technologies such as tDC stimulation are being explored in the cognitive sciences, analyses of reports of mental experience are increasingly recognized as valuable tools to investigate formal parameters of the mental experience associated with tDC stimulation as well as no-stimulus-no-response waking and sleep settings (Wamsley, 2013). However, to obtain accurate and comparable results, we need to develop an awareness of the psychological and linguistic artifacts which we must expect as mental experience gets encoded in a verbal report by the subject, and subsequently decoded by report raters. Among others, we must consider cognitive and memory effects, verbalization effects, gender effects, sociolinguistic demand effects arising from established cultures of dream reporting, as well as unintended linguistic priming effects induced by the phrasings of verbally



delivered experiment instructions. I aim to initiate a fruitful interdisciplinary discussion on the translation effects inherent in this two-fold data collection process by outlining psychological and linguistic theories on reporting subjective experience and their implications for research designs that successfully reduce the amount of translation effects. I expect the results from our debate to help us arrive at a standardized manual for the collection and analysis of mentation reports, which will help us to reach our common goal of controlled, comparable empirical results of mentation report based studies. The results may advance not only basic research by contributing to the multi-dimensional model of the subjective parameters of different states of consciousness, but also advance clinical research, especially with regard to therapeutic assessments and clinical uses of tDC stimulation. **C22**

**203 Dreaming as Social Simulation** Jarno Tuominen, Valli, Katja; Revonsuo, Antti <jaultu@utu.fi> (Department of Behavioural Science, University of Turku, Turku, Finland)

According to Revonsuo (2000), and recently Hobson (2009), dreaming is an internally manufactured simulation of the world, during which only a minimal amount of sensory stimulation reaches our consciousness. Thus, the dreaming brain offers an interesting insight into what happens to our consciousness when it is in minimal contact to external reality through the senses. The function of dreaming has for decades been the subject of fervent empirical and philosophical debate. It is becoming increasingly clear that dreaming may serve several different functions, varying from consolidation of memories to the important sociocultural purposes of sharing, interpreting and narrating these nocturnal inner experiences. The surge of interest into the evolutionary functions of psychological phenomena during the past decades has previously led, for example, to the Threat Simulation Theory of dreaming (Revonsuo, 2000). When dreaming is viewed against a backdrop of human evolutionary history it would appear that attributing the function of dreams to be solely, or even primarily, threat rehearsal, might be too narrow a view. One of the predominant hallmarks of human species is its social nature. Our complex social environment has been seen as a major selection pressure operating on the cognitive faculties of ancestral humans. Correspondingly, it has been suggested (Franklin & Zyphur, 2005; Kahn & Hobson, 2005; McNamara et al., 2005) that one of the main functions of dreaming is the simulation of social interactions, as those ancestors most adept in their social environment were most likely more successful in reproduction than less social skilled individuals. When we look at the contents of our dreams, it seems we spend the majority of our dreams engaged in simulated social interaction, and even more curiously a vast amount of this is spent wondering what the other characters in our dreams think and what their intentions are, even though they are nothing more than the creations of our own sleeping brain (Kahn & Hobson, 2005). Could the contents of our dreams, then, imply that one essential function of dreaming might have been to simulate adaptively important social interactions in addition to threatening events? So far, however, these social simulation theories have not been formulated in a precise enough manner to be subjected to rigorous scientific testing. The aim of this presentation is to review the existing literature and to formulate an empirically testable paradigm for social simulation in dreams and its possible adaptive function. If dreaming is taken to be a conscious state with minimal external input, a closed consciousness working on its own, the contents and structure of our dream world will reveal information not only about the contents and evolutionary history of dreaming, but possibly also about the ontology and structure of our phenomenal consciousness. **P2**

**204 Dreams, Conscious Experience and Cranial Enervation: A New Look at the Mind-Body Problem** Jennifer Windt <windt@uni-mainz.de> (Department of Philosophy, Johannes Gutenberg University, Mainz, Germany)

The currently received view in philosophy of mind and empirical research is that dreaming involves a phenomenologically rich form of conscious experience arising independently of sensory input and motor output. Dreaming, on this view, supports internalist conceptions claiming that the constitutive supervenience base of conscious experience is the brain, not the body (Revonsuo 2006). Externalists, while accepting that dreaming depends on neural activity alone, deny that the same is true for perceptual experience. This is related to the phenomenological claim that con-

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scious experience in dreams, arising independently of sensory input and motor output, is crucially different from standard perceptual experience (Noe 2004). Either way, the theoretical analysis of dreaming is regarded as crucial for adjudicating between these two opposing positions. The aim of my talk is to put pressure on the view, shared by both sides, that dreaming is a real-world example of a naturally occurring state of cranial envatment. I use examples from scientific dream research to defend the “weak-phenomenal-functional embodiment thesis”. One, a majority of dreams can be described as weakly phenomenally embodied states because of the systematic underrepresentation of important dimensions of bodily experience and disturbances in multisensory integration (Windt 2010, forthcoming). Two, experimental stimulation of the physical body is frequently incorporated in dreams, suggesting that external sensory input is not completely blocked, but rather modulates dream experience in a systematic manner. Three, different dream-enactment behaviors suggest that motor output is neither completely nor consistently blocked during REM sleep. Four, leaving contentious metaphysical claims aside, I argue that an interesting explanatory relationship holds between phenomenal and functional embodiment in the dream state, such that bodily experiences in dreams are best explained by appealing to real-body inputs. I close by arguing that scientific dream research can contribute to the investigation of a particular variant of the mind-body problem. By enabling researchers to chart changes in phenomenal-functional embodiment across the sleep-wake cycle, scientific dream research extends existing research on full-body illusions (Blanke 2012) and their discussion in the context of philosophical approaches to bodily awareness (De Vignemont 2014) and minimal phenomenal selfhood (Blanke & Metzinger 2009). This approach goes beyond the dichotomy between internalism and externalism about conscious experience, which is unhelpful and even misleading when translated into an explanatory framework and research strategy for the scientific investigation of conscious experience. Blanke, Olaf (2012): Multisensory brain mechanisms of bodily self-consciousness. In *Nature Reviews Neuroscience* 13, pp. 556-571. Blanke, Olaf; Metzinger, Thomas (2009): Full-body illusions and minimal phenomenal selfhood. In *Trends in Cognitive Sciences* 13 (1), pp. 7-13. De Vignemont, Frederique (forthcoming): A multimodal conception of bodily awareness. In *Mind*. Noe, Alva (2004): *Action in Perception*. Cambridge, MA & London: MIT Press. Revonsuo, Antti (2006): *Inner Presence. Consciousness as a Biological Phenomenon*. Cambridge, MA & London: MIT Press. Windt, Jennifer Michelle (2010): The immersive spatiotemporal hallucination model of dreaming. In *Phenomenology and the Cognitive Sciences* 9, pp. 295-316. Windt, Jennifer Michelle (forthcoming): *Dreaming. A Conceptual Framework for Philosophy of Mind and Empirical Research*. Cambridge MA: MIT Press. C12

## 3.11 Cognitive development

**205 Enhancing Adolescent Metacognition and Minimizing Risk Vulnerability Through Instruction in Developmental Neuroplasticity** Suzanne Russ <suzanne.russ@dickinsonstate.edu> (Psychology, Dickinson State University, Dickinson, ND)

Adolescence is a developmental stage during which repeated experiences produce particularly rapid and enduring neuroplastic changes (e.g., Anderson, 2004). A period of marked synaptic growth occurs in the period preceding puberty facilitating enhanced formation of neural pathways, and a period of marked synaptic pruning occurs in the period after puberty through which underutilized neural pathways are abandoned. These neuroplastic changes are shaped both by positive experience (e.g., practice, study) and insult (e.g., injury, drug use) (e.g., Glaser & Schlaug, 2003), and have a more enduring effect when they occur during adolescence than later in life (e.g., Black et al., 2006; Hopkins et al, 2011). This presentation explores the hypothesis that direct relevant instruction to adolescents on developmental neuroplasticity and on their own neuroplastic potential will (a) enhance mindfulness in decision making, (b) minimize engagement in high-risk behaviors, and (c) enhance overall adolescent metacognition. Results of pilot instruction on adolescent neuroplasticity conducted with two groups of middle school students will be discussed. P2

**206 Interhemispheric Integration in Infancy: Split-Brain Babies?** Kimberly Scott, Elizabeth Spelke; Laura Schulz <threequarks@gmail.com> (Brain and Cognitive Sci, MIT, Cambridge, MA)

Split-brain patients can reason about and even act on concepts that are sequestered in one hemisphere of the brain. Similarly, infants may develop lateralized representations of visual concepts before learning the mappings that give rise to invariance across the whole visual field. Here we present two behavioral studies of this visual challenge: integrating representations computed in the right and left hemispheres of the brain. First, can infants tell that a shape on the left matches a shape on the right? Second, do they represent total approximate number when some objects are on the left and some on the right? We find failures of integration from 12 through 16 months of age. **C5**

## 3.12 Artificial intelligence & robotics

**207 Engineering a Conscious Quantum Computer** Bhakti Kapur <bhaktikapur@gmail.com> (Agra, Uttar Pradesh India)

Attempts to mimic human intelligence through methods of classical computing have failed because implementing basic elements of rationality has proven obstinate to the design criterion of machine intelligence. A radical definition of Consciousness describing awareness, as the dynamic representation of a noumenon comprised of three base states; and not itself fundamental as generally defined in the current reductionistic view of the standard model, which has created an intractable hard problem of consciousness as defined by Chalmers. By clarifying the definition of matter a broader ontological quantum theory removes immateriality from the Cartesian split bringing mind into the physical realm for pragmatic investigation. Evidence suggests that the brain is a naturally occurring quantum computer, but the brain not being paramount to awareness does not itself evanesce consciousness without the interaction of a nonlocal conscious process; because Mind computer and cannot be reduced to brain states alone. The proposed cosmology of consciousness is indicative of a teleological principle as an inherent part of a conscious universe. By applying the parameters of quantum brain dynamics to the stack of a specialized hybrid electronic optical quantum computer with a heterosporic molecular crystal core, consciousness evanesces through entrainment of the non local conscious processes. This ‘extracellular containment of natural intelligence’ probably represents the only viable direction for Artificial Intelligence to simulate ‘conscious computing’ because true consciousness is equal to life. **P1**

**208 Task-Oriented Consciousness – Will My Robot Feel More Happiness and Freedom Than Me?** Rafal Rzepka, Kenji Araki <kabura@media.eng.hokudai.ac.jp> (Graduate School of Information, Hokkaido University, Sapporo, Hokkaido Japan)

Evolution equipped us with instincts in order to to keep us safe, to let us find a suitable partner for reproduction, etc. Even if we are conscious of e.g. cognitive biases, our brain prioritizes them and even researchers of psychology or statistics become victims of errors and biases they investigate [Kahneman 2011]. Unpleasant happenings can cause traumas that influence our behavior, for example, by causing a depression; even a microscopic tumor can change our personality and make us do things we have never been doing before – against our will. We cannot process vast amounts of information that grow every millisecond – the “big data” of news, experiences or discoveries, and even search engines and social networks help us to filter this unprecedented flow of knowledge because we are not able to process it limiting our horizons. When machines begin to understand what their more and more sophisticated sensors sense, the number of learning samples will be soon close and then bigger than lifetime experiences of an average person and then of the whole humankind. In our project for achieving a set of cognitive architectures “living” in the seas of Internet and sharing knowledge [Rzepka 2003], we concentrate on an architecture’s skills to analyze human behavior, to find similarities, to predict it mistakes, etc. [Rzepka 2009]. This knowledge can be used in devices for different tasks from advising people to cleaning houses [Rzepka 2011]. We believe that it is safer to set up different depths of artificial consciousness depending on the particular role the machine was given. Such instances could be also used for philosophic-

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cal experiments because, unlike of animals, programs we work on can (to some extent) explain their behavior, decisions, external and eternal states, etc. Preliminary experiments suggested that computers programmed not to be biased or robots with replaceable parts can artificially feel happier and more free than human beings. We believe that the clear utility and goals or resistance to cognitive errors may lead to high level of satisfaction for a machine and consequently its user. Therefore, the questions we want to raise in our presentation are: (1) can levels of consciousness be artificially manipulated? (2) is a machine that can explain its external states regarded more conscious than animals? (3) could achieving high utility become a base for machine happiness? (4) is it possible to create an illusion of free will algorithm for machines? – and to discuss our thoughts on these topics with the community. **P2**

**209 Declarative Consciousness for Reconstruction** Leslie Seymour <seymour@persinvitro.com> (PersInVitro, LLC, San Jose, CA)

Existing information technology tools are harnessed and integrated to provide digital specification of human consciousness of individual persons. An incremental compilation technology is proposed as a transformation of LifeLog derived persona specifications into a Canonical representation of the neocortex architecture of the human brain. The primary purpose is to gain an understanding of the semantical allocation of the neocortex capacity. Novel neocortex content allocation simulators with browsers are proposed to experiment with various approaches of relieving the brain from overload conditions. An IT model of the neocortex is maintained, which is then updated each time new stimuli are received from the LifeLog data stream; new information is gained from brain signal measurements; and new functional dependencies are discovered between live persona consumed/produced signals. **C6**

**210 Mapping the Space of Possible Conscious Minds** Roman Yampolskiy <roman.yampolskiy@louisville.edu> (Computer Engineering, University of Louisville, Louisville, KY)

What is a conscious mind? No universal definition exists. Humans are said to have a conscious mind. Higher order animals do as well. We believe that an artificially intelligent agent such as a robot or a program running on a computer will constitute a conscious mind. Based on analysis of those examples we can conclude that a conscious mind is an embodied intelligence with a knowledge-base about its environment, and while intelligence itself is not an easy term to define, a recent work of Shane Legg provides a satisfactory, for our purposes, definition. In his work, we will also assume that at least in principle, accurate software simulations of animal and human conscious minds are possible. Those are known as uploads and they belong to a class comprised of computer programs no different from that to which designed or evolved artificially intelligent software agents would belong. Consequently, we can treat the space of all conscious minds as the space of programs with the specific property of exhibiting consciousness if properly embodied. All programs could be represented as strings of binary numbers. The embodiment requirement is necessary since a string is not a conscious mind, but could be easily satisfied by assuming that a universal Turing machine is available to run any program we are contemplating for inclusion in the space of conscious mind designs. Given our definition of conscious mind we can classify conscious minds with respect to their design, knowledge-base or embodiment. First, the designs could be classified with respect to their origins: copied from an existing conscious mind like an upload, evolved via artificial or natural evolution or explicitly designed with a set of particular properties in mind. For each subtype there are numerous architectures, which to a certain degree depend on the computational resources available via a particular embodiment. For example, theoretically a conscious mind working with infinite computational resources could trivially brute-force any problem, always arriving at the optimal solution, regardless of its size. In practice, limitations of the physical world place constraints on available computational resources regardless of the embodiment type, making brute-force approach a non-feasible solution for most real world problems. Conscious minds working with limited computational resources have to rely on heuristic simplifications to arrive at “good enough” solutions. Another subset of architectures consists of self-improving conscious minds. Such conscious minds are capable of examining their own design and finding improvements in their embodiment, algorithms or knowledge-bases which will

allow the conscious mind to more efficiently perform desired operations. In the rest of the paper we will analyze the space of possible conscious mind architectures. The analysis will cover such topics as: Infinitude of mind-space, size and complexity of conscious minds, properties of conscious minds, topology of conscious mind design space, self-improving conscious minds, evolved conscious minds, self-aware conscious minds, uploads, and substrate dependent conscious minds. We will use the produced mapping of conscious mind designs to predict potential impacts of future super-intelligent machines on the humankind. **C6**

### 3.14 Cognitive architectures

#### 211 The New Superego? Whit Blauvelt <whit@csmind.com> (Bellows Falls, VT)

Freud's broad claim that "the unconscious" exists, after years of immense popularity, ran afoul of the backlash against his specific characterization of structure and dynamics. Doubts about the narrower claim led many to reject the broader. Recent work has re-established, along non-Freudian lines, a place for "the new unconscious." Of the three major Freudian entities, this refactored unconscious rejoins continuing focus on "the ego" – even contemporary disputes of the ego's reality from Rylean and Buddhist perspectives grant it a prominent role as at least a pervasive illusion. The third major Freudian entity, "the superego," has fallen from favor much as did "the unconscious," with his specific characterization found untenable by many. The broader case for a theoretical entity in this position may yet be made. A revitalized and re-characterized picture of "the new superego" provides an hypothesis on the structure and dynamics of conscious self which survives anti-homuncular arguments against egos, and so refocuses the explanatory target of a science of consciousness. This target resists the tendencies of some ego-as-illusion perspectives either to reduce all to the unconscious or else to too quickly appeal to transcendentalisms. The new superego may be grounded in recent neuroscientific research on "the default mode" of the brain, partially illuminated by Jung's theory of "persona" and "self," informed by Chuang Tzu's discussion of "the hinge of the ways," and have been personified for classical Greeks in Hecate's focus on crossroads and thresholds. That focus contrasts to the ego's focus on single paths, seen by neuroscience as "the task mode" of the brain with which the default mode – here argued to be ground for the constellation of the as-yet poorly described, theorized, and culturally-optimized new superego – contrasts and alternates. This is not Father Freud's superego; not an idealized, internalized authority figure; nor is it outside the range of (above or below) our conscious self. We can learn to recognize and study the new superego as a recurrent, productive, neurologically instantiated mode of consciousness. **P1**

#### 212 Time and the Brain David Eagleman <seanjudge1@gmail.com> (Baylor College of Medicine, Houston, TX)

Most of the actions our brains perform on a daily basis – such as perceiving, speaking, and driving a car – require timing on the scale of tens to hundreds of milliseconds. New discoveries are building an emerging picture of how the brain processes, learns, and perceives time. We will demonstrate new temporal illusions in which durations dilate, perceived order of actions and events are reversed, and time is experienced in slow motion. Questions addressed include: Does your brain work in real time, or do you experience a delayed version of the world? How and why does the brain dynamically recalibrate its timing judgments? Does subjective time really slow down during a car accident? We argue that the perception of time is a powerful inroad into conscious experience, and that new theoretical work may allow a direct mapping of subjective experience to physiological observations. **PL6**

### 03.15 Ethology

#### 213 Coyote Consciousness: Social Predator Vocalization and Communication Sara Waller <sara.waller@montana.edu> (Philosophy, Montana State University, Bozeman, MT)

Many animals from meerkats to whales use sequences composed of ordered phoneme like units to convey meaningful messages such as predator warnings, location and activity information,

and to cooperatively hunt. Coyotes are social predator-scavengers that share food and coordinate actions to capture their meals. This study (funded by NIMBioS) provides an initial analysis of coyote vocalizations with an eye toward developing a theory of non-human meaning and mental content; one that allows for inferences without propositions and conceptual thought based on primarily auditory and olfactory perceptual content. Frequency patterns analyzed and discussed include harmonics, yip-upsweeps, and yi-yi patterns that appear to be food sharing calls. **C16**

### 3.16 Self-consciousness and metacognition

**214 Anterior-Posterior and Lateral-Medial Changes in p200 Amplitude During a Self-Evaluation Task** Joel Alexander, Tesalee Sensibaugh; Pristene Delegato; Ronald Alexander <alex-anj@wou.edu> (Psychology, Western Oregon University, Monmouth, OR)

The current study differentiated the influence of a self-evaluation task on anterior and posterior cortical regions by comparing latencies and amplitudes of the p200 event-related potential. The current study included 32 participants (age=21.71, sage=3.08; 50% female) all of whom completed three stages. An ERP auditory oddball discrimination task between a target (15% occurrence) and standard (85% occurrence) was included across all stages. The stages included 1) the standard oddball task, 2) the oddball task with a secondary counting task, and 3) the oddball task with a secondary self-evaluation task (i.e., participants indicated if they were surprised by the occurrence of the target tone in the series). Previous research has explored the impact of a self-evaluation task on the p300 component of the event-related potential (ERP), observing an increase in amplitude towards the cortical midline (Alexander et al., 2005; Grindstaff et al., 2011). The heightened level of cortical resource allocation at the central brain may indicate increased parietal involvement in a self-evaluation task compared to other lobes. In contrast, the current study found the p200 amplitude was similarly more responsive to the self-evaluation task, yet with a different pattern involving not just anterior-posterior, but lateral-medial aspects,  $F(6.95, 208.34) = 3.27, p = .003, \eta^2 = .10$ . In contrast to the p300 study data, the p200 did not show increased latency effects with the increased demands of self-evaluation. The higher-order perceptual processing, modulated by attention that the P200 is purported to represent, clearly has a unique precursor response compared to the P300. **C19**

**215 Where Is My Mind: Neural Correlates of Involuntary Attentional Lapses and Mind Wandering** Tracy Brandmeyer, Arnaud Delorme <tracy.brandmeyer@gmail.com> (Centre de Recherche Cerveau et Cognition, Paul Sabatier University, Toulouse, Toulouse, Midi Pyrenees France)

Research investigating mind wandering (MW) and task-independent thought has gained considerable attention over the last 5 years due to its noticeable persistence during waking states, in addition to its unique and highly correlational relationship with default mode network activity (DMN). The DMN consists of a set of midline and lateral inter-connected brain regions, and is supposedly most active during rest. Abnormal DMN activity remains the hallmark indicium for a wide array of cognitive disorders including attention deficit disorder, major depression, autism, post-traumatic stress disorder and so forth. However, recent research has also shown the adaptive and functional role of MW via facilitation of flexible monitoring of both the external environment and internal mentation, while concurrently directing attention to an external task. Due to the 'unaware' nature of MW, which is partially decoupled conscious awareness, the development of nuanced neuroimaging methods is needed to capture these mental states and phenomena in experimental settings and to explore its relationship with the DMN. In particular, we were interested in studying the relationship between the DMN and the depth of mind wandering. We recorded 128-channels Electroencephalography (EEG) data on subjects who performed a focused breath-counting task, counting their breath cycles from 10 down to 1, for a total duration of one hour. The task was comprised of two blocks, counter balanced across subjects. During the first 30-minute block, subjects reported via button press every time their mind drifted off task (i.e. stopped counting, or lost track of which number they were on). During the second 30-min block, subjects were probed approximately every minute (range 45 seconds to 75 seconds) with the ques-



tion “Are you mind wandering now?”. In both conditions, subjects reported the depth of MW episodes on a scale of 1 to 3 (1 reflecting mind wandering while still being able to stay on task, and 3 reflecting a significant period of time being absorbed in their thoughts – zoned out – and off task). We compared the spectral power and information transfer between brain areas associated with the DMN as they have been isolated in EEG using independent component analysis. In particular we focused on contrasting low depth with high depth of mind wandering states. Our preliminary results suggests a state-associated change in theta band (4-7Hz) over frontal midline sites, in which spectral power was higher during longer durations of mind wandering (depth 3) state as compared to the breath focus state. In addition we observed a state-associated fronto-lateral beta (15-30Hz) and occipital gamma (30+Hz) band power increase during the breath focus. Additionally, it would appear that our probe measures were able to produce similar and robust results, as compared to our self-report measures, serving to potentially further validate both measures of capturing MW events. To our knowledge this is the first study to directly compare the depth of MW, as well as probe caught, versus self-reported MW events in an attempt to further validate these methods, in addition to identifying the neural correlates of MW via Electroencephalography and its relationship with the DMN. **C10**

**216 Carruthers on Metacognition, and the Unity of Beliefs and Desires in Animals** Gary Comstock, William Bauer <gcomstock@ncsu.edu> (Philosophy, North Carolina State University, Raleigh, NC)

Do monkeys have Meta-cognition, the second-order capacity to think about their thoughts? In “Metacognition in Animals: A Skeptical Look,” Peter Carruthers (2008) argues that the experimental results do not support an affirmative answer; rather, he says, the animals’ behaviors can all be explained in first-order terms. We identify a key element of folk psychology that Carruthers neglects—the principle of Unity—and restore it to its place alongside beliefs and desires. We conclude by suggesting that the recognition of unity makes it more difficult for Carruthers to sustain his skepticism about conscious experience in animals. **P2**

**217 Performance of Pain: Exploring Performance Art, Pain and Neuroscience** Jareh Das <jareh.das@artscatalyst.org> (The Arts Catalyst – Curatorial, The Arts Catalyst, London, Waltham Forest United Kingdom)

Since the 1960’s we observe the hurt body in performance as a means of presenting diverse experiences ranging from intimacy and complicity to confrontation (Jones, 2002). It has the ability to offer audiences direct, unmediated encounters that destroy pretense, create sensory immersion and open up different kinds of engagement with meaning. Its potency as a ‘live’ form that disrupts the nature of contemporary art is one that can be trace backed to origins within theatre and it continues to defy expectations of who is making art, how they are making it and who they are making it for. It is not uncommon for the body to find itself caught up in a discourse at the intersection of art, technology and body politics with categories such as ‘technological body’, ‘gendered body’, ‘historicised body’, ‘politicised body’, ‘aestheticised body’, ‘performing body’, ‘fragmented body’, ‘hurt body’ etc., all these terms signaling the inescapable historical discursivity of the body. Recently, we observe the commercialisation of neuroscience technologies (fMRI, EEG, EMG etc.) that explore audience experience are becoming more visible the public domain and see these technologies becoming present in an art exhibition setting (Juan Downey, Tate Tanks, 2012 using EEG headsets). This interdisciplinary (art-neuroscience) approach draws on the pain neuroscience research that includes, University College London’s lanetti Lab, whose research interest study the nociceptive system and how its activation generates painful precepts. This poster presentation proposes a move towards a new discursive theory of the hurt body in performance art, by illustrating through several artists case studies, a neuroscientific interpretation of performance art. **A1**

**218 Conscious, Unconscious and Self-Conscious Aspects of the Character Traits Conscience, Compassion and Conscientiousness** Ida Hallgren <ida@filosofi.gu.se> (Dept of Philosophy, University of Gothenburg, Gothenburg, Sweden)

Subscales of the Temperament and Character Inventory (TCI) personality test aim at measuring conscience and compassion. A subscale of another personality test, the Big Five, attempts to cap-

ture the trait conscientiousness. In addition to being, what is considered to be appreciated traits, these traits have also been related to character strengths (Peterson et al., 2004) and responsibility (Cloninger, 2013). The possibilities for us to change our current behavior and behavioral patterns are different depending on if a trait is available for conscious functioning or not. Hence the degree of availability for conscious reflection is relevant for discussions about to what extent we may be responsible for our character and to what extent we can be held responsible for a certain behavior. The aim of this paper is to answer two questions: (i) Can the TCI and Big Five be said to accurately capture the traits of conscience, compassion and conscientiousness? (ii) How are these traits related to each other and how are they related to conscious, unconscious and self-conscious functioning? The discussion of (i) points out, for example, how the TCI subscale supposedly measuring compassion, rather appears to target automatic tendencies for empathic reactions. The sense of compassion instead appears to be closely related to what is captured by another subscale of the TCI which attempts to capture a sense of self-forgetfulness. Self-forgetfulness, elsewhere conceptualized as hypo-egoic functioning, is characterized by a deactivation of in-group identifications and of ego-identifications. It may also be the case that self-forgetfulness and compassion correlate with an enriched sense of awareness, perhaps even an enhanced state of consciousness. Regarding (ii) and levels of conscious functioning involved in conscience, previous discussions have described conscience as consisting of one component of explicit reflection on moral matters, and another component of non-thinking and unconscious responses (Gillon, 1985). Conscientiousness, which can be fully reliant on unconscious behavioral patterns, may or may not be based on values related to the moral sentiments of conscience. Further, here it is argued that to develop a conscience takes a capacity to convert the self-forgetful and intrinsically other-directed state of compassion into unconscious dispositions of conscience via a stage of self-conscious reflection on actions and non-actions. **P2**

#### **219 Distractions from Self-Related Thoughts and Their Effects on Episodic Memory**

Ted Loughheed, Andrew Brook; John Logan <ted\_loughheed@carleton.ca> (Cognitive Science, Carleton University, Ottawa, Ontario Canada)

There is a long-standing debate in philosophy of mind on whether or not consciousness implies self-consciousness. Our study attempts to shed some empirical light on the topic using a novel experiment. We hypothesize, first, that self-consciousness requires self-directed attentional resources, and secondly, that the encoding of episodic memory is significantly reduced in the absence of specifically self-related thoughts. We examined the effects of an abstract distraction task (a game of Tetris) on the ability to encode details from an auditory narrative. In the control condition, we provided participants with intermittent self-referential cues in the form of a second-person narrative, while in the test condition we provided no such cues, using an otherwise identical third-person narrative about a well-known public figure. At the time of writing, data has been collected and the analysis is pending. We present the outcome of our analysis, and discuss how our findings contribute to the debate on the relationship between consciousness and self-consciousness. **P1**

#### **220 Feedback Mechanisms at the Heart of Science and Contemplative Traditions** Wolfgang Lukas <wolfgang.lukas@gmx.at> (CERN, Graz, Austria)

Every human perception and experience, followed by processing and interpretation, shapes our future perceptions and experiences. This feedback-loop mechanism is subject to a wide range of influences, from cognitive biases and logical fallacies to memes and belief systems. Therefore, even though the scientific method aspires to a purely objective way of investigating and understanding the world, such objectivity necessarily appears to be beyond our human reach. A new stance must be adopted that accounts for the first-person perspective and observer biases and their role in feedback mechanisms, especially in the emerging field of consciousness studies. Neurophenomenology can arguably be regarded as one of the most fruitful attempts to bridge the scientific gap between subjective and objective, observer and observed, first and third person perspective. The stance taken in this discipline could serve as a template for other sciences, with the goal to uncover hidden assumptions and reduce observer biases. Second-Order Cybernetics may provide the conceptual framework necessary for the application of such a template to systems

which can be characterized by feedback loops. Similar feedback mechanisms are described in ancient contemplative traditions such as Buddhism, most notably “dependent co-arising” or “*paticca samuppada*”. This mechanism can be regarded as a complex nonlinear system, in which the ultimate aim – to break the cycle and attain an “unconditioned” state called “*nibbana*” – can be achieved via mindfulness practice. General Semantics describes an equivalent approach based upon our use of language and conceptual abstracting, which encompasses the same feedback loop mechanisms with sensory perception as the essential link between a presumably objective world and our subjective experience of it. Here the focus can be turned onto the “map-territory relationship” as well as “consciousness of abstracting”, and dedicated training methods can bring about results which bear striking similarities to mindfulness practices. These similarities can be investigated in terms of their respective interaction with neurophysiological feedback cycles such as the Default-Mode Network and Task-Positive Network. The convergence of modern science and ancient wisdom with regard to consciousness is not surprising. A combined approach using concepts from Neurophenomenology and Second-Order Cybernetics, in parallel with semantic training from General Semantics and mindfulness practice as found in Buddhism, can bring benefit to scientific disciplines as well as for personal experience. When one path corrects the course of the other, any influences and biases which may distort the process of scientific inquiry as well as our everyday experience can be elucidated and reduced for the sake of our own systematic disillusionment. Harnessing the full potential of science and spiritual traditions together, we may thus become able to perceive the world with much greater clarity. **P2**

## **221 Anatomies of Awareness: The Claustrum and Neurological Frameworks of Subjectivity**

Michael Shanks, Annalena Venneri <m.f.shanks@sheffield.ac.uk> (Neuroscience, University of Sheffield, Sheffield, South Yorkshire United Kingdom)

Studies of awareness are relatively novel in neurological and even neuropsychological circles, although it has been persuasively argued that the objective experience of the world as represented in consciousness is built into the act of perception (Burge, 2010). Investigation of the rich variety of abnormal beliefs and experiences which appear early in the course of neurodegenerative disorders including Alzheimer’s disease can contribute to experimental evidence about the higher cognitive functions and related brain networks which underpin normal awareness. The symptoms include animistic beliefs (communicating with images, delusional companions), misidentification of others or the self, changed awareness of the home (which may include the awareness of dead relatives or strangers living in the home) and the experience of contemporary events as already familiar (*deja vecu*). In clinical description and common understanding of these abnormal states of mind, they are often interpreted as disordered representational states with associated delusions. They can be more readily understood, however, as changes in the awareness of the self and the world. Such radical alterations of experience seem to show up when normally inaccessible/unobtrusive ‘background’ neural systems which must support discrete structures of awareness are damaged or dysfunctional. These brain networks and their associated higher cognitive functions can be investigated using an integrated clinical, neuropsychological and neuroimaging approach in symptom defined case and correlative group studies (eg Shanks et al, 2013). An emerging finding from studies with patients with Alzheimer’s disease is that degeneration of the claustrum and associated structures is important for at least some elements of the neuropsychological and neuropsychiatric symptoms in this and other forms of dementia, although the role of the claustrum has been curiously neglected. Such a view derives not only from connectivity studies but also from neuropathological and in vivo neuroimaging correlative studies. The disconnection between cortical and subcortical structures which follows the degeneration of cholinergic neurons (including those in the claustrum) and related cholinergic pathways, isolates mediotemporal structures from associative areas of the neocortex. A range of functions which are essential for the maintenance of efficient cognition and a veridical interpretation of reality and the environment is then compromised. This distinctive multimodal disruption may make a critical contribution to both the neuropsychological and neuropsychiatric symptoms seen in neurodegenerative disorders, and by extension give valuable insight on how subjective awareness is achieved in the healthy brain (Venneri and Shanks in press). References: Burge, T. (2010). *Origins of Objectivity*. Oxford:

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Oxford University Press; Shanks MF, McGeown, WJ Guerrini, C Venneri A. Awareness and Confabulation. *Neuropsychology*, 2013, doi: 0.1037/neu0000031; Venneri A and Shanks MF: "Alzheimers Disease and the Claustrum" in "The Functional Anatomy of the Claustrum". Edelstein L, Ramachandran VS and Smythies J, Eds, in press **P2**

**222 Hilgards' "Hidden Observer" Revisited** Karen Shanor <dr.karenshanor@gmail.com> (Clinical and Neuropsychologist; Adj Prof, Georgetown University, Washington, DC,)

"Hidden observer" has been used to describe a concealed part that knows things that aren't present in a person's open consciousness. The presence of this "hidden observer" has been demonstrated in Stanford University experiments in which subjects are asked to undergo a stress that is usually very painful, such as placing the hand and forearm in ice water, or of having the circulation in the forearm cut off by a tourniquet placed above the elbow. When hypnotized, the subjects are given the suggestion that they'll feel no pain or other sensation. Most report they're comfortable throughout the stress period (Hilgard and Hilgard, 1973, 1975, 1977). However, if the subjects are told under hypnosis to report what they feel through automatic writing the "hidden observer" may report increasing pain even when the hypnotized person reports no pain at all. After the stress is removed and the arm has returned to normal, the subjects are told that when the experimenter places a hand on their shoulder, the "hidden observer" will tell what it remembers about the experience. The 'hidden observer' recalls that the water was indeed very cold, or that the bloodless arm was in pain, but the pains weren't as severe as they would have been in the normal nonhypnotic state. Other experiments have shown that the 'hidden observer' can report sounds heard while the subject is hypnotically deaf or can remember the number of fingers held before the subject's face when the subject is hypnotically blind. It's as though the information received from the environment is registered, processed, stored in memory, and somehow withheld before ever becoming openly conscious. (Atkinson, Hilgard 2009). It has been argued that this "hidden observer" – "purusa" (the witness) of the ancient Sankhya philosophy and many other cultural traditions. We'll revisit the "hidden observer" in light of research recounted in my book, *The Emerging Mind*, as well as recent "default mode" findings. We'll also look at Karl Pribram's discussion of the "hidden observer" in his 2013 book *The Form Within*, as well as University of Pittsburgh's Yan Xu's and UC Berkeley's Walter Freeman's groundbreaking studies. Implications for clinical psychotherapy and anesthesiology will be highlighted. **C20**

### 3.17 Temporal consciousness

**223 Time and Qualia** Daniel Beal <dmbearld@msn.com> (Psychiatry, University of Cincinnati, Cincinnati, OH)

Time is objective only as we entrain ourselves to an external objectification of time. We live in a world where scientists craft ever more precise atomic clocks, to which we are linked by mobile phones which then automatically signify precise time. However, even with this connection, the experience of time is fundamentally personal. Certainly if we are separated from time keeping devices, and are alone time is very individual and subjective. If we're in a crowd, or at a movie or lecture but inner directed in thought and attention, time can still be individual and subjective. Time meets all of Dennett's criteria for qualia subjectivity. However, time-as-qualia is different in some fundamental ways from the 'my experience of a 700 nm wavelength red may well be different from yours' more 'traditional' qualia example. Time and its quale have a more complex phenomenology than qualia related to other senses. What are some the aspects of personal time which are both time quale and distinct time phenomenology? An example of time qualia is attributed to Einstein, "Put your hand on a hot stove for a minute, and it seems like an hour. Sit with a pretty girl for an hour, and it seems like a minute. That's relativity." Of course it's not General Relativity; but it is a clear, if prosaic, example of time quale. Examples of subjective time phenomenology and qualia which are distinct include: 1) a dream which lasts 30 minutes of clock time but includes hours of days of experience; 2) tachypsychia in which someone in extreme danger finds that time slows down while the danger is intense, 3) Meditative states in which time seems to stand still. We will consider these and other aspects of time phenomenology and qualia

and compare these to more technical and scientific treatment of time. We will consider the idea of the Arrow of Time frequently associated with closed thermodynamic systems like steam engines. We will compare this to time's arrow in Prigogine's systems that are far from thermal equilibrium. Prigogine's systems are a reasonable model for all open biological systems and are a useful basis for thinking about thermodynamics and time in a biological context. It is common for theoretical physicists to claim time has no reality when time is not considered essential in their equations. Smolin, alarmed by this modern trend, has published *Time Reborn*, defending and supporting the existence of time in physics. I will argue that a theory of time needs to be based on the personal experience of time. Time qualia and phenomenology are more complex than other perceptions that have a qualia component. At the extremes of time phenomenology and qualia, there are distinct states that can be identified. These states are distinct from usual external perceptions of time. These experiences need to be mapped onto the objective world of consensual time and scientific considerations of time to fully define and understand the nature of time. **P2**

**224 “Happening” is a Distinct Percept and a Perceptual Illusion in the Flow of Time** Ronald Gruber, Richard A. Block, Professor of Psychology, Montana State U. <rgruberm@hotmail.com> (Clinical Assoc. Professor, Stanford University Medical Center, Stanford and S.F., CA)

Background: Our prior study (Gruber & Block, 2012, TSC) suggested that the flow of time has two components, a high level cognition of past-present-future and a low level flow of events (FOE). The best way to test the FOE hypothesis was to query participants in terms of their experience of “happening.” The findings suggested that the FOE is a frequency-dependent perceptual illusion for spatiotemporal events and temporal-only events. If only two visual stimuli are involved, the percept of happening is referred to as “dynamic change” (a subcategory of change detection). The present study was undertaken to examine the nature of the percept of happening and its characteristics including a comparison to the phenomenon of apparent movement. We review the evidence. Method and Results: If stimuli of an apparent movement series differ markedly from one another, the percept of happening is lost. We presented a series of markedly different stimuli with varying ISI (0.5 – 7.0 s). For spatiotemporal changes, the percept of happening was not lost, despite the physical impossibility of anything happening. For temporal-only changes, however, happening was often lost. A physical obstruction between stimuli can prevent apparent movement or cause it to by-pass the obstruction. We presented a series of stimuli with obstructions between them. Happening was still evoked to a large degree, despite the physical impossibility of movement. Apparent movement is modulated by the extent of attention. In our experiments, happening was modulated by attention when scene presentations were spatially shifted on the monitor. Finally, an auditory scenario was created from the notes of an instrumental tune. With increasing ISI the percept of happening was lost. Conclusion: Happening is a distinct percept. It refers to the perception of a transformation over the spatiotemporal or temporal-only gaps between a series of events. Happening is a percept with specific characteristics and has much in common with apparent movement: (a) both are illusory phenomena; (b) it is evoked at frequencies as low as 0.6 Hz; (c) it is not a visual percept but can be evoked by visual or auditory stimuli; it is arguably a dynamic quality for all percepts; (d) like apparent movement it is modulated when stimuli differ markedly or when there are obstructing features; and (e) like apparent movement, attention affects the strength of the percept. Our findings support the concept that the “richness of our visual world is an illusion” and extend it to the non-visual world. **C4**

**225 Predictive Anticipatory Activity: Examining the Evidence for Unconscious Prediction of the Seemingly Unpredictable** Julia Mossbridge, Marcia Grabowecky, Satoru Suzuki, Patrizio Tressoldi, Jessica Utts <jmossbridge@gmail.com> (Department of Psychology, Northwestern University, Evanston, IL)

If humans could activate the sympathetic nervous system before there are perceptual clues to an upcoming threat, this ability would confer a large survival advantage. Along these lines, a recent meta-analysis of 26 experiments published between 1978 and 2010 suggests that unconscious physiological processing occurs seconds before a person perceives a meaningful stimulus that should be, in all normal ways, unpredictable (Mossbridge et al. 2012; Mossbridge in press;

Mossbridge et al., in revision). We call this phenomenon predictive anticipatory activity or PAA. In a common protocol, a randomized series of arousing and neutral stimuli are presented while physiology is recorded continuously. Generally, psychophysiological data (e.g., skin conductance, inter-beat variability of heart rate) from 1-10 seconds before stimulus presentation are compared between the periods preceding arousing stimuli and those preceding neutral stimuli. The basic result arising from PAA experiments is that these pre-stimulus physiological measures are statistically significantly correlated with the emotional significance of the upcoming stimuli. It appears that most individuals are not consciously aware of these physiological differences, but the highly significant results of the meta-analysis suggest that they exist. Of course, a meta-analysis is only as good as the underlying data. In this talk, we will first present the methods of the meta-analysis and its results, then discuss several potential mundane explanations for the PAA effect such as selective reporting, p-hacking, order effects (especially expectation bias), and physiological filtering artifacts. Then we will point out that multiple replications from independent laboratories using the same protocol are necessary to further examine PAA, and discuss the critical experiments that we believe are essential to: 1) confirm the existence of PAA, and 2) shed light on the mechanism underlying PAA. Finally, we will briefly speculate on potential mechanisms underlying PAA and conclude that while the mechanism underlying PAA is not yet clear, it is certain to be consistent with natural physical laws. References: Mossbridge, J., Tressoldi, P., & Utts, J. (2012). Predictive physiological anticipation preceding seemingly unpredictable stimuli: a meta-analysis. *Frontiers in Psychology*, 3, 390.; Mossbridge, J., Tressoldi, P., Utts, J., Ives, J., Radin, D., and Jonas, W. In revision. Predicting the unpredictable: Critical analysis and practical implications of predictive anticipatory activity. *Frontiers in Human Neuroscience*.; Mossbridge, J. Physiological activity that seems to anticipate future events. In press. In *The Evidence for Psi*, edited by Ben Goertzel and Damien Broderick. **PL6**

**226 Consciousness, Presence and Time** Jose Ignacio Murillo <jimurillo@unav.es> (Philosophy, ICS, University of Navarra, Pamplona, Navarra Spain)

John Searle asserts that the essential trait of consciousness that we need to explain is unified qualitative subjectivity. However in this description, as in others, it is common to overlook a very precise trait of what we call consciousness: its special relation to time. In fact, conscious experiences always imply what we call presence independently of its content, but presence is an essential element of time. Moreover, most of our conscious experiences include an experience of time. But, what is the relationship of presence to time? Can it be defined without reference to it? Is it a part of time or not? According to the common scientific view, time is an objective reality outside the mind, whether it be a common property of the world in general, as in the Newtonian view, or a property of each body as in relativistic Mechanics. The difficulty with this position is that it is impossible to define time independently of a mind, because as Aristotle pointed, what is real is not time but movement, and time is a measure of movement. In fact, to measure movements implies to compare movements, but this is not possible without a mind. Thus, consciousness is an essential element of temporality and of our experience of time. But in all experiences of movement there is a now, an after and a before. What is the relationship of consciousness towards these three dimensions of time? Through the history of philosophy presence has been used to be considered the more relevant part of time, and there are even some philosophers who think presence as equivalent to reality. However, this implies to deny the reality of movement, as Parmenides states, or to accept that there is some kind of presence that can totally include past and future, as Hegel states. Heidegger, however, tries to avoid the independence and preponderance of present. For him present cannot be detached from past and future and the preponderance corresponds to the future. In this paper I examine these approaches in order to elucidate the relationship between consciousness, time, and reality. We have to address especially the independence of movement and time that seems to belong to conscious presence. How do we reconcile this feature with the properties of the physical world and the functioning of the living beings which embody it? To open a solution for this problem it seems useful to revise the concept of consciousness, and what its relation is to mental activity and to the singularities of conscious beings. (Bibliography: Aristotle, *Physics*; Dennett, D., *Consciousness Explained*. Boston: Little, Brown and Co., 1991; Husserl,



E. On the Phenomenology of the Consciousness of Internal Time (1983-1917). Trans. J. Brough. Dordrecht: Kluwer Academic Publishers, 1991; Polo, L., *Curso de teoria del conocimiento*, tomo 2. Pamplona: Eunsa, 1985; Searle, J. R., *Consciousness*, *Annu. Rev. Neurosci.* 2000. 23:557-578; Zahavi, D., Gallagher, S., *The phenomenological mind. An introduction to philosophy of mind and cognitive science*. London and New York: Routledge, 2008. **P2**

**227 Doing Time in the ‘Global Workspace’** Peter Raulefs <pr@qiqcs.com> (QIQCS and Stanford University, Santa Clara, CA)

Senses of time, including duration, past/present/future, rhythm, and simultaneity are salient cognitive features. Time is experienced as a stream of conscious events that integrate sensory, motor, and a variety of cognitive processes (James, 1890; Grondin, 2010). Many models have been developed and evaluated on conforming with behavioral findings and neurobiological data. No one model has been demonstrated to fully account for the available evidence. We therefore assume that multiple timing mechanisms are at work, and show how they can be implemented and evaluated in the neuronal dynamic global workspace (ndGWS) framework (Baars et al., 2013; Dehaene and Changeaux, 2005), and its implementation in the LIDA architecture (Baars and Franklin, 2007; Franklin, 2013). Focusing on interval timing in the range of 100s of milliseconds to seconds, proposed timing mechanisms roughly fall into the categories of dedicated vs. intrinsic timing (Ivry & Schlerf, 2008), and global vs. localized timing (Merchant et al., 2013). Also, models address different types of timing tasks (motor, perceptual, and cognitive timing). The approaches expand in various ways on the early pacemaker-accumulator/Scalar Expectancy Theory (Wearden, 2004) model, where discrete or continuous pacemakers emit signals integrated by accumulators into timing events stored in short-term memory, then compared with reference (long-term) memory for decision-making about actions. Evidence (Buetti & Macaluso, 2011) supports distributed timing mechanisms in cortical/subcortical structures. State-dependent models propose that time is differently encoded by stimulus modalities, and that time durations are encoded by previous events (state-dependent intrinsic models), or in terms of a common clock mechanism. Experiments have studied perceiving and estimating durations using procedures with a control (stimulus presented over a time interval) and a reproduction phase (e.g., subjects press buttons for estimated durations). For example, the procedure in (Buetti and Macaluso, 2011) shows that in perceiving and estimating durations, the procedure involves multimodal perception, awareness, attention, decision-making, and action – some of which are unconscious while others are conscious. By stepping in detail through this procedure in a tone duration reproduction experiment, with variations that introduce distractions and signal distortions, we see the key mechanisms of the ndGWS framework playing out over multiple steps covering both the control and the reproduction phase: Unconscious processes perceive a signal, bind it to the experiment context that dominates competing activities to gain GWS attention, and gain attentional consistency as other foci are pushed off the GWS. The GWS event is broadcast to create bindings with other signals from other modalities representing distortions and distractions, where the tone duration context again may win out (or not – e.g., a serious threat) due to prior conditioning and interaction with an implicit self. Supporting evidence identifies cortico-thalamic/subcortical regions performing these steps, where distributed neural assemblies dynamically form and decay, initiated by and communicating through recurrent/reentrant oscillations that have been partially identified for some of the above steps. This allows us to describe and compare timing models with ndGWS mechanisms, with key model parameters subject to tuning and experimental verification, and map the procedure into the “Cognitive Cycle” of the LIDA framework. **C19**

**228 The Plasticity of the Subjective Present: Assessing the Duration of ‘Nowness’** Wolfgang Tschacher, Claudia Bergomi; Fabian Ramseyer <tschacher@spk.unibe.ch> (University of Bern, Bern, Switzerland)

A necessary condition for a person to be conscious is ‘nowness’, i.e. the subjective present (SP). The SP may be accessed from an experiential perspective (such as becoming aware of the temporal flow of consciousness, e.g. in meditation) as well as from a quantitative perspective (e.g., estimating the duration of the SP in a standardized psychological task). Timing and time

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perception generally constitute implicit processes, which are often inaccessible to the individual person and largely unattended in everyday life. Research in this field, however, has shown that timing is involved in many areas of general and practical significance. Timing issues appear to be of considerable scientific interest in psychology and the science of consciousness, with potential value for clinical applications. First, we have developed several paradigms by which the SP can be estimated, and its associations with participants' state and trait properties analyzed. Our basic approach to the role of temporality rests on the binding processes by which different features are integrated in the cognitive system. Binding is an essential ingredient of, for instance, Gestalt perception. In a project on auditory Gestalt perception, we investigated auditory perceptual grouping in 30 schizophrenia patients\*. Patients' mean dwell times were positively related to how much patients were prone to auditory hallucinations. Dwell times of auditory Gestalts may be regarded as operationalizations of the SP; we found that patients with hallucinations had a shorter present. Other findings suggested that the SP may be modifiable by different degrees of mindfulness. Specifically, we currently study the potential SP plasticity in the context of mindfulness-based psychotherapeutic interventions such as mindfulness-based stress reduction and mindfulness-based cognitive therapy. It is the goal of this research to clarify if SP acts as a mediator, moderator, or marker of mindfulness-based therapy outcome. Second, we report on a recent elaboration of the SP relevant for dyadic interaction\*\*. We defined a duration measure of the 'social present' of a dyad by the duration of the temporal window within which the nonverbal motion streams of interactants are significantly correlated. This correlation, 'nonverbal synchrony', was assessed objectively using an automated video-analysis algorithm (Motion Energy Analysis, MEA) developed in our laboratory. Recent empirical trials have included 84 healthy dyads and 104 psychotherapy dyads. We found that the duration of the social present had an extension of around five seconds and longer durations were related to ratings of positive affect in the dyads. We conclude that temporal scales of oneness yield promising goals for future consciousness research in the clinical context: psychotherapeutic techniques may alter binding processes, hence the subjective present of individuals, and may affect the social present in therapeutic interactions and conversing dyads. \*Tschacher W & Bergomi C (2011). Cognitive binding in schizophrenia: Weakened integration of temporal intersensory information. *Schizophrenia Bulletin*, 37, S13-S22. \*\*Tschacher W, Ramseyer F, & Bergomi C (2013). The subjective present and its modulation in clinical contexts. *Timing & Time Perception*, 1, 239-259. C19

### 3.18 Intelligence and creativity

**229 A Study of the Effect of Lifestyle Choices on Spiritual Intelligence in Students** Bharat Agrawal, Unupam Satsangi; Dheeraj Chadha <bagrawal2011@gmail.com> (Electrical Engineering, DEI Dayalbagh Educational Institute, Dayalbagh, Agra, Uttar Pradesh India)

In this paper we discuss the effect different environments have on Spiritual Intelligence of individuals. The subjects in this experiment were college level students. The object of the paper was to demonstrate how different lifestyle choices affect spiritual intelligence. The hypothesis was that students who live a simple life devoid of intoxicants such as alcohol and illicit drugs would have greater spiritual intelligence than those who live a worldly life consuming intoxicants. The tool used was a questionnaire split in to two section one with polar questions and the other with scaled questions. The subjects in this study consisted of students from Dayalbagh Educational Institute in India and several different universities in America. The findings would allow us to demonstrate how environment affects Spiritual Intelligence. P1

**230 Entrepreneurial Intuition** Arsh Dayal, Vishal Sahni <deiarshdayal@rediffmail.com> (Faculty of Engineering, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Successful entrepreneurs are passionate innovators and risk-takers who have extraordinarily accurate hunches about the locus of new future business opportunities (La Pira and Gillin, 2006, Bradley, 2006). Streaks of entrepreneurial intuition are profoundly visible in the most successful entrepreneurs of our times such as Bill Gates, Steve Jobs, Warren Buffet, Dhirubhai Ambani, Azim Premji or even among certain business communities, such as Gujaratis in India.

They are passionate innovative risk-takers whose actions are informed by accurate intuitions about future business opportunities. Often such intuitive foreknowledge involves perception of implicit information about non-local objects and / or events. The intuitive basis of entrepreneurship is that part of entrepreneurial decision and action that is not based on reason or logic, or on memories or extrapolations from the past, but is based, instead, on accurate foreknowledge of the future. McCraty, Atkinson, and Bradley (2004) defined such foreknowledge of a future event as intuition, and viewed intuition as a process by which information normally outside of the range of conscious awareness is immediately sensed and perceived which could be in the form of dream, flash or intuition. Intuitive consciousness is altogether distinct from the ordinary knowledge obtained through the senses or through the processes of syllogistic reasoning. The scientists have already succeeded in mapping out some parts of the brain with reference to the functions they perform in regulating different organs of the body and our ordinary states of consciousness. But the knowledge which the present day science possesses with regard to the functions of the brain and its different areas, is unfortunately meagre. In addition to the different centres localized by the scientists, there are a number of other centres situated in the fissure between the two lobes of the brain. It is on the excitation of one or other of these centres that the gifted ones obtain flashes of intuition and peeps into the mysteries of the spiritual planes. Dayalbagh Educational Institute, where consciousness pervades all aspects of life, is the living embodiment of the innovative educational initiatives of Dayalbagh over the century long period and endeavours to develop entrepreneurial intuition among its graduates through the twin features of educational values and quality teaching, and involve initiatives like coop training and Virtual Incubation Centre. Even the Orchestrated Objective Reduction (Orch-OR) theory of consciousness recognizes a fundamental additional ingredient to our presently understood laws of Nature, which plays an important role at the Planck-scale level of space-time structure. The answer lies in the Spiritual System Theory Framework (Satsangi, 2013). Telepathy holds the answer at the next frontier beyond current status of teleportation or even, a possible 'all quantum teleportation' in future. References Satsangi P.S. (2013), 'Consciousness : Towards Integrating Art and Science of Inner Experience', Vision Talk, International School on Quantum and Nano Computing Systems and Applications (QANSAS 2013), DEI, Dayalbagh, Agra, December 1, 2013. **P1**

### **231 Physiologically-Active Amine-Secretion Correlates of Insight Experience** Noriko Hayashi, Takahumi Mizukuchi; Yoshi Tamori <hayashijohn3@gmail.com> (Nonoichi, Japan)

Creativity is supported by insight, imagination, and inspiration, which are called "three 'I' s for creativity". The present text is targeting the inspiration for explaining creativity. Creativity is a kind of altered or heightened states of consciousness (Sawyer, 2012), which are flow, transcendent, or the most aware-able states of our mind. In order to find fully creative answer, we have to be in a panoramic view of the world. Such a grasping-the-world view is essential environment in the creative mind as well as grasping-the-whole perception plays an important role of the consciousness. Though that comprehensive ability to understand the world is not necessarily important for animals, the creativity has been making that ability into advantageous tool for the evolutionary strategy. Creativity is surely one of the brain function as well as consciousness. To study the biological or/and physiological correlate of creativity (B/P-CC), making proper stimuli for the psychophysical experiment is the most important issue along with the neural correlate of consciousness (NCC). We have developed a hundred of problems requiring insight to solve them. The problems contains 3 Japanese two-letter words ("water route", "water field", and "water gate") which are using the common Kanji letter ("water" in a single letter for this example) and the letter is hidden. Each Kanji character plays a role as a word in English, since a single Japanese Kanji character has a meaning. This task is Japanese version of the RAT (Remote Associates Test). The original RAT was developed by Mednick (1962) to investigate creativity without requiring knowledge. Insight experience consists of three stages (stage 1: searching the solution, stage 2: "aha!" moment, stage3: joyance by the finding). When we solve a hopelessly difficult search problem, it is not so much proper way to stuck around a single idea, thus we have to unleash ourselves from the stuck idea in stage 1. In stage 3, the insight and/or finding itself is a reward stimulus for the brain. Those experiential stages are supported by neural states, which

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are modulated by brain-derived hormone: serotonin, dopamine, and etc. Such physiologically active amine secretion has been detected by a detected by a chromatographic technique using HPLC (High Performance Liquid Chromatography) in reversed-phase-method. HPLC enables us to detect/identify the existence of each component in blood plasma (a mixture of amines DA, 5HT, Ach, as such). Serotonin concentration in the blood plasma which is related to stage 1 during Kanji RAT is measured in high and low performance cases. Our measurement of serotonin HPLC shows weak tendency of high concentration in high performance case in stage 1 compared to low performance case ( $p=0.1$ ). Homovanillic acid (HVA) that is the metabolite of dopamine (DA) concentration as a reward signal in the blood plasma, 35 seconds after the finding of the answer for the problems, also examined. The result shows that task performance and HVA concentration, in stage 2/the beginning of stage 3, are not significantly correlated to each other. This research has been supported by NPO, Neurocreative Laboratory. **P2**

**232 Electroencephalographic Correlates of Insight Experience** Takahumi Mizukuchi, Noriko Hayashi; Yoshi Tamori <tmumadoshi@gmail.com> (Nonoichi, Japan)

Creativity is supported by insight, imagination, and inspiration, which are called “three ‘I’ s for creativity”. The present text is targeting the inspiration for explaining creativity. Creativity is a kind of altered or heightened states of consciousness (Sawyer, 2012), which are flow, transcendent, or the most aware-able states of our mind. In order to find fully creative answer, we have to be in a panoramic view of the world. Such a grasping-the-world view is essential environment in the creative mind as well as grasping-the-whole perception plays an important role of the consciousness. Though that comprehensive ability to understand the world is not necessarily important for animals, the creativity has been making that ability into advantageous tool for the evolutionary strategy. Creativity is surely one of the brain function as well as consciousness. To study the biological or/and physiological correlate of creativity (B/P-CC), making proper stimuli for the psychophysical experiment is the most important issue along with the neural correlate of consciousness (NCC). We have developed a hundred of problems requiring insight to solve them. The problems contains 3 Japanese two-letter words (“water route”, “water field”, and “water gate”) which are using the common Kanji letter (“water” in a single letter for this example) and the letter is hidden. Each Kanji character plays a role as a word in English, since a single Japanese Kanji character has a meaning. This task is Japanese version of the RAT (Remote Associates Test). The original RAT was developed by Mednick (1962) to investigate creativity without requiring knowledge. Insight experience consists of three stages (stage 1: searching the solution, stage 2: ‘aha!’ moment, stage3: joyance by the finding). When we solve a hopelessly difficult search problem, it is not so much proper way to stuck around a single idea, thus we have to unleash ourselves from the stuck idea in stage 1. In stage 3, the insight and/or finding itself is a reward stimulus for the brain. Those experiential stages are related to the several brain areas (Left Parietal Area: P7, Anterior Frontal Area: AF3/AF4). (Jung-Beeman et al., 2004; Kounios et al., 2006) The names of electrode position, P7, AF3, and AF4 are based on international 10-20 system. Electrode P7 is considered to correspond to the posterior middle/superior-temporal gyri (M/STG). Electrodes AF3 and AF4 are considered to correspond to the anterior cingulate cortex (ACC). We are interested in a threshold for the neural activity modulated by a hormonal effect. Therefore, all the potentials are averaged over more than 30 trials. Our results show P7 positivity in 70msec and ACC positivity in 250msec after the response of the moment of the insight. According to MEG study for an insight task, insight experience contains separate processes for the detection (unconscious finding) and the awareness (conscious finding)(Tsuda et al. 2011). Our P7 activity in 70msec is considered to be related to the unconscious part of the insight. ACC activity could be related to the conscious part of the insight. This research has been supported by NPO, Neurocreative Laboratory. **P2**

**233 Free Universe Model: The Nature of Creativity in Man and Our Universe** James Tagg <james@taggs.com> (Crockham Hill, Kent United Kingdom)

Many scientists believe humans are simply flesh and blood computers with an increasingly tenuous hold on the title, ‘most intelligent being on the planet’: The imagined future is computers grow in power until they overtake us, and we end up as their pets! I do not share this view. It is

true computers have become very capable in recent years but humans are, on the face of it, quite different to machines: we display emotional intelligence, we learn by experience, we communicate using body language, we create and, at least, I have free will... Simply observing these qualitative differences is not sufficient to prove a difference between computers and brains, but computer science does recognise theoretical differences. Alan Turing placed a hard limit on the ability of computing machines to automatically discover theorems through his proof the halting problem has no solution. Many people find Turing's result paradoxical: It says computers cannot automatically solve general problems yet they clearly do so some general things – I am typing this on a word processor that was not originally designed to edit this abstract. It has performed a general task. Does this show a degree of creative intelligence? No, this task is purely mechanical. Over the years Turing's work has been expanded to show which things can be computed mechanically and which cannot: There is a boundary, 'a logical limit' that is currently being plotted. In computer science this limit is described by Rice's Theorem – any non-trivial property of a computer program is non-computable. In mathematics non-computability depends upon the exact problem: Hilbert's 10th problem, regarding Diophantine equations, has a logic limit at 'for all, there exists, for all', and non-computability also applies to other fields. Sir Roger Penrose has shown it can be applied to recreational mathematical puzzles and in this paper I will apply the principle to the composition of music. The existence of creativity within our Universe leads to important consequences for the structure of that Universe. To be creative we must process information within our brains using non-computable and therefore non-deterministic 'software'. Such 'software' must run on non-deterministic 'hardware' through all the layers of abstraction, otherwise you could simply examine the more abstract model and determine what the lower layers are going to do. If humans run creative 'software' within their brains, the 'hardware' of the Universe must be non-deterministic. When I wake in the morning and decide to be creative, my first task is to exercise my free will to choose what to work on: Creativity and free will are two sides of the same coin. A Universe that supports creativity must be non-deterministic and that feature gives the Universe its ability to support free will. **P2**

### 3.19 Miscellaneous

**234 Consciousness Quotient as a Predictor of Executive Functioning** Sona Ahuja, Sadhna Sharma <sonaahujadei@gmail.com> (Pedagogical Sciences, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Consciousness is evolving as a single solution to a large number of academic as well as behavioral problems. It has been found to predict academic achievement (Brazdau & Mihai, 2011) and is also related with creativity, intelligence, perception, receptivity, attention, comprehension (Sharma, 2008 & Grossberg, 1999) and transformational leadership qualities (Chauhan & Sharma, 2013). Presently, it is a debatable issue whether to include consciousness, which has been declared as loudest mental phenomenon (Baars, 1997) in the domain of executive functioning or not. Executive functioning is associated with higher order mental abilities which are required to connect past experiences with the present ones and which are required to strategically manage oneself and one's resources. Executive functions including mental abilities such as, working memory, reasoning ability, problem solving, inhibitory control, task flexibility and cognitive flexibility are significant factors for students' learning and academic achievement. The present empirical study underlines the correlation and causal relationship between consciousness and two important dimensions of executive functioning – cognitive flexibility and self-regulation. The strength of functional relationship among these three reveals the predictive ability of consciousness for cognitive flexibility and self-regulation through regression analysis. **P2**

**235 Are Delusions Really Beliefs? Approaches Towards Describing the Ambiguous Mental State** Emily Barrett <barrett.emily@gmail.com> (Philosophy, Sunset Beach, CA)

Delusions are complicated mental states. They are clinically referred to as pathological beliefs, but they do not always seem to satisfy conditions on belief typically employed by philosophers. For example, consider an individual with schizophrenia who claims that thoughts are being in-

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serted into her head. This is the only claim she makes; she takes no action to find out why or how this bizarre occurrence takes place, nor does she exhibit any particular distress about the thought insertion. Does her claim really reflect a belief? Whether or not delusions are beliefs is a central question in Philosophy of Psychiatry, and also has implications for clinical practice. After all, how delusions are described will have important implications for how methods of treatment are conducted. For philosophy, delusions challenge traditional conceptions of belief, and demand the exploration of other mental states such as imaginings, metacognition, and subpersonal inference. Delusions are a rich territory for philosophy of mind and clinical theory alike. The view that delusions are beliefs, known as the doxastic conception, describes delusions in terms of an expanded conception of belief and rationality. Alternatives to the doxastic conception provide different ways of thinking about delusional mental states. Gregory Currie (2000) suggests that delusions are more like imaginings that are mistaken as beliefs. G. Lynn Stephens & George Graham (2004) propose that delusions are not beliefs, but rather higher-order psychological stances or attitudes towards lower-order mental states. Jakob Hohwy (2013) claims that delusions are more like illusions, products of faulty perceptual inference. I will explicate and evaluate both the doxastic conception, as well as its alternatives. Broadly, it will be a presentation of folk psychological mental states and an evaluation of their efficacy in describing a real psychiatric phenomenon. I will also propose a new view towards delusions that unites folk psychological and scientific explanation, in an attempt to forge a small bridge from conscious experience to its neural correlate. **P2**

**236 A Novel Machine Intelligence Based Approach to Personality Classification** Swanti Devguptapu, Prem Sewak Sudhish <swanti@alumni.stanford.edu> (Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Several personality tests proposed in the available literature attempt to cast individuals into pre-determined personality types, usually based on the individual's response to a battery of questions. The most well researched and significant among these is the Myers-Briggs Type Indicator (MBTI) assessment based largely on Carl Jung's theory of psychological types. This test consists of several forced choice questions, the responses to which are scored to classify individuals into one of the sixteen types created by four dichotomies. While the scoring process allows for clarity of preference in each dichotomy, the differences between the reported type and the individual's own perceived type during the best fit exercise is more than a comfortable level, leading to criticism questioning the validity of the test. Several variants and other tests have striven to address this issue through a variety of proposals, including increasing the number of classes to the order of hundreds. This paper advocates that the computation of scores using rather elementary linear techniques is insufficient to address the complexity in human personality types and proposes the use of non-linear models for classification based on standard machine learning techniques. It illustrates how neural networks or support vector machines that consider the individual's response to the forced choice questions as feature vectors being input to the non-linear system would achieve a better classification accuracy and further suggests the use of collaborative filtering in assessing personality types based on partial data collected from individuals. The paper concludes with a proposal for assessment of validity and effectiveness of the several personality tests themselves. **P1**

**237 What Explains Consciousness? Or, What Consciousness Explains?** Don Dulany <ddulany@illinois.edu> (Psychology, University of Illinois, Champaign, IL)

There has been an influential confusion of theoretical assertions according causality to consciousness with metaphysical assertions of nonmaterial ontology and indeterminism. Confusion begins with Watson's famous identification of "consciousness" with the "soul of religion." Consciousness as the subject of Structuralism and Gestalt psychologies was then rejected in favor of S-R Behaviorism. Cognitivism avoids the ideologically objectionable on Computational views with consciousness a noncausal emergent, and on Information Processing views with consciousness only an attentional subsystem of "working" memory. So "What explains consciousness?". With neurocognitivism, historical aims carry over in attempts to explain it—or "explain it away"—as identity with or produced by neural processes (Chalmers' "Hard Problem"). Or identification of its neural correlates (Chalmers' "Easy Problem"). But imaging specific conscious states given



neural complexity and current technology – “Quanta to qualia”, Shannon’s “information” or Bren-  
tano’s “intentionality”, simulation as duplication or model? Conclusions at present: Consciousness  
is coordinate in some way to some degree with brain processes. Implication for classical and  
modern mind-brain views. Or...”What consciousness explains”? Increasing number of critiques of  
evidence for “cognitive unconscious” in various paradigms: failures of replication and method-  
ological biases. On mentalistic metatheory, conscious states are unique carriers of symbolic rep-  
resentations in different modes – the present in perception, the past in forms of remembrance, and  
the future in anticipation, hopes, etc. Any of it can be imaginative. Mental episodes can be deliber-  
ative (“explicit”), interrelating propositional contents, or associative-activational (“implicit”), with  
sub-propositional contents. Any of these mental states and mental episodes can be represented in  
higher-order awareness. The nonconscious are the nonsymbolic interrelating operations within  
mental episodes, neural networks of inactive memory, and sensory and motor transductions.  
Phenomenal reports can provide strong interrelationships, in third-person data language. Theory  
of causal relations among conscious states, including the volitional, entail neither a nonmaterial  
ontology nor free will in the sense of indeterminism where theoretical views strongly contrast, the  
answer lies in a logic of competitive support: Bayes, Duhem-Quine, network logic. Experimental  
examples. What consciousness explains can provide the adaptive explanation of consciousness  
(Dulany, 2008, 2009, 2011, 2012). Dulany, D.E. (2012) How should we understand implicit and  
explicit processes in scientific thinking? In R.W. Proctor & E.J. Capaldi (Eds.) *Psychology of  
Science: Implicit and Explicit Processes* (pp. 197-227). New York, NY: Oxford University Press.  
Dulany, D.E. (2011). What should be the roles of conscious states and brain states in theories  
of mental activity? *Mens Sana Monographs*, 9(1), 93-112. (Keynote address to the International  
Seminar on Brain, Mind, and Consciousness, Thane College, Thane, India, January 13, 2010)  
Dulany, D.E. (2009). Psychology and the study of consciousness. In T. Bayne, A. Cleeremans, &  
P. Wilkens (Eds.) *Oxford Companion to Consciousness*. (pp. 540-544) Oxford, England: Oxford  
University Press. Dulany, D.E. (2008) How well are we moving toward a most productive science  
of consciousness? *Journal of Consciousness Studies*, 15(12). 77-100 (Commentary on 2008  
Tucson Conference). C11

**238 Exploring Consciousness through Personality Tests** Sudhir Sahni, Dr. Renu Sahni <sud-  
hirsahni@gmail.com> (Dayalbagh Educational Institute, Agra, India)

Consciousness is awareness experienced at three levels – physical level, mental level and spir-  
itual level. At the physical level, consciousness takes the form of information as produced by the  
brain, and it is brain activity that scientists are essentially measuring for deducing the concept of  
consciousness, using tools such as EEG, fMRI etc. Beyond this physical world is the mental world  
where consciousness takes the form of cognition which psychologists try to decipher, and still  
beyond the mental consciousness is the spiritual consciousness which philosophers try to surmise  
and conceptualize. The science pertaining to mind and the science pertaining to spirit transcend  
the physical world, and hence cannot be explored using the tools employed in investigations by  
physical sciences. The tools for probing the mind and consciousness are provided by psychology,  
such as the various personality test scales. Many personality test scales are available, such as  
Gray-Wheelwright Jungian Type Survey (GWJTS), Myers Briggs Type Indicator (MBTI), Keirsey  
Temperament Sorter (KTS), Singer-Loomis Type Deployment Inventory (SL-TDI), Socionics  
Schemes, etc. Most of these test scales are based on the typological theory proposed by Carl Jung  
in 1921, according to which psychological types are based on four functions (Thinking, Feeling,  
Intuition and Sensing) and two attitudes (Extraversion and Introversion). GWJTS is one of the  
earliest of these tests, but is primarily of interest in analytical psychology. The MBTI is the most  
widely used and popular commercially available test which uses a forced choice type response to  
questions resulting in 16 personality types. The KTS developed by David Keirsey is a self-as-  
sessed questionnaire closely associated with the MBTI. SL-TDI is based upon the hypothesis that  
people are not of one particular type, but possess varying levels of each attitude and function, re-  
sulting in eight possible combinations. Socionics was developed by Aushra Augusta, a Lithuanian  
researcher and is widely popular in post-Soviet states and Eastern Europe, and is only now being  
accepted in the West. Its emphasis is on inter-type relationships, and in addition to tests, uses

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several other methods such as interviews and questionnaires for determining a personality type. Research is required to determine how well these different tests model the human mind and their utility in consciousness research. **P1**

**239 Emotional Quotient (eq) and Spiritual Quotient (sq)** Anirudh Kumar Satsangi, Ankita Satsangi; Achraj Satsangi <anirudh.jenna@gmail.com> (Director Office, DEI Dayalbagh Educational Institute, Agra India, Agra, UTTAR PRADESH India)

Quotient is a ratio. Emotional quotient (EQ), is a measurement of a person's ability to monitor his or her emotions. The ability to assess and affect situations and relationships with other people also plays a role in emotional intelligence. This measurement is intended to be a tool that is similar to intelligence quotient (IQ). There is no standard of measurement of EQ so far. There is also no standard of measurement of SQ. I have attempted to derive mathematical formula each for EQ and SQ. Emotional quotient may be expressed as the product of wisdom (w) and intelligence quotient (IQ), and spiritual quotient may be expressed as the ratio of parasympathetic dominance (PSD) to sympathetic dominance (SD). Mathematical formula of spiritual quotient and of emotional quotient will certainly facilitate further research in the area of spiritual science. Spiritual quotient leverages emotional quotient and intelligence quotient as well. **P1**

**240 Gestalt Thinking: Bridging the Chasm** Kang Zhou <kangz@email.arizona.edu> (Architecture, The University of Arizona, Tucson, AZ)

The way we treat science and scientific method will in turn influence the way we understand the world. The traditional scientific branches, especially those being widely used in engineering categories like transport phenomena, thermal dynamics, fluid dynamics and kinetics, break down an object or system into tiny pieces of particles, each of which is governed by a group of governing theories and correlations, and thus that object, or systems are supposed to be the sum of the these separated, non-relevant groups of disciplines, which makes a target of analysis extremely complex, with increasingly required precision. In contrast, the systems of Mother Nature are governed by many disciplines that are highly relevant, highly similar, which may seems when analyzed quantitatively, but remain analogous and repetitive in multiple scales, organizing principles and patterns. The thermal regulation of honey bee colony, the fractal structure of a flower caps, and the ubiquitous proportion of phi in plants, animals and humans, are just three examples revealing the vast inner consistency of the order of nature. On the other hand, over a wide range of indigenous people across the continents regards rocks and mountains as conscious living entities; Chinese Taoism treats life as being generated by the very basic symmetric energy of Yin and Yang. Indian culture depicts the energy system of human bodies as Kundalini, being represented by certain patterns and geometries. All of those aforementioned ancient legacies treat nature and the theories of nature as simple symbolic prototype, which generates consistent orders over all forms, dimensions, material, and elements in an elegant way without conjuring up extreme complexity. The kind of archetype of nature also exists in many scholars' proposals, like Arne Naess' Ontology Gestalt. Through architectural and engineering design, our research reveals that gestalt thinking and prototypical approach toward science can potentially bridge the chasm between what has been depicted by science as objective facts, and what has been regarded as subjective feelings rising from human consciousness that are rejected by today's main stream science. We further argue that we, as the co-creator and participants of today's science, instead of being dominated by the products of science, need a new perspective and approach to comprehend science, and utilize it in a wise and benevolent fashion. In order to do so, the language we use in describing and perceiving the science, and the deeply underlying prototype of science need to be summarized, hypothesized and become again the philosophy to guild humans' scientific activities and other creative activities. **P2**

**241 Genetic Encoding of Behavioral Knowledge: Enabling Maternal Care By Ephrin-a5 Gene** Renping Zhou, Michal Sheleg; Ryan Grippo; George Wagner <rzhou@rci.rutgers.edu> (Chemical Biology, Rutgers University, Piscataway, NJ)

It has long been debated whether nature or nurture determines human behavior. If it were all nature, we would be incapable of changing our actions through social modifications such as educa-

tion, reward and punishment. In contrast, the opposing view of nurture claims that our behavior is determined by material and social environment. Although it is generally agreed that both intrinsic qualities (nature) and the environment (nurture) play critical roles in shaping individual behavior, it is not clear at present the kind and extent of contributions by each. This question can be illuminated, at least to a certain degree, by empirical investigations using animal models. If complex behavioral traits can be altered through defined genetic changes to the organism maintained in the same controlled environment, one could conclude that such a behavior is primarily determined by the intrinsic properties of the organism, in other words, by nature (genes). This approach can be used to identify the type and extent of animal behavior traits that are controlled primarily by genes. We have recently discovered a mouse model with which we examined the mechanisms by which maternal care behavior patterns are determined. The mouse line was generated previously to study the function of a molecular signal, ephrin-A5, that is present in several brain structures during mouse embryonic development and in adult. Ephrin-A5 gene was specifically inactivated by making a deletion of its coding DNA. The resulting mice are morphologically normal and showed no apparent deficiencies in motor, feeding and mating activities. However, we observed that the pups from the mothers missing this gene (ephrin-A5<sup>-/-</sup>) have a higher mortality rate during early postnatal period. Consequently we initiated an analysis to examine the maternal care behavior of these mice. A number of stereotypical maternal care behaviors normally exist in mice including nest making, pup retrieval, licking and nursing. We examined the effects of ephrin-A5 inactivation in mice on these maternal behaviors by quantifying the time required to make nests and the quality of the nest. Nest quality was judged by how well the cotton pads provided were shredded and organized into a round enclosure. In addition, we compared the speed by which ephrin-A5<sup>-/-</sup> mothers retrieved scattered pups. All experiments compared age matched ephrin-A5<sup>-/-</sup> and wild type control mice born to the same mothers and maintained in the same laboratory environment, so that the only influence would be from the genetic differences. Our studies showed that the loss of ephrin-A5 gene resulted in a severe reduction of the ability of these mice to build nests and collect new born pups, while no significant difference in maternal aggression against intruding males between these mice and the wild type control were observed. These observations suggest that some of the maternal care behavior in mice is predetermined by genes without the need of learning experience, providing support that some behavior knowledge can be genetically encoded, although it is not clear at present whether or to what extent human maternal care behavior are also genetically encoded. **P2**

## 4.0 Physical and Biological Sciences

### 4.01 Quantum physics

**242 Orchestrated Reduction 20 Years Later** Uziel Awret <awretu@gmail.com> (Physics, Trinity Washington University, Falls Church, VA)

Despite OR's philosophical advantages such as, setting its epistemic limits from the inside, providing a sound pan-proto-experientialist theory and despite its ample biological support it has always faced deep skepticism because it suggested that the physics of consciousness depends on the Planck scale. What the detractors found so highly implausible about OR is that the physics of the brain which did 'perfectly well' with the Hodgkin-Huxley model should suddenly be effected by Planck scale processes. After all, even nuclei seem to have very little to do with the physics of the brain so why should Planck scale processes 20 orders of magnitude further removed,  $10^{\exp(-15)}$  meter to  $10^{\exp(-35)}$  meter, effect the brain? Worse, the field of string theory and the Planck scale had absolutely nothing to do with Condensed Matter Physics or CMT (itself a quantum field theory). If bulk biological tissue harbors Planck scale processes that determine the outcome of macroscopic events than CMT should reflect that so we could ask whether similar physics exists somewhere in the brain. Despite fascinating connections being established between the physics of Microtubules and the two-di Dirac Hamiltonian these do not reach the Planck Scale. However, a quiet revolution in CMT is changing all that and today we can say with certainty that there are deep connections between CMT and the Planck scale. As a matter of fact there are problems in

CMT that can only be solved using these connections. In this paper I will trace this revolution from a 2007 paper on the Quantum Nernst effect in Cuprates (two-di high temp. superconductor) in which an intractable two-di problem forced the authors, in an act of desperation, to transform the problem into a three dimensional problem using Maldacena's Holographic principle or the CFT (conformal field theory)-ADS (anti-de Sitter spaces) duality. This is a principle that shows that any system that is described by a massless conformal quantum field theory in  $n$  dimensions is completely equivalent to a string theory in an anti-de Sitter space with  $n+1$  dimensions with mass but with a singularity. (Our universe is said to be two-di, talk about multiple realizability.) To their utter surprise the problem could be done on one page. What was remarkable is that they used a result from Planck scale physics. Today use of this duality is becoming an important tool in CMT (see, 'Strange Metals' in the January 2013 edition of Scientific American.) where calculating the time evolution of massively entangled electronic states is intractable in 3 dimensions but trivial in the dual 4-di space. What is quite strange here is that the degree of entanglement in the 3-di space (or the two-di space in the Nernst effect case) is equivalent to the temperature of the black hole associated with the anti-de Sitter Space. I will end with hydrophobic pockets, extended electronic orbitals and the strange philosophical conclusions that we could draw if massively entangled electronic states were to exist in say, the 2-di Claustrom (Koch, Walter Schneider.) C24

### 243 A Possible Source of Proto Consciousness in Quantum Vacuum Mani Bhaumik, MD <bhaumik@physics.ucla.edu> (Los Angeles, CA)

Consciousness is both an instrument of perception and a perceived entity itself, which makes it qualitatively very different from anything else we know. It would be cogent to say consciousness is aware of itself, and as such could be a fundamental element of the universe. The stunning scientific discoveries of the twentieth century reveal that the primary source of at least everything physical is embedded in the quantum vacuum at the very foundation of our universe. Unfortunately, we still have not been able to make a distinct accommodation for consciousness as an essential feature in this current scientific world view. However, a possible source of proto-consciousness may be located in the very underpinning of our universe. Quantum entanglement of this proto-consciousness with the large scale quantum coherence, acting broadly across considerable region of the brain sustained by the ubiquitous microtubules, as suggested by Hameroff and Penrose, could evoke the phenomenon of consciousness. By far, the most phenomenal step forward made by QFT is the stunning prediction that the quantum fields, which are the primary ingredient of everything in this universe is present in each element of spacetime of this immensely vast universe. We also comprehend that the primary quantum fields are always alive with quantum activity. These activities comprising the quantum fluctuations occur at mind-boggling speeds some with a typical time period of 10-24 second or less. In spite of these infinitely dynamic, wild fluctuations, the quantum fields have remained immutable possessing the same magnitude, essentially since the beginning of time and throughout the entire visible universe containing regions, which are too far apart to have any communication even with the speed of light. This is persuasively substantiated by experimental observations. The most intriguing question is what keeps the immutability of the fields intact in each element of spacetime to begin with. Does it not suggest the existence of some sort of self-referral scheme that is responsible for maintaining the fidelity of the quantum fields in spite of their frenetic fluctuations? Such a self-referral is an inherent feature of the strongly self-interacting dynamics of the non-Abelian quantum fields. For example, the non-Abelian gluon field strongly responds to its own presence. The self-interaction feature of the quantum fields would be much more pronounced at fundamentally shorter distances, where gradually increasing unification of the fields is expected to occur. The robust self-interacting feature resulting from unification near Planck's dimensions can be imparted to larger dimensions because of quantum entanglement of the fluctuations making them quantum coherent in a universal scale. This attribute of self-interaction, self-coupling, self-organization or self-referral is also the hallmark of awareness or proto-consciousness. Penrose proposes that our brains have somehow contrived to harness this as yet undiscovered physical process embedded in primary reality that is responsible for evoking our own awareness. It would be plausible to consider this unknown attribute to be the proto-consciousness that is apparently associated with the quantum fields for keeping their immutability for all times in spite of their fierce fluctuations. C8

**244 Quantum Bridge Between East and West Views on Brain, Mind and Reality** Gerard Blommestijn <gblomm@gmail.com> (Amstelveen, Netherlands)

There are striking correspondences between the quantum mechanical (qm) reduction process on the one hand and the acts of perception and choice on the other. First: they both have an intimate relationship with consciousness. Second: by means of qm entanglement the reduction process achieves instantaneous interconnection between distant parts of a system without signal transduction. Thereby it binds separate parts of a system together to one unity. This is just like in perception and choice, where all parts and aspects of the whole phenomenal perspective are bound together to the unity of the one consciousness that experiences and chooses it. Third: the outcome of the qm reduction process is essentially unpredictable or non-deterministic, which corresponds to the non-robotic freedom of choice that an organism has within the deterministic probabilities dictated by the laws of nature. Fourth: the fact that in the qm reduction process there is no energy flowing, means that the original argument in favour of materialism, namely that energy has to flow between mind and matter (in case of an immaterial mind) is no longer valid. The above considerations lead to the far reaching view that since quantum mechanics we can identify its reduction process with the ultimate act of perception and with the originating step in a chain of processes that lead to an action. It also means that it is again allowed to think of the essence of the mind (the mind's I) as ontologically independent of its material substrate, the brain. This corresponds to the Eastern view that the essence of reality is the ultimate I, the Self, that which experiences and chooses everything in all of reality, and which cannot be perceived. In the scriptures of India this consciousness principle is called Brahman (the I-ness of all of reality) or Atman (the I-ness of a human being) and it is explicitly stated that these are the same: Atman = Brahman, and that this is the most subtle substance existing throughout the universe. In my presentation I will also make a comparison with the views of the Penrose-Hameroff paradigm, in which the Orchestrated Objective Reduction (Orch OR) is not the entirely random process of standard theory, but acts according to some non-computational new physics. The idea is that consciousness is associated with this (gravitational) OR process and that any individual occurrence of OR would be an element of proto-consciousness. The elements of this proto-consciousness are intimately tied in with the most primitive Planck-level ingredients of space-time geometry. These presumed ingredients at the absurdly tiny level of 10-35m and 10-43s can be seen as corresponding to the eternal ideas or forms of the Platonic realm. Also Whitehead proposes eternal objects that form, together with actual occasions (i.e. drops of experience) the ultimate fundamental categories of existence. As potentials these eternal objects do not change, and any actual occasion receives its characteristics from the ingression of eternal objects. **P2**

**245 Nonlocal Consciousness: The Spirit Paradigm Applied to the Model of the Quantum Brain** Celia Maria Dantas <cdantas@ufg.br> (Instituto de Física, Universidade Federal de Goiás, Instituto de Física, Goiânia, Goiás Brazil)

R. Penrose and S. Hameroff have proposed a model to the consciousness. According to this model, the consciousness would be the quantum computation result that occurs in the microtubules which form the neurons cytoskeleton. They used the idea proposed by H. Froehlich, that biological systems can exhibit similar state to the Bose-Einstein condensation at room temperature, which is crucial for the consciousness emergence. It means that, according to this model, the consciousness is strictly a product of the physical brain. On the other hand we propose the consciousness corresponding an aspect of reality outside physical law. To show this we use the spirit paradigm. According to this, every part of our body and therefore every part of our brain, has a pair correlated made of psyche matter, which is connected to physical body atom to atom, molecule to molecule. Considering this, we will show that the consciousness emerges with (and only with) the non-local interaction of electron pairs canonically conjugate: physical and spiritual electron, which together form a boson, which are described by the Bose-Einstein statistics and can therefore evolve into a Bose-Einstein condensed which is crucial for the consciousness emergence in the Penrose and Hameroff model. With our model it is not necessary the existence of biological condensed as proposed by Froehlich, which has not yet been generated in the laboratory. Also it

justifies the need to have a spirit to occur the consciousness. Only the physical electrons forming a pair with a respective spiritual electron can form bosons capable to evolve in the Bose-Einstein condensate. **P2**

**246 Mental Control of Single Electron Spin** Markus Fromm <markus.fromm@iacr.eu> (Institute for Applied Consciousness Research, Heidesee OT Kolberg, Germany)

In order to measure intentional influence on a single electron's spin, an ion trap and a sophisticated laser beam is being set up. The aim of this work is to hold a small number of magnesium ions in an ion trap and to see if subtle fields or mental intention can provide the 0.8 – eV needed to flip the spin of the single valence electron in the ground state. In this presentation I report on the progress of the experimental setup and the scope of the experiment. The ion trap is built in the linear Paul-trap design. A tuned high frequency voltage is applied to four parallel stainless steel rods which are in 3 sections. The outer sections are used to create the ions. Magnesium atoms from an oven are crossed with an electron beam to produce ions by electron impact ionization. A tank circuit was built to apply up to 500 AC volts to the rods of the ion trap. The operation frequency is 6 MHz. In order to detect the spin flip and to cool the ions, a laser beam will be guided through the center of the trap parallel to the rods. The laser will be tuned to 279.6 nm to cause the magnesium ions to fluoresce. The ions will be excited by the laser photons from the 3s1/2 ground state to the 3p3/2 state. An external magnetic field of 5 to 10 mT is applied to the center of the ion trap by a pair of Helmholtz coils. The laser beam will have a bandwidth of 1 MHz at 279.6 nm. If the spin of the magnesium ion's valence electron is flipped, then the fluorescence will cease. The aim is to cause five magnesium ions to fluoresce for 12 hours. For this an ultra high vacuum is needed. The intent of the experiment is to then apply subtle fields and/or mental intention to the ions to probe if these effects will flip the spin of the electron. The build up of the experiment is well on its way. The ion trap and the tank circuit were completed. The vacuum chamber has been assembled and ultra high vacuum has been achieved. As soon as the Setup is completed we will begin with the experiments where volunteers try to flip the spin. There will be many practical applications. **P2**

**247 A Holistic Scientific Exposition on Free Will and Quantum Wave Function Collapse** Gurpreet Gill, Ankita Mathur, Purnima Sethi <daljeet.gill@aexp.com> (Agra, Uttar Pradesh India)

Consciousness and its attribute of Free Will or intention have been closely linked to the quantum measurement problem. In this study, we attempt to present a holistic view on the concept and modus operandi of Free Will and its much intriguing role in collapse of the quantum wave function adopting a theoretical, experimental and psychophysical approach. We put forward a scientific exposition on the role played by free will in influencing the processes of the physical world based upon the principles of quantum decoherence and the model proposed by Tiller of the two orders of EM gauge symmetry extending in the experimental and experiential space including the highest order dimension of the fundamental particle of spirit. The key idea promoted by quantum decoherence that realistic quantum systems are never isolated, but are immersed in the surrounding environment and interact continuously with it proves to be of much relevance here. Superposition of systems in macroscopically distinct positions will rapidly become entangled with the environment and superposition of states with macroscopically distinct momentums will very rapidly evolve into states of macroscopically distinct positions. Taking an experimental approach to the problem, we attempted to monitor the effect of intent and focus of attention through internal contemplation of the Radhasoami name by a practitioner of Surat Shabda yoga using the double slit experimental setup on the collapse of the quantum wave function on similar lines as Radin et. al. We also adopted a psycho-physical experimental approach and observed an interesting hierarchical order link between the determinism posed by the higher order divine will and our free will exercised in the physical world. We conducted a survey on a set of 30 subjects half of which had deep-rooted faith in a spiritual adept and engaged regularly in meditational practices to measure their levels of volitional effort (will) exercised in different situations in life and to gauge the role of their intuitive consciousness in the decision making process. Based on the various approaches adopted, we propose a quantum hierarchical (holistic) model of Free Will operating through the



hierarchy of Spiritual-Mental-Physical planes as a subset of HOT-SCANE proposed by Most Revered Prof. P.S. Satsangi. A quantum spiritual force field may be associated with each plane and the extent of mutual coupling of these force fields may be attributed to the meditational practices of the practitioner and surrender to spiritual adept. Through this study we would thus like to assert that the spirit entity is the one ultimately powering our free will and our conscious decisions and that intention induced quantum wave function collapse could be attributed to the interaction of the quantum spiritual force field with matter. **P1**

**248 Quantum Vibrations In Microtubules – ‘Orch OR’ – 20 Years On** Stuart Hameroff  
<hameroff@email.arizona.edu> (Anesthesiology, MD; Psychology; The University of Arizona, Tucson, AZ)

Prevalent views ascribing consciousness to complex computation among integrate-and-fire brain neurons fail to account for memory, binding, the ‘hard problem’, real-time conscious control and (arguably) EEG rhythms. On the contrary, the Penrose-Hameroff theory of ‘orchestrated objective reduction’ (‘Orch OR’), introduced in the mid 1990’s, suggests consciousness and cognition derive from deeper-order, finer scale quantum vibrations in microtubules during integration phases inside integrate-and-fire brain neurons (e.g. within dendrites/soma of pyramidal neurons). According to Orch OR, superpositioned states of microtubule ‘tubulin’ subunits entangle to perform quantum computations according to the Schrodinger equation during neuronal integration phases, these computations terminating by Penrose ‘objective reduction’ (‘OR’) at time  $t = \hbar/E$  ( $\hbar$  is the Planck-Dirac constant, and  $E$  is the gravitational self-energy of superpositioned tubulins). Penrose OR is a proposed solution to the quantum measurement problem tied to properties of fundamental spacetime geometry (related to quantum gravity), and introduces subjective experience with each OR moment. When occurring in random environmental superpositions (i.e. ‘decoherence’), OR moments are accompanied merely by low intensity, non-cognitive ‘proto-conscious’ experience. However in brain microtubules, quantum superpositions may be isolated and ‘orchestrated’ (‘Orch’) by memory, synaptic inputs and resonances, allowing functional cognition accompanied by Orch OR moments of full, rich conscious experience and choice. Microtubule tubulin states chosen in each Orch OR event can trigger axonal firings to consciously control behavior and adjust synapses. Orch OR has enormous explanatory power, but has been viewed skeptically, as heat in presumably random biological environments has been assumed to cause ‘decoherence’ of quantum states. But functional quantum activity is observed in photosynthesis, olfaction, bird navigation and -microtubules. Using nanotechnology, Bandyopadhyay’s group discovered quantum resonance (gigahertz, megahertz and kilohertz) in single microtubules, and microtubule bundles inside active neurons, with coherence as long as  $10^{-4}$  secs (10 kilohertz). Microtubule quantum vibrations and Orch OR events e.g. at 10 megahertz ( $10^{-7}$  secs coherence) can resonate across scales, and interfere to generate slower ‘beat frequencies,’ seen as EEG rhythms. Thus Orch OR predicts that EEG derives from faster, finer scale quantum vibrations in microtubules inside neurons, e.g. apical dendrites and soma of cortical pyramidal neurons. As  $10^{-7}$  secs microtubule coherence is sufficient for Orch OR, and  $10^{-4}$  secs microtubule coherence has been verified, Orch OR is on firm ground experimentally regarding decoherence. Also, recent evidence indicates anesthetics act in microtubule quantum channels to selectively erase consciousness. In conclusion, after 20 years, Orch OR is the most rigorous and successfully tested theory of consciousness ever put forth. Noninvasive therapies aimed at brain microtubule vibrations (e.g. megahertz transcranial ultrasound ‘TUS’) offer potential benefit for a variety of mental and cognitive disorders. Reference: Hameroff S, Penrose R (2014) Consciousness in the universe: A review of the ‘Orch OR’ theory. *Physics of Life Reviews* 11(1) 39-78 <http://www.sciencedirect.com/science/article/pii/S1571064513001188> **PL9**

**249 The Fundamental Mechanisms of Consciousness: Unveiling the True Relationship Between Brain and Mind** Joachim Keppler <joachim.keppler@diwiss.de> (DIWISS, Roth, Germany)

An essential prerequisite for the development of a theory of consciousness is the clarification of the fundamental mechanisms underlying conscious processes. In my talk I present an approach

that sheds new light on these mechanisms and opens up entirely new perspectives for consciousness research. Overview: The approach starts from the hypothesis that consciousness is not produced by the brain, but based on an all-pervasive substrate. From this perspective, the brain can be regarded as a complex system that makes use of a very specific interaction mechanism by means of which it filters the varied shades of sensations and emotions selectively out of the ubiquitous sea of consciousness. I demonstrate that the latest developments in physics not only support this line of thought, but also furnish the appropriate substrate as well as the interaction mechanism. Moreover, the neurophysiological body of evidence suggests that the functioning of the brain relies on exactly this mechanism. Details: The approach builds on stochastic electrodynamics (SED), a theoretical framework that provides a deeper understanding of quantum systems and reveals the origin of quantum phenomena. The key insight from SED is that quantum systems have no intrinsic properties. Rather, they acquire their physical properties by means of an interaction process with an all-pervasive stochastic radiation field, called zero-point field (ZPF). This property acquisition process is based on a fundamental mechanism that acts like a filter on the ZPF and results in local modifications of the ZPF (ZPF information states). The core characteristic of the mechanism is the formation of stable attractors. I give reasons why the ZPF is an eminently suitable candidate for the carrier of consciousness, implying that by virtue of the above mentioned mechanism a system acquires not only its physical properties but also its phenomenal qualities. In order to substantiate this assertion, I interpret the neurophysiological findings in the context of SED, leading to the conclusion that the brain has all the characteristics of a macroscopic quantum system and can be viewed as a stochastic oscillator that operates near the critical point of a phase transition. The default mode is the disordered phase. A suitable sensory input induces a transition to the ordered phase and prompts a cell assembly to fall into an attractor (a perfectly synchronized activity pattern). Whenever a stable attractor is reached, a ZPF information state is generated and a conscious experience arises. In this way, the brain produces an individual stream of consciousness by periodically modifying the ZPF and generating ZPF information states. In summary, the presented approach, which is fully consistent with the foundations of physics and the findings of neuroscience, suggests that the universe is imbued with an omnipresent substrate of consciousness and explains how the brain shapes this substrate in a causally closed functional chain. I conclude with an overview of the main implications of the approach and an outlook on systematic test scenarios. Reference: A new perspective on the functioning of the brain and the mechanisms behind conscious processes, *Frontiers in Psychology* 4:242. **P1**

### **250 Intrinsic and Induced Extrinsic Properties of Quantum World – Emergence of Consciousness and Its Negative Mass** Jianfeng Li <ljf@fudan.edu.cn> (Department of Macromolecular S, Fudan University, Shanghai, China)

In one of our recent works, we proposed a pre-spacetime quantum theory to account for the relativity of the intrinsic (phenomenal) and extrinsic (physical) properties of the universe. It is found that consciousness can spontaneously emerge as a duality of time, while gravity, mass and distance are all connected to the quantum entanglements between physical entities. In particular, the mass can be interpreted as the entanglement entropy of the physical entity to the rest of universe. The new interpretations of mass and consciousness imply that the consciousness might have a negative mass, but this counter-intuitive prediction needs to be verified by future experiments. **P2**

### **251 Developmental Perspectives of Consciousness: A Case for Triality of Consciousness** CM Markan, Priti Gupta <cm.markan@gmail.com> (Physics and Computer Science, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Taking inspiration from the Quantum Consciousness Theories proposed by Penrose-Hameroff and VonNeumann-Stapp, a recent paper [Gupta, P., Markan, C. M. (2013). Exploring a Quantum-Hebbian Approach Towards Learning and Cognition. *NeuroQuantology*, 11(3)] shows how neural assemblies could be formed supervised by some purely quantum mechanical processes viz. (i) Dendritic Microtubule Entanglement (ii) Collapse of superposition of quantum states (iii) Quantum Zeno Effect. Through successive QZEs or riveted attention, species systematically builds hierarchy of neural assemblies and hence over a period of time acquires a personality,

which varies from person to person possibly based on initial collapse to a random neural assembly. Interestingly this model based on Quantum-Classical duality raises some philosophical questions that are intriguing. What role the initial random choice may have in choosing a personality type? Are we merely a creation of randomness of choice? Does God Play Dice? This question has intrigued researchers for long. Einstein thought that the randomness could be explained by a deeper level of deterministic behaviour or an explanation that we don't yet understand. The choice of outcome states of a collapse, according to Sir Penrose, is neither completely deterministic, nor random, but has an element of non-computability influenced by Platonic logic embedded in space-time. Non-computability is a clue, a delicate thread with which to unravel the mystery of consciousness. As regards the ontological character of nature's choice of the outcome of the agent-chosen probing action, the standard position is that nature's choice is purely random. Prof. Henry Stapp finds this position unacceptable. He considers it to be rationally incoherent for some definite choice to arise from nothing at all. According to him rational coherence demands concordance with the principle of sufficient reason: every occurrence must, in a rationally coherent scheme, have some sufficient reason to be what it is. Recently, an experiment conducted in the Prayer Hall at Dayalbagh shows a random number generator can indeed be interrupted by some kind of a Spiritual Force [Satsangi, P.S., Sahni V. A Systemic Experimental Study of Macrocosmic Consciousness, Proc. of 31st NSC, MIT Manipal, (2007)]. This effect was most pronounced in the presence of the Spiritual Leader as compared to others with relatively limited internal experiences. Similarly, based on his experiment on how the pH of water is altered by intent, William Tiller conjectures "Spirit makes an intention. The intention is imprinted in some format onto the mind nodal network lattice... All those nodal points are converters... They convert consciousness to energy and send energy beams to the surrounding area. That's what our physical stuff responds to..... As we increase, through intention, the coupling ... we increase the magnitude of the effect. If the effect becomes big enough, we totally change the world". Is there a triality of consciousness in the existence of creation? This paper argues that duality perhaps is not enough, some kind of triality of Consciousness consisting of (Intuitive) Intention, Attention, Perception would be needed to rescue the creation from wilderness in the sea of randomness. **P1**

## **252 Psi-Psychism: The Most Likely Explanation of Consciousness?** Colin Morrison <cstdm1@hotmail.co.uk> (C. S. Morrison, Cupar, Fife United Kingdom)

Evolutionary theory, recent experiments, and the diversity of views on consciousness in the literature suggests that allowing our intuitions any influence upon our views on consciousness is unjustifiable. In this paper I attempt to eliminate that influence by demanding that all our conclusions follow from a fully objective procedure for generating explanations – one that is maximally successful at generating the established explanations for the things science currently accounts for, beginning with those that have most features in common with human consciousness. The resultant theory entails that our consciousness constitutes the reality behind the wave function of a quantum particle, measurements of which have become adapted to determine our focus of attention. It shows why such an attention-focusing system would evolve, and how it would come to contain precisely the data we find in our subjective experiences. Indeed, it explains all the main features of our experiences, including the way their intensity varies with the intensity of a stimulus, their image-forming nature, the confinement of particular 'modalities' to particular senses, our 'spotlight of attention', inter-modal binding, and the association of pain with tissue damage. Due to the way it was obtained, I argue that this theory ought to be considered the 'most likely' explanation of consciousness. According to this theory our consciousness and qualia are the effects of consciousnesses and qualia that tiny particles possess, and their association with specific types of biological information is a product of adaptation by natural selection (just like every other data-encoding part of our brain activity). A similar position has been adopted by others (e.g. Galen Strawson 2006, Henry Stapp 2007). However, by obtaining my position through strict adherence to the most justifiable explanation-generating principle I can come up with, I am able to go a lot further than other philosophers without fearing that my inferences are arbitrary or irrational. This allows me to confidently infer the ontological interpretation of quantum mechanics (dubbed 'The Psi-psychistic Interpretation') indicated earlier. According to that interpretation consciousness plays the role in

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the measurement process that Stapp (2007) attributes to Nature. It randomly chooses the outcome of a measurement of a quantum particle's position. Those choices are random because the consciousness is free to choose any of the possibilities – all of which are represented in its experience. Differences between the qualia in which each possibility is represented are the thing that makes the consciousness more likely to choose some outcomes rather than others. That is why the experience of a consciousness constitutes the reality that the wave function describes. As in Stapp's theory (Stapp 2007), human consciousness has a free choice that plays an active role in evolution. However, that free choice does not influence behaviour via the quantum Zeno effect, but via the well-known randomness that separate measurements of a single quantum particle's position will naturally generate. Since the wave function is conventionally denoted by 'Psi', the explanation of human consciousness that this procedure yields has been dubbed 'Psi-psychism'. **P1**

**253 Objective Meaning and Meaningful Coincidence in Quantum Mechanics** Sky Nelson <theskyband@gmail.com> (Santa Rosa, CA)

Making meaning of events in our experiences is generally thought of as a subjective process. However, it seems clear that certain types of actions lead to predictable types of consequences. For instance, we can agree that certain actions are destructive and others constructive. If I drive recklessly on a regular basis, this could be classified as a destructive action simply because it leads to a predictable consequence, e.g. it is more likely that I will find myself in a car accident. It may be that through my choice of action, I correlate myself to specific consequences. This is the beginning of a definition of objective meaning. This definition leaves out any reference to good or bad outcome, and relies instead on correlated outcomes. It may be possible to use quantum mechanics to formalize this definition, and show that my reckless driving has the effect of correlating myself to a sub-group of possible futures which is more likely to contain a hazardous random event that leads to a car accident, e.g. a (Schrodinger's) cat running out in front of my car. I propose that your intentions and your actions work together to manipulate the density matrix of your environment. This causes you to land in a sub-group of possible futures which matches the objective meaning of your actions, possibly leading to meaningful coincidences. In addition, it may be that the outcomes which have the most meaning also represent the greatest local decrease in entropy. Hence, although thermodynamics predicts that the system as a whole will never decrease in entropy, conscious entities (i.e. entities with conscious intention) may have the ability to bring about meaningful coincidences through a local decrease in entropy. **P2**

**254 Consciousness and the Laws of Physics** Sir Roger Penrose <rouse@maths.ox.ac.uk> (University of Oxford, Oxford, United Kingdom)

Is consciousness of little relevance to the laws of physics, perhaps coming about merely as a side-effect of complicated computational activity, or is it intimately connected with those laws, being a manifestation of specific physical processes or even specific materials? Orch-OR proposes that whereas neuronal microtubules would be playing a key role in the production of animal consciousness on Earth, that role would be their ability to support large-scale quantum coherence to a level where spontaneous gravitationally induced objective state reduction (OR) takes place. A strong theoretical argument, coming from a clash between accepted principles of physics (Einstein's equivalence principle and the quantum superposition principle), gives good reason for believing that gravitational OR (or something like it) ought to be true. Physical experiments currently under development may well provide confirmation or refutation of this proposal within a decade. Orch-OR depends upon a positive conclusion, and also that each occurrence of gravitational OR is a non-computational process accompanied by an element of proto-consciousness. Consciousness itself, would involve vast numbers of such proto-conscious events acting in an appropriately orchestrated way. New developments suggest that "beat frequencies" are a likely consequence, possibly giving insights into the origin of EEG. **PL3**

**255 The Possible Consciousness** R Richa, Prof. D. K. Chaturvedi; Prof. Soam Prakash <richa.dei.2007@gmail.com> (Department of Zoology, Dayalbagh Educational Institute, Agra, UTTAR PRADESH India)

There are mysteries of consciousness science in the consciousness measurement. Scientists struggling to answer this mystery meet the paucity of holistic approach. We are usually bound in the realm of either biological science or physical science. The efforts are limited to direct and indirect measurement of consciousness and there is no such success till date. The hunt for solution to measurement problem of consciousness is still on. Hameroff (2006, 2010) suggested Gamma synchrony EEG as best measurable correlate of consciousness. Likewise, we are also looking for such significant measurable correlates of consciousness. He also mentions intelligent behavior of Paramecium. Paramecium, a prokaryote is able to swim around, find food and mates, avoid obstacles, learn and have sex, all without a single synaptic connection. It was Sherrington (1953) who suggested first that paramecium utilizes intelligent organizational functions of cytoskeletal lattice polymers called microtubules. Now the obvious question would arise "whether consciousness instigates such intelligent behavior in prokaryotes or not?" Are all prokaryotes are conscious? If consciousness exists in prokaryotes, then what is the graded level of consciousness? How can we measure it? Could we at least find a measurable correlate of their consciousness? It is now known that all living organisms emit weak biological radiations which may be called as biofield. A biofield is an endogenous, complex endogenous, complex dynamic electromagnetic field resulting from the superposition of component electromagnetic fields of the organism that is proposed to be involved in self-organization and bioregulation of the organism (Rubik, 2002). The aim of present study is to find out external correlate of consciousness which can be measured by available instruments. We attempt here to hypothesize that biofield may be a measurable external correlate of consciousness. We know that consciousness exists in the highest evolved and intellect creature man and it is evident by biofield then why not the same can happen in prokaryotes? The experiments were initiated in our lab to work on the proposed hypothesis. We could attempt to measure the biofield of two specific bacterial cultures *Bacillus subtilis* and *Bacillus thuringiensis* in lab with the help of M.E.A.D (Meridian Energy Analysis Device). We therefore analyzed the pattern of biofield for a given time period. The above mentioned cultures were kept and grown in different set of combinations and controls. In order to see the conscious effect of each one on the other. The results show that during growth time, the cultures exhibited an increase in the magnitude of their field. It indicates that they are evolving separately but as conscious organisms. They are therefore aware of each other's presence. We therefore would like to complete this quest with questions i.e., i. Is this the consciousness or its parameter we are measuring? ii. Is it an external measurable correlate of consciousness or not? iii. Will it lead us to the possible pathway of the evolution of the consciousness from unicellular prokaryotes to multicellular organisms? **P1**

**256 Why Quantum Mechanics and the Emergence of Mind Should Not Be Disentangled** Javier Sanchez-Canizares <js.canizares@unav.es> (ICS. Mind-Brain Project, ICS. University of Navarra, Pamplona, Navarra Spain)

In recent decades, progress in the field of neurosciences has triggered an interest in understanding mind-brain relationships. Quantum Mechanics (QM) has been present in the debate from its beginnings through the well-known measurement paradox. The standard interpretation of QM considers two basic, fundamentally irreducible, processes: (i) the deterministic evolution of the wave-function according to the Schrodinger equation, once the initial conditions have been settled; and (ii) the indeterministic wave-function collapse into one of the possible outcomes, after performing a specific measurement. So, QM would point to the limits of a purely deterministic view of nature and, in particular, of brains. Mainstream critiques about the importance of QM in the physics of the brain stem from the experimental field. In spite of the existence of quantum models trying to approach the mind-brain problem, the basic claim of neuroscientists is that no experiment has been presented hitherto showing unequivocal signs of quantum traces in the brain. As a matter of fact, we do not yet have a definite answer to the question about the empirical relevance of QM in the brain and none of the current QM proposals for the brain seem to have neurobiological plausibility. Though, at the same time, pre-QM science alone is not adequate to

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tackle the mind-brain problem. Detractors of the QM influence are confident of the role of decoherent processes at different physical scales in order to ensure a classical deterministic behavior of the brain. Nevertheless, how decoherence actually occurs in different physical or biological systems is poorly understood. Decoherence does not provide a consistent ontology for the reality of the world, simply offering a pragmatic procedure for practical purposes. While neuroscientists may not go further in this problem, limiting themselves to the empirical evidence, philosophers of science should draw some conclusions. Mere reference to classical complexity as a would-be explanation for the mind leads to a philosophical conundrum. Since QM is the underlying basic physical theory wherein classical behavior is retrieved thanks to decoherence, decoherence itself should be understood in QM terms. However, for the process to work properly, we need to invoke an a priori different treatment of parts within the system. This must be split into a subsystem and a thermal bath whose degrees of freedom are averaged out. So, we need to invoke a diverse, ad-hoc treatment of a part of the physical system. In this sense, recourse to decoherence as an explanation of the emergence of classicality in the brain, and eventually complexity-mediated consciousness, entails a dualistic and incomplete perspective and begs the question. We may conclude, from the philosophical point of view, that the measurement problem of QM is profoundly linked with the mind-brain problem. It is highly unlikely that we will solve one problem without solving the other. Since decoherence is an epistemic-limited procedure, we cannot hope to grasp the ontological emergence of consciousness without understanding the QM measurement paradox. This is the reason why the mind-brain problem and the measurement paradox should not be disentangled. **P1**

**257 Quantum Modelling of Thoughts and the Sixth Sense** Achint Satsangi <as.thehuman@gmail.com> (Faculty of Engineering, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The thoughts in mind can be considered as a 'wave function'. The mind processes many thoughts simultaneously, and hence can be looked as a 'superposition of thought'. The collapse of wave function or decoherence can be due to internal and the external factors. The external factors correlates to the sixth sense. What is Sixth Sense? The Eastern spiritual Traditions and the Western Science have different outlooks regarding its cause and existence. Sixth sense is the "subtle perception ability". The observations of the East suggest that there exists a "mental space" and we all are "connected" through it. One's thoughts can affect others. How this works- When a person has developed a composition of thought – thought waves or "ripples" are created in the mental space of the source which sort of "interferes" with the thought function of the other – leading to 'collapse' of the 'wave function'. Hence one is able to sense when someone is staring at self, one recollects image of an friend or relative suddenly, which happens when one focuses his line of thought to the other. This ability is further enhanced by meditation, and the followers of the spiritual religion have had advanced experiences. **P1**

**258 A Quantum Physical Argument for Panpsychism** Gao Shan <gaoshan@ihns.ac.cn> (Institute for the History of N, Chinese Academy of Sciences, Beijing, Beijing China)

The relationship between consciousness and wavefunction collapse has been studied since the founding of quantum mechanics (von Neumann 1932/1955; London and Bauer 1939; Wigner 1967; Stapp 1993, 2007; Penrose 1989, 1994; Hameroff and Penrose 1996; Hameroff 1998, 2007; Gao 2004, 2008, 2013). There are two main viewpoints claiming that they are intimately connected. The first one holds that the consciousness of an observer causes the collapse of the wave function and helps to complete the quantum-to-classical transition (von Neumann 1932/1955; London and Bauer 1939; Wigner 1967; Stapp 1993, 2007). The second view holds that consciousness arises from objective wavefunction collapse (Penrose 1989, 1994; Hameroff and Penrose 1996; Hameroff 1998, 2007). Though these two views are obviously contrary, they both insist that there are no quantum superpositions of physically definite perception states. Different from these seemingly extreme views, it is widely thought that the quantum-to-classical transition and consciousness are essentially independent with each other (see, e.g. Nauenberg (2007) for a recent review). At first sight, this common-sense view seems too evident to be intriguing. However, it has been argued that by permitting the existence of superpositions of physically definite perception states., this view may lead to an unexpected new result, a quantum physical effect



of consciousness (Gao 2004, 2008, 2013). In this presentation, I will introduce this interesting result and discuss its possible implications. It is usually thought that consciousness has no causal efficacy in the physical world. However, this may be not the case. I will show that a conscious being can distinguish physically definite perceptions and their quantum superpositions, while a measuring system without consciousness cannot distinguish such nonorthogonal quantum states. This indicates that consciousness has causal efficacy in the physical world. Moreover, the existence of this distinct quantum physical effect of consciousness also suggests that consciousness is not emergent but a fundamental feature of the universe. This provides a possible quantum basis for panpsychism. References Gao, S. (2004). Quantum collapse, consciousness and superluminal communication, *Foundations of Physics Letters* 17(2), 167-182. Gao, S. (2008). A quantum theory of consciousness. *Minds and Machines* 18 (1), 39-52. Gao, S. (2013). A quantum physical argument for panpsychism, *Journal of Consciousness Studies*, 20, 59-70. **P2**

**259 Towards Multi-Particle Quantum Teleportation Through Graph Theoretic Physical System Modelling** Dayal Pyari Srivastava, Vishal Sahni <paritantra2013@gmail.com> (Department of Physics and Comp, DEI, Department of Physics and Computer Science, Agra, Uttar Pradesh India)

The paper includes a detailed discussion of three-particle quantum teleportation using three particle quantum entangled states called GHZ states. The entangled states are shared between sender Alice, intermediary supervisor Charlie and receiver Bob. They share one particle each of the GHZ state. Measurement for Charlie is made according to basis vector pair “ket 0 star” and “ket 1 star”, (where “ket 0 star” = “ket 0” + “ket 1” /  $\sqrt{2}$ ) and “ket 1 star” = “ket 0” – “ket 1” /  $\sqrt{2}$ ), unlike measurements by sender Alice which are according to normal basis vector pair “ket 0” and “ket 1”. An alternative approach has been shown by adding a Hadamard gate at Charlie’s port before measurement gate. In this case, we do not have to change the basis vector-pair for Charlie. The results have been further generalized by considering n-particle entanglement which exhibits n-fold quantum entanglement between sender Alice, (n-2) intermediary supervisors Charlie and receiver Bob. The rigorous graph theoretic modelling approach adopted in this paper considerably facilitates proper book keeping of even different basis-vectors and hybridization of quantum communication with classical telecommunication of measurements by sender Alice and intermediary supervisors Charlie to the receiver Bob. The classical measurements so communicated to Bob encode information for applying requisite Pauli spin matrices to correctly recover the qubit sent by Alice at receiver end by Bob, through quantum teleportation. Hierarchical clustered quantum Hopfield network models avail of five hierarchical levels of quantum entanglement-based neural interaction microtubules spread among 13-23 billion neurons in the human cortex of the estimated 100 billion neurons in the brain. **P1**

**260 What can the Psi Evidence Teach us about Quantum Theories of Consciousness?**

George Williams <grwilliams@gmail.com> (Media Bureau, Federal Communications Commission, Takoma Park, MD)

The puzzling natures of both quantum mechanics and consciousness has led some to explore the possibility that the two are linked. Those that argue for such a connection generally find justification for their views in certain features on the ‘measurement problem.’ While there is no consensus among physicists for an explanation of this most persistent problem in quantum mechanics, most nevertheless spurn explanations with consciousness have a crucial role. Such dismissals are misplaced, however, for two reasons. First, the current theoretical gap for explaining the fundamental aspects of consciousness implies that ruling out the possibility of such explanations is untenable. Second, there is a body of empirical evidence that suggests that mental intention can affect physical processes such as random number generators. The psi literature suggests we should be open to the possibility that consciousness and matter are linked. In this paper, I advocate making use of the growing psi literature to evaluate the various quantum mechanical theories of consciousness. A number of features of quantum mechanics, such as the nonlocal behavior between entangled particles and the mind-matter links implied by some interpretations of the ‘measurement problem,’ suggest some interesting similarities with psi. The psi data demonstrate a nonlocal connection not

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explicable in terms of classical mechanics and a mind-matter effect on random number devices. A short review of the literature on psi will help provide direction for what links might exist between consciousness and the world of subatomic physics. Most quantum explanations of consciousness that might be consistent with psi can be placed into two categories: 'collapse of the waveform' and hidden order explanations. I argue that the framework that best fits the psi data is the hidden order explanation, such as Bohm and Hiley's proposed explanation of quantum mechanics, which posits a hidden or implicate order that guides the behavior of the quantum mechanical waveform. This framework falls into the neutral monism category explanation of consciousness, where mind and matter have a common, neutral foundation. This foundational stratum of reality, in the case here, is composed of pure information and potential. Such a framework can provide an economical explanation to different categories of psi, as well many puzzling aspects of consciousness and quantum mechanics. The implication is that our minds, as well as all of reality, are connected via a field of proto-conscious potentia or seed stuff. An inherent component of this information dense field is the set of probabilities associated with the possible manifestations of reality. And by virtue of our connection with this field, we can both perceive and affect those probabilities, albeit in most cases by a small degree. **P2**

### 4.02 Space and time

**261 A New Understanding of Space and Time Infers a Universal Evolution, Which Culminates in the Emergence of the Quantum Mind** Eva Deli <eva.kdeli@gmail.com> (Nyiregyhaza, Hungary)

Space and time, as two of the most important physical quantities, are present in some form in basically every equation ever written about dynamical systems. However, there is sorely little understanding of what space and time actually is. For example the Minkowski space-time delegates time into a fourth, minor dimension to space. However, temporal changes are inseparable from and intertwined with all three dimensions. As an inalienable part of every spatial dimension, time is an equal partner to space. For simplicity, I shall consider a two dimensional universe made up of orthogonally conjoined energy fields, space and time. Further it is posited that time is insulated within micro dimensions (the Calabi-Yau space), and it is thus elementary matter fermions. The interaction of time with space inversely changes the spatial curvature and the manifold – time energy ratio, where energy insulation limits interactions into quanta of standing wave harmonics. Increasing field curvature imposes information content on the manifold, while decreasing field curvature triggers negative time, lessening manifold information content. Hence, the age of material systems is proportional to the information level of the manifold. Our galactic neighborhood is over ten billion years old. Due to the many complex steps evolution requires, only matter with such enhanced age can produce life. However, within gravity-free regions negative time (negative spatial curvature) erases manifold information and creates antimatter. The integrated nature of space (macro dimension) and time (micro dimensions) points toward an encompassing theory, capable of answering the many questions considered a puzzle in physics today, such as matter antimatter ratio, entanglement, the experienced low entropy, or the accelerating expansion. It also explains time, gravity, and mass. The two interconnected energies, space and time allow us to consider a cosmogonic evolution, driven by the entropy decrease of the universe's accelerating expansion. The universe expansionary potential eventually isolates spatial energy within micro dimensions, forming an orthogonal, yet symmetric energy structure to matter. Energy vibrations might become visible matter, but in the material brain life is an affair of energy. Highly structured mental frequencies betray nonlinear complexity about the energy unit, which is the mind. The environmental changes constitute the energy of time. Mental interaction with time changes spatial and manifold ratio, and generates the quanta of elementary forces, emotions. Therefore the mind can be considered an elementary particle. The myriad specific mental phenomena can be intuited as various aspect emotional equivalents of elementary forces, gravity, electromagnetism, nuclear strong and weak forces. Understanding the operation of the mind permits us to map out a congruent life; goals and positive inspirations can be efficiently reached. Emotional stability, optimism is indispensable quality of intellectual excellence. The accumulation of negativity however increases

temporal field strength, constricts time (appropriately called stress), which slows, inhibits mental progress. The hypothesis frames a new paradigm in physical and neurological sciences. The analogue operation of matter fermions and the mind allows conclusions with appropriate corrections to be carried over between the two fields (theoretical physics and neurology) for the mutual benefit of both. **P2**

**262 Conscious Spacetime. A Possible Connection Between Phenomenal Properties and Six-Dimensional Spacetime** Jan Pilotti <dr.pilotti@telia.com> (Pilotti Science-Art, Örebro, Sweden)

Einstein's special theory of relativity showed that space and time are relative but that spacetime intervals are absolute, the same for all observers, so spacetime is more fundamental. It is argued (e.g. Minkowski, Petkov) that spacetime is ontological four-dimensional, so all past events, all events now, and all future events exist at once in four-dimensional spacetime. This 4D spacetime can be visualised as a one-dimensional time-line where all points are full three dimensional worlds at that time. That people in near-death-experience can see their whole life at once can be interpreted as that this four-dimensional spacetime is open for direct conscious experience. There are mathematical and physical arguments for extending the theory of relativity to six dimensions, three space and three time dimensions. These extra dimensions have no straightforward physical interpretation. In analogy with the picture of one time dimension this 6D spacetime can be visualised as a three-dimensional time-box where all points are full three dimensional possible worlds. In analogy with that one seemingly can experience the four-dimensional spacetime in NDE, it is argued that the six-dimensional spacetime of possible worlds possibly can be related to conscious experience. Following Chalmers' analysis and suggestion conscious experience is taken as fundamental. So the task is to formulate some bridging principles between the physical and the phenomenal conscious experience. Extra dimensions and timebox are not ordinary physical but seem physical enough as connected to the theory of special relativity, but also seem non-physical enough to possibly connect to phenomenal properties. It is proposed that all matter, not only microphysical, all events and processes in six-dimensional spacetime, have intrinsic aspects with phenomenal properties as their grounds. In this view sensory experiences are mainly localised in matter, but not in brain but in the experienced matter in space outside ones brain, the content in the now, the space- or matter-aspect of spacetime. Thoughts, fantasies and dreams, as all mental experiences, are in time, outside the space now, the time-aspect of spacetime and identified with events in possible worlds in the six-dimensional spacetime, which can be realised in the future, are lost possibilities for the now or haven't been realised in the past. Episodic memories are earlier realised events in spacetime. Wrong episodic memories are when we mistake a not realised possibility for a realised possibility. Semantic memories and abstract thoughts are interpreted as speech in a possible world. In this view processes in sensory organs and brain don't create our experiences but are the traces of how consciousness is brought in contact with phenomenal properties in the six dimensional spacetime outside our brain. A thought is mental as a possibility, which could have been or can be realised and thus be material. What is in the now a sensory experience, located in experienced matter, is in the next instant a memory, outside the now, that is mental. So mental and matter can transform into each other and be seen as time- resp. space- aspect of Spacetime, as a form of Conscious Monism. **P1**

**263 Relativistic Consciousness** Richard Sieb <siebr@shaw.ca> (Department of Neuroscience, University of Alberta, Edmonton, Alberta Canada)

Einstein's theories of relativity may account for the temporal and spatial distribution of our visual conscious experiences. Spacetime is the arena in which physical events take place. An event in spacetime is specified by its time and place. In any given spacetime, an event is a unique position at a unique time. Visual conscious experiences are events occurring in visual consciousness. Our visual consciousness is an observational perspective of spacetime. Each visual conscious experience has a unique position and a unique time in our visual consciousness (frame of reference of spacetime). A spacetime may be described at small scales using coordinate systems (manifolds). General relativity describes spacetime as a four dimensional curved manifold. Hence

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by general relativity, any visual conscious field is a four dimensional curved spacetime manifold. The location of a conscious experience in our visual consciousness therefore may be described by four real numbers, analogous to location of an event in the spacetime of general relativity. The separation between two events in spacetime is given by the invariant spacetime interval. Hence the separation between two conscious experiences in our visual consciousness may also be given by the invariant spacetime interval between the two conscious experiences. The invariant spacetime interval takes into account not only the spatial separation, but also the temporal separation as well. An invariant spacetime interval is given by the spatial separation minus the product of the temporal separation and the speed of light in a vacuum (a universal constant which relates space and time). The spacetime interval represents the shortest path between two events in spacetime or two conscious experiences in visual consciousness. This is geodesic motion (by general relativity) representing pure motion (inertial motion); that is, motion free from external influences. Three types of spacetime interval may be important for visual consciousness. If the temporal separation of two conscious experiences is greater than the spatial separation (a time-like interval, the spacetime interval is less than zero), then the geodesic motion between the two conscious experiences is less than the speed of light and a cause or effect relationship (one conscious experience may occur in the past or future of the other) can exist between the two conscious experiences. Hence the conscious experiences may occur in the same location in visual consciousness, but they cannot occur simultaneously. If the spatial separation of two conscious experiences is greater than the temporal separation (a space-like interval, the spacetime interval is positive), then a cause and effect relationship cannot exist between the conscious experiences because the geodesic motion between them would have to be faster than the speed of light (which is impossible). Hence such conscious experiences can only occur simultaneously and at different locations in our visual consciousness. A light-like spacetime interval occurs when the temporal separation is equal to the spatial separation (the spacetime interval equals zero) and the geodesic motion between the two conscious experiences equals the speed of light. Light-like intervals mark the boundary between time-like and space-like intervals. **P1**

**264 Algorithmic Information Theory, Non-computability, Thermodynamics and General Relativity. Can We Show That Space-Time Must Have 3 Spatial Dimensions?** John Small <jds340@gmail.com> (Mindoro Marine Ltd, Faversham, Kent United Kingdom)

Gregory Chaitin's work on Algorithmic Information Theory recasts the work of Godel and Turing in terms of the information content of the axioms of a system. This suggests that we could create a metric on a space of propositions in terms of the information content of the axioms required to decide if they are true or false. Negative information would be used to denote the information missing from an axiom system which would have to be added to make undecidable propositions become decidable. Negative information implies complex probabilities. This leads on to the topic of negative and complex entropy. We argue that the most natural metric space is the Minkowski metric with three dimension of space and one of time. Certain topological properties of the parallelizable spheres make it possible to link this metric to a metric of computability and non-computability. The work of Ted Jacobson and Sir Roger Penrose provide tantalising pointers to being able to view the metric tensor of General Relativity in terms of information content and see the metric as rephrasing Godel's and Turing's work on non-computability in the context of observable events. **P2**

**265 Dimensionality, Experiential Space and the Binding Now** James Van Pelt <james.vanpelt@aya.yale.edu> (Divinity School, Yale University, New Haven, CT)

The physical world so thoroughly dominates our focal attention that the subtleties of how experience interacts with physicality are often occluded. When we do attempt to explore the structure of experience, we tend to analogize from physicality, as when St. Augustine conjectured about the mental forms stored in "the vast recesses, hidden and unsearchable caverns of memory, to be brought into the light when the need arises". Such analogies between the physical and experiential are common, as when we speak of "outer space" contrasted with the 'inner space'. Yet – is the very idea of experiential space, "inner" or not, veridical in any sense? That question

can be approached by considering the ways experience is structured by dimensionality. Physical dimensions are not perfectly analogous to their experiential counterparts that seem to structure “inner space”. The latter are arrayed along the continuum bounded by self and world, and can be teased apart from their physical counterparts by means of a Flatland-like perspectival regression—a process of repeatedly “stepping back” the POV from which the world is regarded. That process indicates that experiential dimensionality, like physical dimensionality, is structured from “bundles” of at least one temporal and three spatial dimensions, but also suggests that experience is structured by a total of seven dimensions: four analogous to the spatial and temporal, and three additional dimensions that make possible such experience-only phenomena as empathy. (Interestingly, versions of M Theory require a total of ten or eleven cosmic dimensions, including six or seven supernumerary dimensions somehow “curled up” within four-dimensional space.) The two dimensional sets, physical and experiential, share a cosmic nexus in the most mysterious of all dimensions: the temporal. Consider that Einstein demonstrated that the rate at which time passes dilates or contracts relative to the speed at which one frame of reference proceeds toward or away from another, maintaining the constant relationship ‘C’ between space and time and demolishing the Newtonian assumption of absolute universal time. (A spaceship traveling near the speed of light might travel for two years while twenty years pass on the planet from which it departed). During this presentation it will be demonstrated that the experience of time remains synchronized in all frames of reference; so a clock on the planet of departure may tick ten times for every one tick on the spaceship, yet each tick in every case must occur within the same present moment. The “now” point, at which the future becomes the present becomes the past, may be only “a stubbornly persistent illusion” in physics (Einstein). Yet the universal ‘now’ constitutes a cosmic and experiential constant “X” interacting with “C” to maintain the temporal unification of experiential and physical domains – i.e., of experience, experiencer, and that which is experienced. A deep consideration of dimensionality reveals the fusion of experience and physicality in the temporal singularity experienced as the present moment. **C19**

**266 Husserl’s “Pure Phenomenology” and Further Adventures in Time** John Yates <uv-science@gmail.com> (Neuroscience Department, Institute for Fundamental Studies, Mumbai and Goa, Mumbai, Maharashtra India)

Subsequent to the Abstract 222 in the 2008 Conference book, we have extended our work to cover the latest work on chronesthesia, have used latest methods in neurolinguistic programming and hypnosis and are using masked priming and similar techniques to considerably enhance the temporal Doppler effect of Caruso. We bear in mind the Orch-or effect of Penrose and Hameroff and have done many experiments on physarum polycephalum. Much more of the preliminary work is discussed in detail in my blog at <http://tjohn.blogspot.in/>. It was found that Husserl’s work on phenomenological reduction fitted in well with our use of both the McTaggart A and B series and we showed that both are necessary to describe time. In addition to my book “Time Travel in Theory and Practice”, I have explained a method of procedure to build a simple time travel machine and are doing further experiments in an attempt to iron out any bugs in our present procedures. More detailed results will be supplied in a later blog, together with additional practical construction details. **P1**

## 4.03 Integrative models

**267 Mathematical Model for Cognitive Factor: Attitude, Emotion, Motivation on Measuring the Reflection of Consciousness** Jyoti Kumar Arora <dei.jkarora@gmail.com> (Humanities and Applied Science, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Abstract: Every person has enough energy and potential which is not utilize in a proper manner from in his routine activities in unskillful ways. Ancient times to modern era, consciousness has remained a mystery. As we probe deeper, the question of consciousness goes on confusing. Mystics try to explore it in the domain of spirituality, Psychologists find it in the part of cognitive, Biologists try to understand it in the realm of microtubules in brain and computer scientists try to explore it in term of artificial intelligence while engineers conceptualize it as a system with spik-

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ing neural network working in terms of biological neurons. All observations whether man made or natural are nothing but the effect of the altered states of consciousness. It has been conjectured that the environment and association of a person over a period of time influence his domain of social activities. Whatever is the confusion one thing remains common that the consciousness is subjective and has its root in the cognition of self awareness. Emotions are closely related to desires and it is a personal feeling or willingness to possess an object, to conduct an interaction with the external world. The net algebraic effect of these tendencies can be considered as a measure of reflection of consciousness in the material world of reality. It is associated with exceptional control over one's mind and will, intellectual and moral enlightenment, and profound personal growth. The QFC would be further improved by providing favorable conditions like presence of atmospheric negative ions before and after spiritual practices. Cognitive factors with the awakening of consciousness resulting into Artificial Neural Net Work modeling would be the main focus. Present piece of work have been carried out that the complicated human emotional and perceptual phenomena can be modeled and formally treated based on cognitive informatics theories and denotation mathematics. The set of 29 questions deals with domain of human activities and has been considered as input 1 whereas the 20 questions for mental tendencies were considered as output in designed questionnaire. The positive tendencies of a good citizen, enhancing reflections on consciousness to a great extent, were considered as output 1, while negative tendency as output 2. A single layer n-input 2 output neuronal model was utilized to train test and cross validate the data. It was found that persons performing spiritual activities for more than a year continuously and actively participating in voluntary service without demanding any recognition have strong more positive reflection, compared to those just started or have been involved with such activities for less than a year. **P1**

**268 Quantum Cognition – A New Frontier in Consciousness Studies** Harald Atmanspacher <atmanspacher@collegium.ethz.ch> (Collegium Helveticum, Zurich, Switzerland)

Starting with early speculations by Niels Bohr, Wolfgang Pauli and David Bohm, the idea to apply basic ideas of quantum theory to mental systems has received increasing attention over past decades. A number of approaches focus on quantum physical mechanisms for brain activity. Yet others try to utilize quantum structures to study mental and behavioral processes directly, leaving open the challenging question of how they are correlated with brain activity. Attempts of the latter kind, subsumed under the notion of quantum cognition, have led to surprising success in understanding challenging problems in decision, perception, learning, and more. It is a key conceptual insight in quantum cognition that the observation of a mental state does not only yield a result (quantitative or qualitative), but also implies a generally uncontrollable backreaction on that state. We know from quantum theory how this feature can be formally expressed in terms of non-commuting operations. Two simple examples, order effects in surveys and questionnaires and temporal nonlocality in bistable perception, will be briefly presented to demonstrate how non-commutativity and its consequences can explain and predict central features of mental activity in novel ways. **C8**

**269 Hypothesis: A Biological Basis for the Mind** N.J. Beaumont <nick@nickbeaumont.com> (London, United Kingdom)

Our minds experience our sensations and are the authors of our thoughts and actions; however, the biological basis of this inaccessible subjective core has not been identified. In this presentation, I reinterpret the biology of the brain, and identify a realm of it that is complementary to the resting and action potentials of neurons, and suggest how these fluctuations can reciprocate, and alter neuronal activity. I propose that the flux in this complementary realm constitutes the mind. This hypothesis is empirically testable; it suggests how neuronal correlates create sensations and mental events, it describes how the mind develops in infancy, its structure, which species possess them, and how many times similar systems evolved. This model may have clinical implications: suggesting how the mind can be altered by chemical insult; or damaged through traumatic brain injury. Furthermore, it suggests how physical changes in the brain may cause illnesses of the mind. **P1**



**270 An Analytical View on the Nature of Individual Consciousness** K. J. Bose <2bose.on@gmail.com> (Bangalore, Karnataka India)

One of the elegant descriptions of consciousness was given in one of the earliest references to consciousness we know, i.e. in the Yoga Sutras of Patanjali [1]. But though the description or definition might actually capture the real nature of consciousness itself and might even provide a way to subjectively contemplate consciousness and its dynamics, it however does not provide us a practical way of comprehending and working with consciousness objectively with a scientific method. After centuries of negligence by main stream science on the inclusiveness of this subject into the realm of objective study, the advances made in the few decades in the field of neuroscience with respect to the measurement and analysis of brain activities along with a set of proposed theories on consciousness did not yield anything serious that can be worked with both in principle and practice. In this paper I will provide an analytic view on the nature of individual consciousness which will help further in either eliminating or embracing certain ideas which can lead to the realization of the phenomenon of consciousness. Though there might not be a breakthrough in pulling out the objectivity of consciousness for experimenting with testable predictions on its nature, this analysis should certainly lead to the design of thought experiments which will narrow down the landscape that has to be probed further for ultimately conquering the problem of consciousness. To set the point straight I will directly deal with the analysis of the subjective nature of consciousness. **P1**

**271 Consciousness, Intelligence and Sapience in Multiscalar Systems** Ron Cottam, Willy Ranson; Roger Vounckx <ricottam@etro.vub.ac.be> (Informatics and Electronics, Vrije Universiteit Brussel, Brussels, Belgium)

We establish a connection between information processing and processor architecture, which provides linguistic separation between conscious intelligence and sapience, and which is applicable in either a computational or a conceptual form to any context. How on earth do we manage to relate to a multiplicity of mutually-exclusive scales of our environment through the singular focus of consciousness? Presumably there must be some kind of interface between the two which implements coding/decoding, either of which may be integral or dis-integral in character. In any unified system the unification of multiple scales by their interaction is itself a consciously recognizable system property: this is hyperscale. In this paper we describe not only how hyperscale can fulfil the function of integral/dis-integral coding/decoding between the multiple scales and the singular form of mental consciousness, but also how it is a natural and necessary part of any unified multi-scalar system. Information processing in a system always takes place between different 'architectural' scales of a processing entity: simplistically, we can view intelligence as the tool which permits an overview of the relevance of individual items of information and the means by which all available information is taken into account in generating or updating a new, higher-level, simplified representation of the information system. As such it functions as a complex mix of context-translator, interpreter and comparator. System unity presumes a degree of coherence across all the scales of a system, where all of these are derived from others through intelligence. Sapience is the tool which permits evaluation of the relevance to a conscious purpose not only of individual items of information, as does intelligence, but also of the multiple system scales themselves as individual informational entities. The individual scales of a natural system are partially isolated from each other (through en-closure) but also partially in communication (through process-closure). The balance between these two through mutual observation takes the form of an autonomy negotiation. Hyperscalar coherence is created through this mutual inter-scalar observation, whose recursive nature ultimately generates the independence of high-level consciousness. Consciousness acts both as the servant of intelligence and sapience and their master in promoting an entity's coherence, cohesion and survival. We conclude that intelligence and sapience are distinct and necessary properties of all information processing systems, not only conscious ones, and that the degree of their availability controls a system's cognitive capacity, if not directly its application. The central hypothesis is that we integrate all observational 'architectural' scales into a hyperscalar 'phase space' within which we are free to roam without taking any account of the 'reality' of

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the 'location' from which we make our observations. Considerations of internalism, externalism and even the 'existence' of our viewpoint itself are ephemeral within hyperscale: we are the lords of our own creation, of our own 'scale-free selves', and we can fly anywhere, view anything. This raises an exciting possibility: is hyperscalar 'phase space' the origin of Baars' 'Theatre of Consciousness' **P1**

**272 Why Phi Networks (Not Wifi)? How Hierarchical Predictive Coding Explains Both Why the Phi Measure of Network Structure Is Relevant to Consciousness, and How It Sheds Light on What It Is Like.** Stephen Deiss <sdeiss@eng.ucsd.edu> (UCSD Multimodal Imaging Lab, UC San Diego, Computer Science Dept., San Diego, CA)

At least since 1860 following Helmholtz perception has often been characterized from multiple perspectives as a process of knowledge-driven top down inference (Helmholtz, 1860, Friston, et.al., 2006). This view is rapidly gaining traction in the cognitive sciences and neuroscience because of how it simplifies and integrates many diverse experimental results from an action-oriented perspective (Clark, 2013). At the same time the Phi measure and its derivatives from Integrated Information Theory IIT, (Tononi, 2008) has shown promise for quantifying the graded ability of systems to exhibit consciousness to those who would observe it objectively in clinical and research settings. However, the axiomatic approach of IIT leaves a gap in explaining why the structure explains level of awareness. There are unappreciated deep connections between the Bayesian predictive coding view and the IIT view that provide valuable insights. Hierarchical prediction error minimization supports the mathematical foundations of IIT by showing what the forward and backward connections are doing to bring about consciousness, and how the small world structure of mammalian brains is optimized for this. Both of these theories in turn support phenomenological intuitions of how perception is a process of meaning discovery and interpretation creation guided by expectations (Deiss, 2009). The successful integration of these three perspectives, Bayesian brain with integrated information and with associative meaning-making, will be a great source of both theoretical and practical understanding of consciousness in all its graded varieties. These are first baby steps. **C6**

**273 Panpsychist Realism Through a Study of the Enzyme Citrate Synthase** Jeff Graubart <jeffgrau@rcn.com> (Independent Consciousness Studies Researcher, Chicago, IL)

Panpsychist Realism (PR) follows from a relativity that treats creation of time as real and takes the Bohr atom in a different direction than quantum physics, integrating the subjective, along with energy and charge, into the building blocks of the universe. PR is still speculative in many areas, however, a recently developed and revolutionary gravitational theory produces accuracy to 11 decimal places and has potential to become a unified non-field theory. PR also excels at providing a model for molecular bonding and cellular biology and integrates them with relativity and miniverse mechanics. In the presentation, the new gravitational theory will displace some miniverse mechanics, however, all information can be found in the accompanying text. The main focus of the presentation remains citrate synthase, the first enzyme in the Krebs cycle, broken down into its constituent steps in far greater detail than is possible with purely physical reductionism. First, PR basics are discussed. 1) PR relativity and gravitation. 2) Von Neumann-Stapp operators bridge the explanatory gap from subject to object. 3) How vNS and EA are used to convert thermal kinetic energy into infrared radiation, suggesting a conservation of entropy. Infrared radio is then discussed using citrate synthase as a receiver and one of its substrates, oxaloacetate as a transmitter. The carbonyl bonds of oxaloacetate easily demonstrate the basics of modulated transmission, as well as simple identification. The alpha-helices of the protein provide the inductance and the beta-sheets the capacitance of an LC circuit. PR entanglement is used to lay down one or more circuits. Hydrogen bonds can function as dielectrics or semiconductors depending on the path of the circuit, although in the case of citrate synthase, an h-bond is the sole capacitance. The math to show resonance in the infrared range is demonstrated. Citrate synthase lives as a dimer to achieve depth perception in locating a substrate from its identification signal. Internal imaging and recognition are purely subjective and have no correlates in physical reality. Once the substrate has been located, glycine and arginine navigators are employed to retrieve the substrate and bind it

into place. This navigation process demonstrates the conservation of energy, quantum tunneling, and linear relation of substrate to reaction rate, use of thermal energy to improve speed and reliability, and most importantly, the skillful use of isomerization. Once the substrates are bound, the catalytic action is described using PR and contrasted with the similar, but less intuitive physicalist description. The citrate synthase then opens, releasing citric acid into the cell and beginning the process anew, about 300 times a second. I demonstrate that every step in the enzyme process is impossible or unlikely in a physicalist world. **P1**

**274 In Self-organized Criticality Models, The Content of Experience Is Not Digitizable: As A Result Conscious Information Processing Is Not Computable As Penrose Proposed.**

Alex Hankey <alexhankey@gmail.com> (Yoga & Physical Scienc, SVYASA, Vivekananda Yoga University, Bangalore, Karnataka India)

In 'The Emperor's New Mind', Penrose proposed a metamathematical proof that information processing by consciousness cannot be emulated by digital computers. Despite additional reasoning in two more books, his proposed proof was never fully accepted. Penrose's starting point was his own experience that mathematical intuition suggests hypotheses to prove, an ability that he reasoned has no digital equivalent. Here we offer a proof of Penrose's proposition starting from the assumption that Self-Organized Criticality provides the basis for experience, so that mental content is represented by information in cortical states at criticality. Such states can be created by known brain processes. Inhibition of Lateral Inhibition described in Pribram's 'Languages of the Brain' registers information in experience. It is a linear transform of the digital information used by the brain for preliminary, pre-conscious processing. Analogous to a Fourier Transform, it provides a direct link to Wilbur's Holographic Paradigm. Transformed states can be structured according to the required instabilities, allowing information passed to experience to become the required kind of coherence information described below. Criticality states so formed are characterized by high internal coherence, because their potentials governing restoration to equilibrium do not obey Hook's law. Resulting states are not quantizable, and are non-reductive as Chalmers's condition for representing experience requires. Non-reductive states form Banach Spaces i.e. mixtures of vector states possessing internal coherence. Critical instability implies long-range coherence, so their information content is embedded in internal correlations. The 'fluid nature' of correlations means that their information content is not representable in digital form, only as coherence information. This can couple directly to similar systems, offering a new basis for understanding Sheldrake's 'Seventh Sense', as well as Penrose's intuitive abilities. In system non-linear dynamics, critical instabilities are strange attractors, so the brain can manipulate coherence information through the usual transformations at such singularities. Such processing has no digital equivalent, and is therefore non-computable. **QED. P2**

**275 The Quadrimental Brain Model and Modular Consciousness** Bruce Morton <bemorton@hawaii.edu> (John A. Burns School of Medicine, University of Hawaii, Guatemala City, Guatemala)

McLean's Triune Brain Model was expanded to the Quadrimental Brain, due to the discovery of the extensive non-motor properties of the cerebellum. However, because of the bi-laterality of the vertebrate brain, this model was insufficient and led to the development of the Dual Quad-brain Model (DQ) with its semi-independent modular consciousness elements (Morton, 2011). The DQ accommodates multiple elements of consciousness, including those proposed by Freud and others. It can account for essentially all of human behavior from the diabolic to the divine. In the DQ, the right and left cerebral hemispheres contribute to normal consciousness, where the left hemisphere "Reporter" specializes in top-down analysis of important details, including language, while the right hemisphere "Imaginer" specializes in bottom-up analysis of the global view, including spatial imagery. Five evolutionarily earlier brain elements operate outside of hemispheric consciousness. The ancient limbic cingulate cortex appears to contain a unilateral executive "Ego", which has been shown to confer individual right or left brain-oriented behavioral laterality in the form of "Hemisity" (Morton & Rafto, 2010; Morton, 2014). It also acts in advance of conscious awareness to determine whether to use the unilateral brain core reptilian "Id" or the

unilateral cerebellar social brain “Superego” to pursue violent or non-violent solutions to the issue at hand. A defective developmental arrest repair program (“xDARP”) is also housed unilaterally in the cerebellum. Its unconscious activation leads to inappropriate struggles, often between mates, that are the source of common escalating conflicts leading to crimes of passion. This element is similar to Freud’s “Thanatos” and Tolle’s “Pain Body”. Lastly, another unilateral element of the brain core, “The Servant”, effector of final behavioral output, selflessly obeys a higher power, be it an internal brain element or an external hypnotic dominator. Thus, we are a committee of self-aware elements, most of which are outside of cerebral consciousness, a “Society of Seven”. The social brain Superego appears to be the source of the hidden “Higher Intelligence” or “Holy Spirit”, which comes to the fore in life-altering near-death experiences, including initiations, religious conversions, and psychedelic-induced “Ego death and transcendence”. These incidents also appear to have been at the origin of the world religions. Thus, the Dual Quadbrain Model provides a logical and testable framework to account for human consciousness and behavior. References: Morton BE (2011) “Neuroreality, or How 7 Brain Elements Create 7 Minds and 7 Realities”, Megalith Books, Doral, FL. Morton BE & Rafto SE (2010). Behavioral laterality advance: Neuroanatomical evidence for the existence of hemisity. *Personality and Individual Differences*, 49, 34-42. Morton BE (2013). Behavioral Laterality of the Brain: Support for the binary construct of hemisity. *Frontiers in Psychology*, doi: 10.3389/fpsyg.2013.00683. **PI**

**276 Alternate Dimensions to Neuroscience** Hari Mulukutla, Sarah Dolgonos MD, MPH <ashram@gmail.com> (Consciousness Studies, Shadowmere Center, Harriman, NY)

If scientific research approached the brain as a universally connected, inherently omniscient organ, what new understandings might we come across? This presentation will discuss the impact of frame of reference on our understanding of consciousness, and the research processes that drive it. For example, the hypothesis that the visual cortex is wired to detect Fourier transforms, rather than direct edges and geometric shapes, leads to a conceptual jump from one-on-one representation in neuronal cells to spectral distribution and analysis. Expanding further on the possibility of spectral distribution of neuronal inputs and outputs, some astute neuroscientists, such as Karl Pribram, have suggested that our brain functions as a hologram, where information is distributed universally and each part of the brain contains information related to the whole. mapped model. The model of a holographic brain enables new avenues by which innate knowledge and experiences that defy the space-time continuum may be studied and explained. Stories from Eastern philosophies, such as Shankaracharya’s Drik Drishya Vivekam and the Bhagavatam will be used to demonstrate parallels between the holographic brain and contemplative concepts of consciousness. **PI**

**277 General Systems Theory (GST) and Concepts of Indian Philosophy May Provide a Holistic View of Consciousness and its Evolution** Surendra Singh Pokharna, Dilip Bobra, MD <sspokharna15@yahoo.com> (General, Research Institute of Scientific Secrets from Indian Oriental Scriptures (RISSIO, Ahmedabad, GUJARAT India)

The concept of consciousness has become an active field of research after the discovery of finer structure of brain and involvement of quantum physics in its working. With the possible involvement of information in quantized space time geometry at Planck level and the idea of Objective Reduction (OR) and Orchestrated Objective Reduction (ORCH OR), there is a need to develop a more comprehensive concept of consciousness taking many other aspects into account like the evolution of consciousness towards certain goal; extra sensory perception; entropy and order related with spiritual evolution; possibility of information layers in human systems; concepts of consciousness and knowledge in the Indian philosophy in general and Jainism in particular.. General Systems Theory (GST) is a generalized methodology to study properties of both the physical systems and living systems. This technique includes even methodologies used to study these systems. Actually system’s properties depend on their domain. The domain of systems is the field over which they extend. It can be classified as to whether: (a) Systems are living or nonliving, (b) Systems are abstract or concrete, (c) Systems are open or closed, (d) Systems exhibit a high or low degree of entropy or disorder, (e) Systems display organized simplicity,

unorganized complexity or organized complexity, (f) Systems can be ascribed a purpose or not, (g) Feedback exist or not, (h) Systems are ordered in hierarchies and/or Systems are organized, (i) System and associated processes are reversible or irreversible, (j) Cause determines the Effect or the Effect determines the Cause and so on. Various systems which could possibly be considered in the present context are (a) OR and ORCH OR in neural systems, (b) mechanism of holographic storage in neural system, (c) non-local attributes and their implications on a macroscopic level, (d) possible information layers and their interrelations starting from Planck's length and going up to higher levels, (e) evolution of consciousness and ultimate goal of the evolution, (f) extra sensory perception which need not follow space time invariance condition of modern science but may still exist, (g) study of Shanon's entropy, order and their possible inter-relation with spiritual evolution of Soul as mentioned in Indian philosophy, (h) signal to noise ratio in the brain and its change with spiritual practices, (i) system for studying possible evolution of process of measurement related with consciousness and others. Some examples are given from Indian philosophy in general and Jainism in particular which indicates the possibility for existence of new frontiers of knowledge and evolution. They include the possibility of estimating sizes of microscopic particles of matter through knowledge structured in the consciousness, extraordinary memory of spiritual masters, exploring system of fourteen stages of consciousness and five different type of bodies of human beings whose extensive details are available in Jainism. It is proposed that most of the spiritual processes mentioned in Indian system of thought are accompanied by a decrease in rate of Shanon's entropy production in the biosphere. **P2**

**278 Transcendent Nature of Human Consciousness** Alex Vary <axelvary@wowway.com> (NASA Retired, North Olmsted, OH)

The usual question put is, "How does the brain generate consciousness?" It is proposed that a more potent and interesting question is, "How does consciousness generate the brain?" This question presumes that consciousness preexists and transcends its earthly material embodiment – that human consciousness is global, extending beyond the neural boundaries of the brain, beyond self-awareness, beyond sentence. To propose and argue the transcendent nature of consciousness, one must boldly assume that it transcends everything material – that consciousness transcends every aspect of the material world, indeed the observable cosmos. This paper provides a basis for arguing the transcendence of consciousness. The approach is to assume consciousness as a basic attribute of the universe – self-generated, physically implemented, abstract yet experiential. The challenge is to make theoretical connections between neural processes and conscious experiences. The usual methods of cognitive science and neuroscience have failed to yield a completely satisfying explanation of consciousness, or the intricacies of human consciousness. This paper assumes that our material reality is a part of a greater transcendent reality in which we humans are immersed through our consciousness. This paper contends that human consciousness transcends its physical embodiment while interlinking sub-atomic and life-evolving genetic domains with a universe of pure thought. We experience it in the space-time milieu of the physical world, which provides an environment for human consciousness to put things into spatiotemporal order – to satisfy an innate intellectual urge to bring order out of chaos. It seems reasonable to conclude that a transcendent omniscient consciousness needs the tangible and that the tangible needs consciousness to perceive order in chaos and, at least locally, to bring order out of chaos. An illustration is meme-driven evolution and replication toward generating an increasingly refined human integument for consciousness. A conceptual framework is proposed to help explain the transcendent nature of consciousness and its relation to the physical world. The proposed framework is based on deductions and information revealed primarily by distinct quantum phenomena which are demonstrably transcendent. An essential feature of the framework is the mesostratum; a signal transmission modality. The mesostratum machinery imagined here offers a explanatory gap-filling linkage from a superstratum transcendent continuum to a physiostratum temporal discontinuum. This paper suggests ways to access the mesostratum, to explore it; and also suggests new approaches needed to enhance the study of and explain the nature of human consciousness. **P2**

### 4.04 Emergent and hierarchical systems

**279 Practicing High-Order Consciousness at Low-Order Reality: Towards Building an Integrative Corporate Model of Consciousness System Dynamics** Sanjay Bhushan <bhushan.sanjay@rediffmail.com> (Management, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Inspired from the Downward Causation based evolutionary epistemology of consciousness which states that the processes at the lower levels are restrained by and act in conformity of the laws of higher levels of spiritual-psycho-physical realities; one can adventure to construct a dynamic and integrative corporate model of practicing socio-physical-psycho-spiritual consciousness in a day-to-day worldly routine. Bohr, Pauli, and Heisenberg; the chief architects of quantum theory had also made it abundantly clear that sharp dichotomies and contrarities can always be replaced with far more subtle and sophisticated complementarities between different aspects of the same reality. Similarly, consciousness system dynamics also displays a unique balance of integration, cohesion and robustness at the global level and differentiation and multiple realizability at the component levels. A Corporate Model of Consciousness presented in this paper emphasises over the management and real life adoption of the high-order spiritual consciousness aspects in a low-order psycho-physical-social living by judiciously blending spiritualism with a guarded materialism. This form of Consciousness Management System can be envisaged as a collection of decision components which are co-ordinated together to perform a function or attain a specific goal. These systems interact with their environment across a separating boundary while still maintaining gradation and hierarchy. The various aspects identified and integrated in our corporate model are related to diverse practices ranging from managing an individual's initial and desired states of spiritual consciousness, social diffusion of consciousness through pure spiritual corporate living practices, better health care practices and controlling the supply of counterfeit medicines through community consciousness and sensitisation, removing vulnerabilities of poor artisans in traditional textile clusters through innovative capacity building and competitive consciousness, promoting indigenous knowledge for disaster mitigation in tribal communities, to finally, exercising socio-environmental- humanitarian initiative of capacity building in the low-impact Eco-communities by ensuring supplies of adequate Physical, Social, Economic, Technological, Environmental and Spiritual resources. Using the modeling and simulation framework of System Dynamics, a holistic influence corporate model has been propounded which highlights the mutual interplay of influencing factors related to the diverse sub-elements of consciousness system as elaborated above. The model primarily investigates the structural dynamics of circular causality across the high order-low order spectrum of consciousness practices. It, therefore, captures the key structural relationships that define a complex consciousness management system based on inherent feedback channels projecting causality. Action and control are at the heart of this method and with the support of empirical facts and data, long-term impacts of various decision scenarios have also been simulated to assess alternative policy of practicing a corporate model of high order spirituality at low order reality under a holistic perspective. The present research has also identified the key policy intervention points that are critical for this purpose. It was also intended to assess the cascading effect that these interventionist decisions create over the entire consciousness spectrum. **P1**

**280 Phylogenesis of Consciousness: Absence of Correlation Between the Evolutionary Extension of the Human Brain Size and the Respective Development of Consciousness Manifestations** Michael Lipkind <michael@lipkind.info> (Molecular Virology, Kimron Veterinary Institute, Beit Dagan, Israel)

According to the classic Darwinian principle, an evolutionary advance of any physiological function is closely related to anatomical development of the respective organ, e.g. a giraffe's neck, an elephant's trunk, horse's hoofs, seal's flippers, a wasp's sting, etc., i.e. the function is the determining factor of evolution. However, the evolution of the human brain as an anatomical organ that provides consciousness does not follow the above rule. In particular, the extraordinarily rapid (on the evolutionary scale) extension of the humanoid brain ("The Great Encephalization") was



not accompanied with the corresponding advance in behavioral activity. Namely, the evolutionary development of anatomically complete human brain was accomplished about 190000 years ago, while the vestiges of human civilization were traced back about 40000-50000 years ago when the Cro-Magnon human began to express intellectual manifestations of the Homo sapiens. The discrepancy between the anatomical evolution of the human brain and its “delayed” functional maturation leads to conclusion that during more than 100000 years the anatomically complete human brain with its potential capacity for origination of consciousness was “out of use”. Such kind of development may look like an “evolutionary trend” towards the consciousness emergence, i.e. the evolution of the anatomical human brain was realized as if “in advance”, thus preparing the necessary conditions for the mental capacity to start functioning later. Such a scenario is beyond the regularities of classic genetics. The suggested explanation is based on the notion of field that is based on the action-at-a-distance principle. Accordingly, in addition to genetically based chemical activities, evolutionary development of any biological property is realized by the involvement of a hypothetical cellular field whose dynamic spatial configuration determines the species-specific evolutionary course. Out of the four field notions applied in the modern science only the electromagnetic (EM) field could be in principle employed for explanation of biological evolution. However, since the specificity of the spatial-temporal configuration of the cellular EM field must be completely dependent on intracellular distribution of solitary EM micro-sources, it can not take on the role of a primary factor determining the evolution of human brain. Therefore, the concept of a field irreducible to any known physical fields is attempted for the analysis of biological processes including such evolutionary prodigy as the utterly rapid extension of the human brain. The respective field theory delineated earlier (Gurwitsch, 1944) has been employed for analysis of different biological problems including some aspects of consciousness enigma (Lipkind, 2003), while the field nature is under discussion (Lipkind, 2013). Consequently, the rapid evolutionary extension of the human brain is explained by the respective dynamics of spatial-temporal configuration of the declared irreducible field of the developing brain. An additional suggestion concerns a starting point of such development which relates to a conjectural mutation in the non-coding DNA region, which up to recent times was considered as “evolutionary waste”. P1

**281 Fractal Brains and Fractal Minds: A Novel Symmetry, Self-Similarity and Recursivity Decomposition of the Structures and Processes of Brain and Mind Leads to Several Key Unifying Insights** Wai H. Tsang <wai.tsang69@gmail.com> (Independent, London, United Kingdom)

Brain and Mind science is characterized by dizzying complexity and a myriad diversity of facts and findings. We demonstrate that through the systematic application of the inter-related and fundamental concepts of symmetry, self-similarity and recursivity; we can show that the complexity of the brain reduces to a small number invariant organizational patterns and processes. These hidden symmetries span not just the physical substrate of brain but also the emergent structures of mind and allow us to conceptualize neuroscience and psychology as one continuum. We formalize our approach using the non-Euclidean geometry of binary N-Space and the hierarchical language of binary trees and binary combinatorial spaces. We show that this binary formalism corresponds to a wealth of empirical evidence and gives us a powerful and very general way of describing the structures and processes of brain and mind. One which is binary, bifurcating, doubling, digital, gridly and discrete. This unifying language then allows us to conceptualize all the various aspects of brain and mind as a single all encompassing hierarchical structure. So that the emotional, symbolic, sub-symbolic and neural substrate are brought together in a single conception and unity. With this unifying organizational principle, concept and language, we are then able to show that all the seemingly separate processes of brain and mind, are really the expression of a single underlying recursive process. Furthermore this symmetry of process extends not just to how brains and minds work, but also how brains come into being, i.e. neurogenesis. So that the entire brain theory is able to be succinctly expressed as a single recursive process deriving from a single atom of recursion. In the same way that our brains and minds derive from the originator recursive atom of the fertilized egg. The preceding, allows us to explain and implement recursive self modification and recursive self reference, which are some essential features of intelligence and consciousness.

This is through the introduction of a feedback loop whereby, the underlying recursive process creates and augments structure through instantiating mappings in combinatorial space. In turn the structures so created, themselves encode mappings which go on to further express the original process but in augmented form. So in the strangest of strange loops, the original recursive atomic seed, extends itself through mapping, then feeds back on itself recursively to better extend it self, and so on and so forth. Finally we use this to explain the full significance of the Polar Frontal Cortex, a brain region involved in recursive thought processes and show why this facility is key to understanding consciousness and explaining human intelligence over that of animals. **C24**

### 4.07 Quantum biology

**282 Opening “Pandora’s Box”: Direct Measurement of Microtubule Bundle Resonance in a Live Neuronal Axon Suggests Scale-invariant Brain Dynamics Extends Inside Neurons** Anirban Bandyopadhyay <anirban.bandyo@gmail.com> (Advanced Scanning Probe Micros, National Institute for Materials Science, Tsukuba, Japan; MIT, Cambridge, MA, Tsukuba, Ibaraki Japan)

Electromagnetic resonance (e.g. megahertz and kilohertz) discovered in single, cell-free microtubules (Sahu et al, 2013a; 2013b) has been questioned in terms of occurrence and relevance in neurons and the brain. In this study we inserted, and recorded from atomically sharp (0.1 nanometer) electrode tips in cytoplasm in and around bundles of parallel microtubules in axons of hippocampal neurons in culture. We found that (1) when the axon ‘fires’, the propagating membrane depolarization wave (‘spike’) is accompanied by a unique, complex waveform in cytoplasm, near and along the microtubule bundle. (2) Analysis of the intraneuronal cytoplasmic wave shows frequency overlap with recordings from single microtubules, with a common megahertz resonance peak. (3) We also measured cytoplasmic resonance in multiple neurons in a network or cluster of neurons, and found resonance overlap in the kHz domain. We suggest a spatiotemporal scalar (‘fractal-like’) hierarchy extends downward in size, and increasing in frequency, from brain to neuronal networks to neurons to microtubule bundles to microtubules, and to single ‘tubulin’ proteins (the subunit of microtubules). In such a proposed massively parallel, scale-invariant hierarchy, information at any level is distributed among all levels, and the entire system, and thus applicable to the mechanism of consciousness. References (1) Sahu et al (2013) *Biosens Bioelectron* 47:141:8. (2) Sahu et al (2013) *Appl Phys Lett* 102:123701. **PL9**

**283 The Feasibility of Quantum Coherent Effects in Microtubules and Their Potential Role in Neuron Function** Travis Craddock, Travis J. A. Craddock; Douglas Friesen; Jonathan Mane; Stuart Hameroff; Jack A. Tuszynski <traddock@nova.edu> (Psychology/ Computer Science, Nova Southeastern University, Ft. Lauderdale, Florida)

It was once purported that biological systems were far too “warm and wet” to support quantum phenomena mainly due to thermal effects disrupting quantum coherence. However recent experimental results and theoretical analyses have shown that thermal energy may assist, rather than disrupt, quantum coherence, especially in the ‘dry’ hydrophobic interiors of biomolecules. Specifically, evidence has been accumulating for the necessary involvement of quantum coherence and entanglement between uniquely arranged chromophores in light harvesting photosynthetic complexes. Amazingly, the ‘tubulin’ subunit proteins, which comprise microtubules, also possess a distinct architecture of chromophores, namely aromatic amino acids including tryptophan. The geometry and dipolar properties of these aromatics are similar to those found in photosynthetic units indicating that tubulin may support coherent energy transfer. Tubulin aggregated into microtubule geometric lattices may support quantum coherence, which could be of import for biological signaling and communication essential to living processes. Here we present evidence of coherent excitation between chromophoric amino acids in tubulin via dipole interactions coupled to the surrounding thermal environment. Arguments for the conditions favoring a quantum mechanism of signal propagation along a microtubule are provided. Plausible mechanisms connecting this quantum coherent phenomenon to overall neural function is also discussed. Within this framework we discuss information storage via post-translational modifications of microtubule subunits as a memory encoding mechanism, disruption of normal microtubule function via volatile anesthetics,

and the pathologic conditions of neurodegenerative disease resulting in cognitive impairment, including loss of consciousness. Overall, we provide a comprehensive framework for describing the molecular underpinnings of higher cognitive functions, including consciousness, that are consistent with both current neuroscientific theory, and the present understanding of quantum effects in biology. **C24**

**284 Ultrasound Vibrations Stabilize Microtubules In Vitro** Saatviki Gupta, Nandita Gupta; Arun Kumar Gupta; Stuart Hameroff <saatviki@gmail.com> (Dayalbagh Educational Institute, Delhi, India)

**Introduction** – Microtubules (MTs) are self-assembling polymers of tubulin, the brain's most prevalent protein. MTs support and organize neuronal interiors and synapses, are implicated in memory and consciousness, and have been shown to have megahertz resonant vibrations [1,2]. Ultrasound ('US') consists of mechanical vibrations in the megahertz range, and when applied to the brain (transcranial ultrasound, 'TUS'), reportedly improves mood in human volunteers [3], possibly acting via effects on MT resonant vibrations. In this study, we examined US effects on MT stability in vitro after assembly from tubulin. **Methods** – An in vitro assay kit (Cytoskeleton Inc., Denver, CO) with porcine brain tubulin and appropriate reagents and buffer was used for self-assembly of MTs, monitored by optical density ('OD') spectrophotometry. Preliminary experiments showed maximal MT assembly after ~20 minutes, following which three groups of MTs were studied post-assembly. Group 1 received taxol (which stabilizes/'freezes' MTs) immediately post-assembly (at ~20 minutes). Group 2 received US with a MicroMaxx portable ultrasound system from SonoSite, Inc. (Bothell, WA). With assembled MTs in a quartz cuvette, one outer wall of the cuvette was coated with a thin layer of ultrasound gel, following which the active US transducer at 5 MHz was applied to the gel-coated wall along its length for a 2 minute interval, followed by a gap of 3 minutes. This 5 minute cycle was repeated over the course of ~3 hours (36 exposures of 2 minutes), following which taxol was given. Group 3 received no US, and then taxol after 3 hours. All three groups were examined with electron microscopy after taxol stabilization. **Results** – OD indicative of MT assembly decreased slightly in the US-treated Group 2, and decreased much more in the non US-treated Group 3 so that at ~3 hours the US-treated Group 2 OD was ~28% greater than Group 3, indicating US-induced enhanced MT stability. Electron microscopy showed evidence of assembled MTs in Group 1 > Group 2 > Group 3. **Discussion** – US appears to stabilize assembled MTs in vitro, supporting the idea that TUS may act through neuronal brain MTs. As Alzheimer's disease, post-operative cognitive dysfunction, traumatic brain injury and other disorders are associated with destabilized MTs, our results suggest TUS may be useful in their treatment. **References** – [1] Sahu et al. (2013) Biosensors & Bioelectronics, (47)141-148; [2] Sahu et al. (2013) Applied Physics Letters (102) 123701; [3] Hameroff et al. (2013) Brain Stimulation, 3(6) 409-415. **C13**

**285 Subtle Energy Legitimized: U.S. Pat. #8,362,766 Circuit for Analyzing and Affecting Subtle Energy Resonance. Principles and Applications.** Stanley Jung Leib <stanley@jungleib.com> (Stanley Jung Leib Laboratories LLC, Portola Valley, CA)

Without instrumentation, philosophers cannot compete with neuroscientists. A Cartesian presumption endures that mind must ever be so private and immaterial as to be technically undetectable. Approaching the fourth century of this logjam, how does philosophy progress? Excluding emerging categories of technical evidence precludes the ability to ground consciousness objectively, yet apart from mere switches (neurons). Addressing this quandary, SJL's research into peculiarly-sensitive semiconductors has now earned the first USPTO recognition of its kind: a system for analyzing and affecting consciousness-related energies so subtle as to have evaded detection by conventional electromagnetic means. SJL's newly-certified instrumentation offers philosophy an escape from self-imposed limitations by enabling objective insight into two key areas inaccessible to neuroscience. First, is consciousness of inner states unprovoked by sensory input-reflection, memory, reverie-creative and intuitive solutions emerging from 95% unconsciousness into 5% consciousness: and how effectively the 5% concentrates, intends, attends, meditates, operates upon the world. The second area concerns impressions of spaces or places. Ceremonial venues or

humble doorways may suggest the sacred, commercial, natural, entertaining, competitive, healthy, or the dangerous. What is the origin, information content, and accuracy of these sentiments? Novel devices have been asserted to store intentions that could later and elsewhere influence physical, chemical, and biological processes. Continent-spanning entanglement stimulated some deep re-thinking of quantum physics. Yet these claims were vulnerable for their dependence on highly-practiced meditators. Since 2006, SJL has focused on removing idiosyncratic variables from psychoenergetic technology. To TSC 2009 we reported our real-time analyzer, and entanglement experimentation showing register-specific data transfers exceeding 75% accuracy. To TSC 2010 we reported the patent application and accompanying videos. To TSC 2011 we reported FFT proof that our sensors encode situation-specific periodic waves with high signal-to-noise ratios. To TSC 2014 we are honored to report 2013 January receiving U.S. Pat. #8,362,766 Circuit for Analyzing and Affecting Subtle Energy Resonance, and to update the conference on what has now been demonstrated, learned, and theorized. To stimulate research we introduce a modular sensor that can be interfaced to any popular micro-controller. For example, an adapting detector can seed a music synthesizer with evolving waves that uniquely voice its studio. Emotion-sensitive detectors enhance personal electronic devices. Signature capture also informs reversing the process: impressing minds and places with signatures generated from other sources. Signatures as diverse as healing disease, managing classrooms, purifying materials, increasing solar panel yields, or modulating nano-fabrication space could be distributed via the web. Theoretically, we suppose a Subtle Timbral Spectrum model within electromagnetics describing a massively-parallel wide-band crystalline-based gigahertz frequency response through stochastic resonance—invoking this biological mechanism to highlight the interface of inanimate and animate. Finally, we solicit the conference's expertise in quantum consciousness with regards to prior suggested SU(2) gauge state modulation, but more importantly, possible congruence with the Penrose-Hameroff-Bandyopadhyay trajectory—the coincidental points being animate emergence of the crystalline realm, and microtubule megahertz frequency generation. **P2**

**286 Experimental Studies of Microtubules** S Prakash, Aarat Kalra <shiroman@gmail.com> (Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The question of whether or not quantum information processing takes place in the brain is crucial for developing theories of consciousness. While many assume that quantum information processing cannot possibly be relevant to brain function, others disagree. In particular, Penrose and Hameroff have identified neuronal microtubules as potential candidates for structures supporting topological quantum computation in the brain. In addition to describing experimental work carried out by one of the authors, this paper will try to clarify our motivations for studying microtubules to an audience of non-specialists. We will also ask the question, what are the best experiments to support or refute Penrose and Hameroff's claims in the near future? It is important to distinguish between the various claims one might make about microtubules, and the extent to which experiments support these claims. One can claim that microtubules are special – they are involved in more than just cell structure and division. A stronger claim is that microtubules are involved in cognition and/or classical information processing. An even stronger claim is that microtubules are involved in quantum information processing. A great deal of evidence already supports the claim that microtubules are interesting, and more experiments along this track can be performed. However, finding evidence supporting or refuting the stronger “quantum” claims about microtubules is difficult. Quantum mechanics is certainly relevant for molecular physics (consider, e.g., the ammonia maser). The question is whether or not sufficiently complicated structures exist that protect quantum information from decoherence for time-scales long enough to allow some quantum information processing to take place. The challenge for theorists and experimentalists is to design smoking-gun experiments that would unambiguously support or refute precise claims about quantum information processing in microtubules. Some ideas on this front would be presented, but we admit that much work remains to be done. We would conclude by pointing out that, whether or not Penrose's objective gravitational reduction can be demonstrated, experiments supporting the existence quantum information processing in the brain would have profound implications the hard problem of consciousness. **P1**

**287 Quantum Biology in Laboratory Experiments and Consciousness Experimentals** Soam Prakash <soamprakashdayalbagh@gmail.com> (Zoology, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

Penrose and Hameroff theory of consciousness warrant quantum biology explanations. In nature, a few such phenomenon have been decoded and discovered so far. We have been engaged in the synthesis of Nanogold/Nanosilver particles with green technology and synthesizing geometrically different nanoparticles for various biological purposes (Soni and Prakash 2009, 2010, 2011, 2012, 2013). However whenever the new particles are being created using electron transfer from the membrane enzymatic system we found a change in electrical field. It initiates a new biofield studies due to reduction theory and a quantum biology system works within itself, (Prakash and Prem Saran, 2012). To elaborate we have used different species of fungi, plant tissues, plant products which are responsible for new particle synthesis.. We, therefore, suspect here a new quantum biology phenomenon in the synthesis of these nano materials are induced by photons/radiations could also be able to synthesize and generates differentially different nanomaterials. Using UV, Laser, Infra Red and Sunlight we could demonstrate this possibility. Each of this having unique experiment on Biofield formation. This will be presented in a sequentially initiating biofield to have similar effects. Therefore, could it be considered as good example for an quantum biology phenomenon (Richa and Prakash, 2013). In Experiential Experiments -The advent of quantum theory has brought the advent of a spiritual science of consciousness. The examples of quantum biology in fundamental phenomenon lead to self examination which warrants revolutionary change in approach of study itself. Whether or not science (present day consciousness science) consider it to be a part of science is not debatable as the quantum phenomenon has been now discovered in photosynthesis, bird's migration dynamics (?). Electron transfer in enzymatic reactions, nano material formations and in many similar phenomena in which we are attempting to answer the basic question of the spiritual transformation from man to god. Scientists have photographed soul leaving body, consciousness in disembodied bodies (Prakash, 2012) and so on. A bio-field theory emergence of radiations from spiritual objects (Satsangi and Sahni, 2012, He 2012) and even from microbes (Richa and Prakash, 2013) could be the answers to biofield formation and could also be observed externally by non invasive techniques in the inner experiential studies and in spiritual transformations (Price and Barrell, 2012). The dichotomy of eastern philosophy and western philosophy should not be existing now since Consciousness and quantum biology are universal phenomenon. A fusion of these two are the need of the hour. The biology of spirituality is a quantum phenomenon allowing you to be in two positions at the same time, as a soul (particle/energy) and wave function (energy wave) therefore establishing duality in nature. The requirements of this lead to inner practices. It is by doing synchronization, harmony, tunneling, entanglement, which leads you basically in two forms. Scientifically light or wave (sound) or coded names and their refulgence. Both can be perceived and experienced. It is experimented in the inner journey itself. Scientist looking for the quantification of consciousness may consider this a prerequisites for the consciousness experiences. **P1**

**288 Does the Stock Market Provide Indirect Support for Penrose/Hameroff's Orch OR Theory of Consciousness?** David Smolker <dsmolker@aol.com> (Apollo Beach, FL)

Penrose/Hameroff Orch OR theory proposes that consciousness arises from biologically orchestrated Diosi-Penrose quantum mechanical reduction processes within tubulin proteins that comprise collections of microtubules within brain neurons. These quantum processes are tied to fundamental space-time geometry and involve actual objective (i.e., physical) evolution of coherent superpositioned separated space-time configurations that reach a critical gravitational threshold before reducing to a single space-time configuration. This reduction is viewed as an instant of proto-conscious awareness cascades of which, when biologically orchestrated via microtubular and neuronal processes, give rise to streams of actual consciousness while regulating neuronal synaptic and membrane activity. As of yet, however, there is no direct proof of this theory, due primarily to the inability to measure the minute scale at which Orch OR is hypothesized to occur. If Orch OR is correct, however, we would expect that periodic changes in the brain's biomolecular processes, and, ultimately, in the character of conscious human behavior, should be calibrated

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to and synchronized with periodic changes in basic space-time geometry structure relevant to Orch OR. Markets may provide a clue as they are a direct window into the character of conscious human behavior. Prices rise and fall, sometimes dramatically, in direct relationship to the rate and intensity of the collective conscious neuroeconomic decision-making of market participants. The brain and markets both display cyclical, scale-free fractal behavior. This suggests that price fluctuations may be tied to fluctuations in the rate and intensity of Orch OR in accordance with  $T=h/E$ . Specifically, externally induced changes in the gravitational self energy of the difference between the two superpositioned tubulin mass distributions as measured by the temporal separation  $T$  and spatial separation  $S$  increase or decrease Orch ORs frequency and/or intensity resulting in an increase or decrease in the experiential intensity of each conscious moment. This increased or decreased intensity could be amplified through scale free, stochastic resonance of microtubules extending potentially brain-wide from one neuron to adjacent neurons via gap junctions and inter-neurons, and would be reflected in the increased volatility of markets themselves. The question remains as to what mechanism may induce these changes. It is tentatively suggested that these fluctuations are tied by Orch OR directly to the fundamental space-time geometry of the Solar System itself. Specifically, it is suggested that subtle periodic changes in the tidal gravitational effects on the Earth of the Sun/Planet system affects the rate and intensity of Orch OR in accordance with  $T=h/E$ . Preliminary visual inspection of the monthly S&P 500 since the early 1800s shows a clear correlation between major long term price shifts and the zero point phases of the angular momentum of the Sun as it orbits the Solar System's center of mass. This correlation provides indirect support for the validity of Orch OR theory. **C23**

### 4.08 Biophysics and living processes

#### **289 Does Consciousness and Electrons Exist in Water – A Necessity for All Forms of Life?**

Ingrid Fredriksson <ingrid-f@telia.com> (Triquetra-Return AB, Arjang, Sweden)

Every one of your cells are conscious, together they make up you and your consciousness. Does consciousness and electrons exist in water? In every living being and organism there is an entire world as amazing as the one we see around us. In our body there are 100 trillion cells (10<sup>12</sup>), and DNA that extends 10,000 kilometres. The base pairs in our DNA are held together by hydrogen. Maybe the hydrogen bonds in DNAs base pairs that constitute our immune system and our consciousness! There is water in the cells, and between them, and while large molecules have to go through membrane proteins to enter the cells, small molecules like H<sub>2</sub>O and O<sub>2</sub> can pass through the cell membrane without difficulty. In the spaces between the brain cells, at the end of every neuron, the basic unit of a brain cell, are synapses, where chemical charges build up. In the same space dendrites, tiny filaments of nerve endings communicate with other neurons, sending out and receiving their own electrical wave impulses. This, together with the quantum hologram and non-local consciousness, provides an explanation and an exciting developmental phase in the illusion in which we live. Consciousness appears to exist in everything that has DNA. If we conceive a non-local consciousness, as it is demonstrated by the EPR paradox, Alain Aspect, or modern information technology, we gain a number of explanations for what had previously been unexplained, as when consciousness leaves the body in out-of-body or near-death experiences when people describe having seen their body from above, or – why not – when a loved one dies and knowledge of this reaches us instantaneously on another continent. “I have my body and I am consciousness” says Pim van Lommel. **P2**

#### **290 The Simplicity of Complex Systems: The Inquiry Into the Nature of Life, Mind and Death Phenomena (essay)**

Mark Iosim <miosim@earthlink.net> (Hooksett, NH)

The emergence paradigm, which is dominant in complex system research, states that the essential properties of a system, as a whole, cannot be explained by the properties of its parts; the system's essential properties appear emergent. However, after almost a century of development, emergence has not demonstrated that it is a viable alternative to reductionism. The critical examination of emergence performed in this paper shows that the perception of emergence is caused by hidden properties of parts observable only during interactions in the system; a system acts as



‘litmus test’ or a ‘magnifying glass’ that reveals the parts’ properties not observable otherwise. This methodology leads to the inference that mental capacity is a fundamental property of matter. This description of the world, known as panpsychism, enables the explanation of not only life and mind phenomena, but also opens new opportunities in physics by offering a realistic interpretation of mathematical formalism of quantum mechanics. The proposed theory of intelligence, which is inclusive for living, nonliving, natural and artificial systems, shows that systems are capable of accumulating intelligence from one hierarchical level to another. The critical element of this theory is the ability to share information, which is also the foundation of the proposed theory of consciousness. Without sharing information, the system cannot be considered conscious, regardless of how conscious their members are. A rock, regardless that it may consist of conscious molecules, is an aggregate because its molecules have an insignificant degree of interaction among themselves. Some living and even social entities are also aggregates; a population of inmates locked inside jail cells or passengers on public transportation do not share information, and therefore their collective consciousness may not exceed that of a rock. The system’s conscious experience is not simply a sum of conscious experiences of its members. Instead, the system, as an entity of higher intelligence, acquires a conscious experience that is not accessible by its members. The dynamic reciprocal relationship between intelligence and consciousness causes the accelerated evolution of conscious systems toward the highest levels of intelligence and consciousness. Intelligence is not recognizable in nonliving, equilibrium systems. However if systems steer far enough from thermodynamic equilibrium they start making unavoidable mistakes in search for equilibrium that lead them farther away from their destination toward increasing complexity and self-organization thus making their intelligent abilities observable. Nevertheless, we do not recognize these abilities as intelligence; instead, we call it ‘life’. The proposed view on life phenomena offers a new road map on biological evolution in which chance and random mutations are replaced with the goal-directed intelligent processes. The sophistication of biological forms is the living testimony of how intelligent these processes are. If ‘life’ indeed emerged due to the inevitable mistakes in finding equilibrium, ‘death’ must be what ‘life’ is looking for, but it takes a lifetime to reach this destination. Thus, life and death are deeply interconnected and we may never understand life without understanding death. **P1**

**291 The X-Structure; the Basic Nature of Life and Existence – Ontology of Consciousness and Reality** Steen Loeth, Arnold Therner; N-B Therner; Per Bruus-Jensen <nep@newcosmicparadigm.org> (and New Science, NCP X-AION New Cosmic Paradigm – Advanced Institute of Ontological Principles a, Skoevde, Sweden)

According to the X-structure reality fundamentally – both objective and subjective – is immaterial emptiness and stillness. The X-structure constitutes the very basic nature of Reality, Life and Consciousness. This fundamental X-structure is in principle the same for everything including the infinite Universe, and activates and transforms the emptiness and stillness into energy, force, movement, matter and life-experience/consciousness. The primordial domain of existence “X0” is an all-embracing unmanifested, virtual world of emptiness and stillness, containing infinite potential of creative possibilities and continuously activating an indivisible, integrated, triune operating principle with three functional aspects: X1 creator and experiencer (the subject/I, emptiness, stillness); X2 creative and experiential ability (energy); X3 the created and experienced (movement, the material illusion, the manifested universe, life-experience/consciousness). X2 is expressed by seven extremely subtle qualitative “fundamental/basic energies” with specific characteristics. These basic energies build up everything from the most subtle (consciousness, thoughts, feelings, memories etc.) to the very densest (physical matter, black holes etc.). The primary fundamental energy (“the mother energy”) holds and operates via a number of so-called creative principles, termed morphogenetic effect constants; formative and structuring forces which sustain and organize life and reality. We can empirically observe the effects of these morphogenetic effect constants e.g. in the constants of nature, laws of nature with their extremely delicate precision. The X2-function and its effect constants “split up” the all-embracing totality (X0), i.e. the status of nonduality and nonlocality, the nature of infinity and eternity is divided and separated into life-units, individuals, as well as states and distances, comprising space and time, etc. The

complementarity of wholeness/oneness – duality/separation, and also “the structure of entanglement” are formed and expressed through the morphogenetic effect constants (X2). The result of the interaction between the subject (X1) and its creative/experiential ability (X2) is represented by the created (X3), namely the material illusion as objective reality on one side, and the experience of it as subjective reality on the other, “the subjective reality complex”. Everything created (X3) emerges as expressions of life (movements) and thus constitutes a contrast to the X0-nature of emptiness and stillness. Creation involves conversion of energy and manifests itself as movement – the five universal classes of motion: primordial motion (“from A to B”), space, time, transformation, matter. Motion is the most distinctive feature of life – movement is life in demonstration. Note that all motions of the Universe neutralize each other, confirming the all-embracing X0-nature of emptiness and stillness. X3 includes as mentioned the experience of expressions of life (movements) and thus the generation of consciousness, i.e. knowledge of something’s being, including itself. The phenomenon of consciousness/life-experience concerns the way in which X2/energy and its objective functions (= energy conversion X3/objectively), exist for X1 (= life-experience X3/subjectively). The X-structure is based on the intuitive knowledge illustrating the Cosmic Worldview conveyed by the Danish intuitive philosopher Martinus Thomsen – presented by Per Bruus-Jensen and “the X-Project” by NCP X-AIONS, Advanced Institute of Ontological Principles and New Science, researching the Ontology of the Cosmic Worldview and presenting New Science, [www.newcosmicparadigm.org](http://www.newcosmicparadigm.org) **P1**

### 4.09 Evolution of consciousness

**292 Consciousness of Oneself as Object and as Subject. Proposal for an Evolutionary Approach** Christophe Menant <[christophe.menant@hotmail.fr](mailto:christophe.menant@hotmail.fr)> (Bordeaux, France)

We humans experience ourselves as objects and as subjects. The distinction initiated by Kant between consciousness of oneself as object and consciousness of oneself as subject was a strict one. The rigidity of that distinction has been challenged by philosophers from the continental and the analytic traditions [1]. From another perspective, researches about animal self-awareness are widening the horizon of studies relative to the nature of self-consciousness [2]. These various perspectives introduce the interest about addressing consciousness of oneself as object and as subject in an evolutionary background. We propose here to follow that path by using an existing scenario about the evolutionary nature of self-consciousness based on evolutions of representations and of inter-subjectivity [3, 4]. The scenario presents an evolutionary approach that can introduce self-consciousness as an acting body and self-consciousness as a thinking and feeling entity. These two aspects of self-consciousness are then compared to consciousness of oneself as object and as subject. The scenario proposes that an evolution of inter-subjectivity brought our pre-human ancestors to reach the capability of identifying with their conspecifics. This process coupled with an evolution of representations led our ancestors to build up representations of themselves as entities existing in the environment, like the conspecifics they identified with were represented. As conspecifics were perceived as existing and acting in the environment, identifying with them led to an elementary version of self-consciousness as an acting body, close to self-consciousness as object. Also, as different conspecifics could display very different behaviors like dominant or submitted, it was not possible to identify with them spontaneously. Knowing and understanding one’s own identity as perceived by other members of the group was necessary for a pertinent identification with conspecifics. Such need to think about one’s own characteristics and identity introduced self-consciousness as a thinking and feeling entity, close to an elementary version of self-consciousness as subject. In addition, the mental states of the thinking and feeling subject monitoring the actions of the body object addressed the common evolutionary source for consciousness of oneself as object and as subject. We present here that evolutionary approach to consciousness of oneself as object and as subject with the corresponding phylogenetic outcomes relative to the mind-body problem. Continuations are proposed. References:[1] Beatrice Longuenesse. Self-consciousness and consciousness of one’s own body: Variations on a Kantian theme. *Philosophical Topics* 34 (1/2):283-309 (2006).[2] Mark Bekoff. Consciousness and Self in Animals: Some Reflections. *Zygon*. Volume 38, Issue 2, pages 229 -245, June 2003. [3] Chris-

tophe Menant, Evolution and Mirror Neurons. An Introduction to the Nature of Self-Consciousness. TSC 2005, <http://cogprints.org/4533/>. [4] Christophe Menant, Evolutionary Advantages of Inter-subjectivity and Self-Consciousness through Improvements of Action Programs. TSC 2010, <http://cogprints.org/6831/> **P1**

**293 Affective Constitution of Consciousness: An Evolutionary Foundation for Cognitive Forms of Consciousness?** Jaak Panksepp <jpanksepp@vetmed.wsu.edu> (Integrative Physiology and Neu, Washington State University, Pullman, OR)

My goal here is to suggest that an understanding of affective processes may be an optimal way to scientifically understand the constitution of conscientiousness. Because of the bipolar affective structure of brain emotional processes – comprised of various negative and positive affects – a neuroscientific fathoming of raw emotional feelings may be an ideal scientific approach to penetrating the neural constitution of primal consciousness. The key finding is as follows: We have long known that wherever in subcortical brain sites one applies highly localized deep brain stimulation (DBS), and obtains coherent emotional behaviors (e.g., Seeking, Rage, Fear, Lust, Care, Panic and Play), animals will treat these within-brain arousals as ‘rewards’ and ‘punishments’ as evaluated by various simple learning tasks. These effects do not need to be ‘read-out’ by neocortical functions. Since rewards and punishments are always experienced by humans, we should grant feelings to other animals. Incidentally, humans consistently report experienced affective changes during such artificial DBS applied to those subcortical neural circuits. Thus, the first glimmers of consciousness in Brain Mind evolution arose in medial zones of the brainstem. These hedonic effects, of subcortical origin, are gold standards for the existence of evolved affective qualia in animal and human brains. These affective qualia arise from emotional action systems of the brain. These affective states directly index survival issues, and probably guide the unconscious learning mechanisms of the brain through yet unfathomed ‘Laws of Affect’. Further study of intrinsic brain emotional systems has the potential to promote our understanding of how the foundations of mind were evolutionarily constituted from intrinsic survival coding/promoting neural activities. Thus, abundant evidence suggests that bottom-up affective regulation of learning emerged earlier than top-down cognitive controls in neuro-mental evolution. This analysis suggests the likelihood that mental features that emerged first in neural evolution (e.g., affective consciousness) served as an essential scaffolding for the emergence of higher cognitive consciousness. In sum, more recently evolved neocortical brain regions cannot exhibit consciousness without brainstem affective substrates. In a more speculative vein, cognitive abilities may have emerged from affective feelings, explaining why affects still guide a great deal of higher cognitive processing that emerged later in Brain Mind evolution. One way this may have been achieved is that the ‘free-energy’ of low-frequency affective neurodynamics (e.g., theta rhythms), which emerge from more ancient subcortical SEEKING regions of the brain, helped constitute a more subjectively discrete cognitive-anticipatory, external information-based consciousness in higher brain regions. Cognitions may arise from a neural transformation of ‘free subcortical affective energies’ to higher-frequency neurodynamics (e.g., forms of ‘bound-energy’ – beta and gamma rhythms). Thereby, the lower-frequency rhythms of emotional affects may have been a platform for the emergence of higher brain experiential functions. This also helps explain the continuing power of affective processes in guiding and regulating cognitive information processing at all phases of life. In short, the premise advanced here is that the earliest evolutionary forms of consciousness served as a critical platform for higher forms of consciousness. **C20**

**294 Significance of the Physical World for Consciousness Evolution** Chhaya Satsangi, Soami Prasad Satsangi <singh\_chhaya@yahoo.com> (DEI Dayalbagh Educational Institute, Panvel, Maharashtra India)

Consciousness is awareness or knowing and is an integral part of human personality. It is beyond mind and matter, and our most prized possession. It sets us apart from the opulent variety of earth-life and puts upon us an onus of responsibility. Its evolution enables us to distinguish between the temporal and the permanent. Like the sun gives life to this earth, similarly, consciousness give a direction and purpose to human life in accordance to ones level of consciousness evo-

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lution. Out of the various types of existences in the physical world the greatness of human body has been emphasized in different world religions. In Christian tradition it is said that God made man after His own image and in Sant Mat the human body is said to be the microcosm of the great macrocosm or Universe. In human body there exist six centers of energy and through them one can establish contact with the different subtle regions of creation in the universe by meditation or other spiritual practices and can acquire higher consciousness. As for a small child, the school acts as a place for the evolution of his consciousness & the teacher in the school helps to develop his consciousness similarly this physical world is the school for the man and the Spiritual guide is his teacher. For evolving higher consciousness proper guidance from a spiritual guide is necessary. In Sant Mat the Sant Satguru, a spiritual guide is said to be the manifestation of the Supreme Being- the creator of this universe. Though he looks like an ordinary human being but in reality he is undifferentiated from the Supreme Being. His spirit is in direct communion with the Supreme Being. He uses the physical world as a means to teach the man and to remove his ignorance. The man learns through the daily experiences in his life here. These experiences finally add to his consciousness. Gradually the man realizes that his attachments to the things of the world are the cause of all the sorrows and the Sant Satguru is his real Father. As the true importance of happiness can't be realized in absence of sorrows, similar is the case with Supreme Being. We can't realize His importance in absence of this physical world. Our interactions in the world help us to comprehend the temporal nature of the things here. Under the guidance of the spiritual teacher & through this human body only one can attain higher levels of consciousness. The Sant Satguru thus helps us in evolving our consciousness and to experience the bliss through the gift of human body, while still living in this world of temporal nature. So this physical world which is also referred to as Maya is very much a part of the Supreme Being and is not an obstacle to realize our oneness with the Supreme Being but a means for that. **P1**

**295 The Natural Problem of Consciousness: Why Feeling Has Not (yet) Been Selected Against in the Actual Natural World** Pietro Snider <pietro.snider@unibas.ch> (Philosophisches Seminar, Swiss National Science Foundation (SNSF), Basel, BS Switzerland)

Current scientific consciousness research aims at understanding the nature, function, and underlying mechanisms of consciousness. A central theoretical and empirical question regarding its causal function has however not received sufficient attention. Admitting that feeling (i.e., the qualitative aspect of experience) is a subjective biological phenomenon supervening on physical properties of the brain, what is the best explanation for the fact that feeling has not (yet) been selected against? How can we explain the fact that such contingent supervenience relations have endured throughout evolution until the present time? The contingency of correlations between neural activity and feeling, even if coupled with an evolutionary story about the fitness advantage of having a neural system, is not sufficient to exclude the possibility that the very fact of feeling has (or at least has had) some self-standing biological value too. Could being conscious have contributed to the overall biological fitness of the members of some species? How? Drawing on interdisciplinary research, I claim that feeling is a cost-effective pattern-detection system assembling diverse information coming from a complex integrated multi-modal sensory system onto a weighted, unified, rough subjective experience which is informed well enough to drive selective behaviour. I suggest that variations in the rough valence of some feelings (feeling good or bad) have been tuned by natural selection to encode pre-conceptual information about how to react efficiently (quickly and with a better-than-chance success rate) to a countless number of potentially life-threatening situations. I claim that feeling is a biologically efficient phenomenon contingently better than non-feeling at prompting selective behaviour in beings having to deal with a multitude of integrated multi-modal sensory information and living under demanding environmental constraints. **P2**

**296 Information Controlling Energy in Complex Control Loops Enabled Survival of Genes in Cells and Organisms Which Evolved into Concepts of Self and Ultimately into Consciousness** Paul Storey <paulstorey@live.com> (Robotics Engineer, T3M, Citrus Heights, CA)

Science utilizes quantities which are known and measurable, verifiable and repeatable, as the building blocks of our explanations of the universe. These principles are applied to the explana-

tion of consciousness. Evolution is the explanation of the origination and development of life. As one of the most remarkable creations of evolution, conscious minds are the culmination of a long path through the billions of years of increasing complexity of reproducing creatures on earth. If we adopt the evolutionary viewpoint in our quest to explain and understand consciousness, then consciousness can be seen as coming from nonexistence, up through primitive single celled beginnings, through billions of years of increasing complexity allowing increasing abilities, to its remarkable present state. Although this viewpoint will be difficult to accept for those with supernatural inclinations, it allows us to use the tools of science and engineering to be applied to consciousness, and to compare the brains and the qualities of perceptions and awareness of the plethora of creatures surrounding us as waypoints leading to the consciousness which we possess. The evolution of consciousness throughout billions of years then extrapolates backwards to a definition of consciousness in fundamental physical units expressed in engineering terms. The tools of the hard sciences, thermodynamics, entropy, information theory, cognitive science, robotics and artificial intelligence, can then be applied to the brains and minds at all progressive stages of life which culminated in our conscious minds. My previous presentations discussed in depth the control systems of primitive simplistic organisms, and why these control systems were so essential to understand how a cell could maintaining equilibrium to sustain its life, followed by how additional control enabled the creature to move, to coordinate its parts, integrate sensory data into internal states representing an external world, and states representing itself. The self was the aggregate of the control systems acting to maintain homeostasis so its chemical systems could continue to function thus continuing its existence. The control systems enabled information to control energy for a purpose which is maintaining homeostasis. These information controlled energy systems, over time and increased complexity, became the goals, the drives, instincts and emotions of the organism. Control theory is not an easy field to understand, nor is it lucrative to those studying consciousness from other perspectives, but it is indispensable to keeping one standing without falling over or to understand how anything can walk on legs. The actions to seek food, shelter and reproduce are all activities coming from advanced control systems built on earlier control systems. Briefly, information controls the flow of energy to maintain the commanded set point. The set point is the goal, the purpose, which in living things is to sustain existence and to reproduce. In life, the genes are the ultimate information controlling the flow of energy of the organism. Survival of the self in single celled organism evolved into consciousness. Consciousness is defined from its physical fundamentals as energy carrying information flowing through complex control loops with the purpose to sustain the self. **P2**

**297 Consciousness: The Forgotten Element in the Evolution of Altruism** Burton Voorhees <burt@athabascau.ca> (Center for Science, Athabasca University, Victoria, BC Canada)

Questions of altruism and morality have been points of contention in evolutionary biology and evolutionary psychology for many years. Apparently altruistic behavior has been found in higher animals, in spite of the apparent loss of evolutionary fitness implied by acting for the benefit of others at a cost to oneself. Altruism has been explained in terms of acting to transmit closely related genes (kin selection), group selection, and expectations of reciprocity. On the other hand, human altruism seems to sometimes go beyond altruistic actions that provide biological or economic reward. Humans also gain psychological benefits from extending help to others, and feelings of satisfaction at "doing a good deed" can provide sufficient reward. There is a question of identity involved. Humans tend to congregate in marked groups and to make personal sacrifices for the benefit of the group, even if it isn't composed of close genetic kin. This is because we have to capacity to (and are vulnerability to) identify with ideas, beliefs, symbolic cues, and so on. These become a part of our personal identity and, as such, evoke survival related behavior with biological foundations. If the basic identification is simply with Humanity as such this leads to a different sort of altruistic behavior than if our basic identifications are with sports teams, political ideologies, religion, racial or ethnic groups, nationalities, and so on. In this paper, we suggest that there is an objective foundation for altruistic behavior beyond marked group identification, namely our ability to recognize identity of consciousness with other human beings. By considering the relevance of consciousness, and self-consciousness this apparent paradox is resolved. **P1**

**298 Engaging in a Co-Operative Inquiry into the Evolution of Consciousness** Joan Walton, McCann, Martin <waltonj@hope.ac.uk> (Education, Liverpool Hope University, Alvechurch, WORCS United Kingdom)

The aim of this presentation is to report on the first phase of an action research (co-operative inquiry) project. Research question: Given the hypothesis that we, individually and collectively, are involved in the evolution of consciousness, what are the implications for how we live our lives? Research focus / aims: 1. To engage in a co-operative inquiry to discover what happens when individuals aim to continuously hold in their minds the view that “consciousness is primary, and we are participating in an evolution of consciousness”. 2. To discover what evidence can be collated through direct experience which will either support or negate the hypothesis that we are, individually and collectively, participating in an evolution of consciousness. Theoretical framework: The inquiry has been informed by writers/researchers such as Alan Wallace and Amit Goswami, who argue for the primacy of consciousness; and also by the findings of quantum physics, such as the double slit experiment, in which it is proven that the presence of an observer influences the nature of reality that emerges. Methodology: A group of 10 people have come together to engage in a co-operative inquiry. Co-operative inquiry was developed by John Heron (1996), and involves two or more people researching a topic through their own experience of it, using a series of cycles in which they move between this experience and reflecting together on it. Co-operative inquiry is an appropriate research methodology for those who wish to engage in research that enables personal and social transformation. By including a focus on subjective experience, it is relevant for the study of consciousness, which is experienced subjectively by all human beings. The group has also accepted William James’ idea of “radical empiricism”; that is that we will include in our inquiry any aspect of our experience; but we will not include anything which we have not experienced. Findings: Even at an early stage, there have been rich and diverse findings, which will be shared in the presentation. One example of these is as follows: the co-inquirers have discovered that the nature of reality which emerges from within the group is influenced by the nature of the questions that are asked. For example, if we attempt a rational debate to define the concept of “consciousness”, we get caught up in a contentious argument which results in tension, and a growing sense of conflict in which individuals attach themselves to notions of “right” and “wrong” answers. However if accept consciousness as something we all experience, and we share in turn our experiences of what are significant experiences of consciousness, we find that we can appreciate each other’s experiences, leading to a sense of connectedness, warmth, and general well-being. The implications of this for how we might live our lives in wider society, and how we can influence the quality of relationships in communities, both local and global, are explored. P2

### 4.10 Medicine and healing

**299 Placebo Effects, Mirror Neurons, Biological Motion, and Manual Therapies in the Medical Therapeutic Context: The Art of Medicine** Kristen Corman <kristencorman@mac.com> (English; Health Sciences, Worcester State University; Brigham and Women’s Hospital, Boston, MA)

What is the relationship between placebo effect in a medical therapeutic setting and the activation of the patient’s mirror neuron system? Over the past decade, research on the placebo effect has shifted from the non-genuine nature of placebo to the “genuine psychobiological event” that the patient experiences (Finniss 2010; Price, 2008; Kong and Gollub, 2006). The neurobiological, psychological, and behavioral responses, or “placebo effect,” in the patient occurs in a psychosocial context that activates the patient’s receptor pathways for conditioning, expectancy (Benedetti 2003), somatic focus, memory, and meaning (Finniss, 2010). Psychosocial context may include both the clinician-patient relationship, such as engaged forms of bedside manner, communication, and empathy (Finniss 2010; Kaptchuk 2008), and the clinician-administered procedure, “act,” “simulation” (Finniss 2010), or “ritual” of treatment (Miller, 2008). The patient’s interaction with the environment also informs this psychosocial scenario. It is this surrounding context that is dynamic, not inert, in its effect (Finniss, 2010; Benedetti 2003). Manual therapies provide an insight into how mirror neurons may enable the placebo effect. Visuo-motor mirror neurons in



humans activate both when an individual observes another person execute a motion, and when the individual executes the same or similar action. The mirror system maps the visual system's description of motion onto the motor system's understanding of what that action means. Mirror neurons thus mediate understanding of action (Fadiga 1995; Decety 1999; Rizzolatti 2004; 2008), intention (Iacoboni, 2005; Fogassi 2005), empathy (Iacoboni 2008), imitation, emotion, language (Rizzolatti, 2008a,b), and manual tool use (Iacoboni 2008; Umlita 2007; Ferrari, 2005; Hofer, 2005). Placebo effects can also come into play without conscious awareness (Jensen, 2012). The motor aspect of mirror neurons can also be activated in an unconscious state, for example, in REM sleep dreams of motion (discussion, TSC 2010; Hong 2009). Though unconscious dreamers don't see a perceptual experience generated from external stimuli, they do experience "fictive" movements and visions (Grillner, 1985; Porte, 1986; Hobson, 1988). In conscious states, mirror neurons are activated by the biological motion of the human joint system (Johansson, 1980), the "pendular motions of the limbs" that are processed by the STSp motion and object pathways (Grossman, 2002; Calvo-Merino, 2008). Presumably, patients' mirror neurons activate while observing clinicians' hand-arm gestures, when hands interact with target objects (Gallese, 1996). Moving hands or muscles are internal (somatic) motor activities (Damasio, 1989a). Through "somatic focus" (Finniss, 2010), hand motion could form a contextual prompt to open pathways to create the placebo effect. In Damasio's model of consciousness, the particular sensory cortice that takes in the stimulus information affects how it is stored and recalled (Damasio, 1990). Information taken in through the hand, such as tools or playing an instrument, can affect domain inscription (Damasio, 1989b). Both mirror neurons and placebo effect models activate to hand motion. Both mediate emotion and empathy (Rizzolatti, 2008a,b), with placebo working through conscious expectation (Price, 2008). These neurobiological benefits can be evoked during manual therapies (acupuncture, reiki, engaged communication). "Manual contact" may increase the effect of the placebo treatment (Streitberger 1998; Price, 2008). **P2**

**300 Analysis of the Material and Immaterial Elements in the Healing Places: The Case of Mayantuyacu in Peruvian Amazon Forest** Tania Re, Gavazzi A, Capolupo A, De Lauro E, Falanga M.R, Morese R, Epifani F, Loiacono I, Perotti G, Siri A, Vitiello G, De Martino S, Firenzuoli F, Gori L, Fani R, Valentini, Elia V, Mancuso S, Toso D, Encalada S, Flores J. <tania.re77@gmail.com> (Anthropological Department, Unesco Chair – University of Genoa (Unesco Chair Anthropology of Health – Biosph, Torino, Italy)

Premises: Right from the most distant prehistoric sites of care and healing were identified for a particular energy and environmental shape. The sensitivity towards nature, plants, rocks, exposure to light or in the dark of night shelters, areas of plant growth, it was always a crucial aspect in the identification and selection of suitable topos energy to medical care. The place is already a part of the therapy. Somehow the emergence of modern medicine and the indifferent localization of the sites linked to the planning of care therapies and the undifferentiated urbanization, has in fact neglected, apart from a few isolated cases, this aspect of the cultures of health. In this historical moment in which western medicine and are trying ethnomedicine a common approach to medical science by exchanging knowledge and experiences, is there space to bring greater awareness to the relationship between the care, the environment and knowledge told The research: The research project involves a multidisciplinary team of anthropologists, physicists, chemists, ethnobotanical, architects and medical doctors and its primary objective is the analysis of places of healing and the processes that have in place. In particular, in it was analyzed Mayantuyacu, a healing center located in the Peruvian Amazon where the ancient art of healing ashanika is set. Mayantuyacu is situated on the bank of a river with thermal water at 100 – flowing in the middle of the forest. Around the central Maloca, where is the common life, were built to accommodate malocas other people who come to Mayantuyacu to know and to seek treatment from knowing millennial ashanika and properties of thousands of plants including plants teacher. Results: We analyzed the following elements: water, music (icaros), teacher plants, ceremonial architectures (malocas) involved during the healing ceremonies and their impact on different species (plants, animals and humans). Particularly we analysed the following elements: 1. Architecture: we present preliminary results obtained by the study of the ethnographic emphasis has allowed us to identify the

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presence of sacred spaces and their periodic re-enactment in ceremonial events, which constitute the central event of the transmission of a world view and a stable and harmonious relationship with the landscape and with other living beings 2. Water: we present preliminary results obtained by the study of the electrical conductivity measurements on different samples 3. Music: we present preliminary results obtained by the study of the heart mechanical vibrations by means laser Doppler vibrometry. We compare the recorded signals for an individual in two different conditions: at rest and listening to the music of the South American shamans. An analysis of the shaman music is also realized, by using the decomposition method in time domain, in order to study self-similar structures of the listened music. 4. Teaching plants : We present preliminary results obtained by the study of the different properties of the teaching plants used by the ashanika. Conclusions: The co-presence of several areas ensures the necessary dialogue between knowledge to fully preserve the tangible and intangible heritage and acquiring knowledge about ancient healing process and innovative consciousness aspects involved in them. **P2**

### **301 Prevalence of Intuitive Preference Among University Students and its Relation to Stress**

Poonam Sharma, Ira Das, Head, Department of Psychology, DEI <khushi2327@yahoo.in> (Psychology, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

A study of Intuitive preference was made on a sample of 120 university students (both male and female) of middle socio-economic status. Intuition was measured with the help of MBTI by Briggs & Myers. Those who prefer intuition tend to focus on the future, with a view towards patterns and possibilities. The scores on intuitive preferences was found to be normally distributed. Though the coefficient of correlation between intuition and stress was very low, it was found that students with very high and very low stress had low scores on intuition. Students with optimal level of stress had highest level of intuitive preference. This shows that at least an optimal level of awareness and alertness is required for perception of possibilities, meaning and relationship by way of insight. Very high level of stress also decreases intuitive preference. **P1**

### **302 Psychoneuroimmunology** Shubhrananda Swami, Shubhranandaswami Psy.D.

<drshubhranandaswami@templeofbhaktiyoga.com> (San Diego CA and Cornville, AZ, Temple of Bhakti Yoga, Cornville, AZ)

Consciousness, being the foundation, the circuitry of our microcosmic universe. Acceptance and ones sincere willingness to participate in their own change in direction of consciousness, releasing any potential and actual illness or disease need be addressed at five levels of consciousness: Bliss, Supramental intellect, mental, vital, and physical. Psychoneuroimmunology is the suppression of the immune system via repression, suppression and oppression of ones true nature which causes anything from mental illness, cancer to arthritis and the effect is in the action, non-action and or reaction of the person. Psychoneuroimmunology including a persons belief systems, begins ones alignment to health. Dis-ease is not purely genetic or germ theory based; it is, causality, karmic potential susceptible to environmental possibilities. Psychoneuroimmunology includes study of the brain (which is the map of ones vital body) where all illness and disease of that one person can be found, is traceable in the consciousness of the being. Sri Ma insists we feel our changes, they are a must for the collective quantum shift in human consciousness. Absolute knowledge is a must for growth and development with theoretical and practical teachings of the Absolute Truth. These are the means through which Mataji uses to unfold the Truth of every human being. Swamiji teaches that consciousness is the very foundation of Be-ing. The first sense, often referred to as the sixth sense, is intuition. It has all but, died along with vulnerability. The mind, by nature is pure. The essence of mind is meaning. The mind holds onto the impressions of our life, the Soul is the repository of memory. The impressions of the mind become thought forms which we define our life by. All of life is circuitous. Here is where disease can become physically apparent. Understanding bloodline consciousness is key to unlocking all clinical diagnosis, be it, diabetes from womb born adrenalin dumps due to predisposition of mothers emotional state to sexual abusers and the victimized, and the ability to recognize psychopathy and more before age 7 years. If healing is to occur there must be acceptance of the imbalance of origin then-educate-eradicate and annihilate everyone else's concepts and perceptions and find you. 99.9% of the human condition

is ignorance and that is curable. A desired resolution toward wellness is required for a balanced peaceful life. **P2**

**303 From Newtonian Medical Model to Einsteinium Holistic Model** Amanda Velloen <amanda@qhsa.co.za> (Research and Development, QRL, Pretoria, Gauteng South Africa)

Albert Einstein knew about it, a genius who lived very humble in the early 1900. He identified that energy was all that is, could be used either to destroy or to heal. Today, Quantum Physics, exploring Consciousness, definitely and amazingly helped me with the study of this energy and its relation to all aspects of our everyday reality. Today I can proudly introduce my book, "Change your thinking and be healthy". Modern science, especially Medical Science can now explore this energy and its avenues for healing. A paradigm shift from the Newtonian Medical Model to the Einsteinium Holistic Model needs to take place very soon. The potential for restoring imbalances in the body, mind, and spirit can no longer be disputed. In other words, quantum physicists have put science behind what alternative health practitioners have known for centuries, that the mind and body are one. You are what you think, even your diseases! The Einsteinium or quantum model views health and healing in a multidimensional context, rather than in a traditional linear format. Modern healthcare can advance only by embracing and integrating this new understanding. Therefore, traditional medicine, especially pharmacology and surgery, must be revolutionized and revitalized by the new paradigm of quantum healing, or energy medicine. When I changed careers from a Medical Scientist to becoming a Quantum Health practitioner, I gained an in-depth knowledge of energy and bio-terrain concepts, making me better equipped to address the prevention and reversal of degenerative diseases and aging through non invasive natural means. Quantum physics, as a driving force behind alternative and integrative medicine, gives us new hope for preventing disease and promoting optimal health, forever living healthy for every human being. The vision that scientists have for the next hundred years which includes teleportation, instant manifesting of food and physical immortality via the assistance of machines does not vary much from the vision many spiritual people have of teleportation, instant manifestation and physical immortality. We all need to unite and co-operate. Love and co-operation is the key NOW and eternally... A visualization exercise explains the driving force, e-motion or energy in motion. Visualise or imagine what it would be like to be vibrantly healthy, physically immortal in a healthy community. What does it feel like? What changes do you sense within the community? A feeling of deep peace and joy are felt. All are free from fear and tension, they can relax completely. The peace envisioned is not dull, boring peace but dynamic peace full of excitement, creativity and fun! The ultimate consciousness for the individual is a shift away from struggle into flow and ease. Connecting fully with The Truth, loving themselves and others unconditionally, creating ongoing health forever living! Educators, doctors, and researchers needs to come together to create innovative online courses including Naturopathy, Biofeedback, Nutrition, Homeopathy, Hypnotherapy, and Hormonology. These programs must pull together all the pieces of the puzzle into a coherent and practical multi-dimensional model. **P2**

**304 The Healthy Human Mind and the Science of the Phenomena That Appear in the Stream of Consciousness** Henry Vyner <hmvmd@mindspring.com> (Center for Nepali and Asian St, Tribhuvan University, Lake George, CO)

For the last 22 years, we have been conducting research on the nature of the healthy human mind amongst Tibetan lamas living in South and Central Asia. In this research, I have been interviewing lamas about their experiences of their own mind in meditation for the purpose of: (1) Developing a descriptive science, or typology, of the phenomena that appear in the stream of consciousness and (2) Deriving from that descriptive science from that descriptive science an empirically valid theory of the nature of the healthy mind. This research is generating a new field of scientific inquiry: a science of the phenomena that appear in the stream of consciousness. One of the salient findings of this new field of inquiry has been that the egoless mind is a far healthier mind than the egocentric mind, and that as a species we have long been operating on the mistaken and unexamined assumption that the egocentric mind is a healthy mind. In pursuing this work, the science of the stream of consciousness has set aside the question of whether or not it is possible to

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scientifically study consciousness, and simply moved forward by taking up the empirical study of the phenomena that appear in the stream of consciousness. This workshop is going to present: (1) An overview of our findings on the nature of the healthy mind and (2) A systematic introduction to the findings and theory of the science of the phenomena that appear in the stream of consciousness. C7

### 4.11 Miscellaneous

**305 Educating for a Quantum Perspective** Carmel Ashton <atma.vidya.one@gmail.com> (Mount Victoria, NSW Australia)

"... no theory compatible with quantum theory can require spacially separate events to be independent" (1). (Brief summary of entanglement, quantum perspective) While science has given intellectual understanding that the whole of reality is entangled through the web of interconnecting relationships, real knowing at the level of human experience is largely dependent upon individually reaching into those 'farther reaches ...'. It is in these increasingly inclusive post-formal levels where we come to an experiential realisation that we and the world is an ecological whole. Much of what we do as a species and how we live individually appear to be in violation of this fundamental principle. Drawing on philosophical perspectives, theories and research from diverse disciplines, evidence emerges for the interrelatedness of crises across the globe: from those in personal and community health and wellbeing, to the failures of natural systems (2, 3). At the heart of each, is a crisis of perception, or what Ploikin (4) described as 'epidemic failures in human development'. The essential truth of this is probably not really understood below the level of 'systems thinking', a post-formal operations level of human development. The complication is this: it is estimated by research over three decades, that approximately only 9% of adults in the developed world function at this post-formal level of development. We need to look very closely into the arena of human development theories and research (5) for clues as to what has gone wrong. By doing so a link between a quantum mechanical view of reality, and the levels of human development, or conscious awareness, will emerge. Maslow introduced the term 'farther reaches of human development'. It was however later post-formal theorists (6) who contributed an understanding of how those 'farther reaches' differ from the mainstream human ways of perceiving and responding to the world. Scrutiny of the theories of Maslow, Erikson, Graves and Kohlberg hold key to where the failings in development lie. At the same time understanding the interrelatedness of the various streams of human development give clues to how the failing in education for development of a more inclusive perspective can be addressed. The poster will summarise • evidence of how and why mainstream western culture lives an outdated paradigm and how a plethora of crises stems from such outdated perspective; • recent research in human development, including tables representing consistent finding across three decades of research at major universities indicating the breakdown of levels of functioning; • characteristics consistent with functioning of the level of up to 70 – 80% of adult population ('concrete operations'); the next 10% at 'formal operations' functioning; and lastly approx 9% 'post-formal'. Examples from literature of the 'quantum perspective' of those 'farther reaches of human development' (eg Tennyson, Wordsworth, Blake) will be included. • Why and how educating for emotional intelligence is critical to accessing the more inclusive levels of development. P2

**306 Optical Deconstruction of Fully-assembled Biological Systems** Karl Deisseroth <deissero@stanford.edu> (Department of Bioengineering, Stanford University, Stanford, CA)

Karl Deisseroth's research group develops optical tools for precise, high-resolution investigation of intact biological systems, and applies these tools to study the neural circuit underpinnings of adaptive and maladaptive behavior; he also continues to practice psychiatry and direct undergraduate education in Bioengineering at Stanford University. Over the past decade his laboratory created and developed both optogenetics (a technology for precisely controlling millisecond-scale activity patterns in specific cell types using microbial opsin genes and fiberoptic-based neural interfaces<sup>1,2</sup>) and CLARITY (a technology to optically resolve high-resolution structural and molecular detail within intact tissues without disassembly). Most recently in optogenetics, his

team has developed strategies for targeting microbial opsins and light to meet the challenging constraints of the freely-behaving mammal, engineered a panel of microbial opsin genes spanning a range of optical and kinetic properties, built high-speed behavioral and neural activity-read-out tools compatible with real-time optogenetic control, disseminated the tools to thousands of investigators, and applied these optogenetic tools to develop circuit-based insight into anxiety, depression, and motivated behaviors<sup>3,4</sup>. Distinct from optogenetics, his CLARITY technology<sup>5</sup> can be used to transform intact biological tissue into a hybrid form in which components are removed and replaced with exogenous elements, resulting in a transparent tissue-hydrogel that both preserves, and makes accessible, structural and molecular information for visualization and analysis. With CLARITY, whole mouse brains have now been labeled and imaged, and molecular markers have been used to identify individual structures and projections in banked human brain tissue, thereby unlocking rich sources of information for probing disease mechanisms as well as the native structure and complexity of the nervous system<sup>5</sup>, in a manner complementary to optogenetic approaches <sup>6</sup>. 1 Deisseroth K (2010). Optogenetics: controlling the brain with light. *Scientific American* 303(5): 48-55. 2 Deisseroth K (2011). Optogenetics. *Nature Methods*, 8:26-9. 3 Kim SY, Adhikari A, Lee SY, Marshel JH, Kim CK, Mallory CS, Lo M, Pak S, Mattis J, Lim BK, Malenka RC, Warden MR, Neve R, Tye KM & Deisseroth K (2013). Assembling behavioral states: divergent neural pathways recruit separable anxiety features. *Nature* 496:219-23. 4 Warden M, Selimbeyoglu A, Mirzabekov J, Lo, M, Thompson K, Kim S, Adhikari A, Tye K, Frank L & Deisseroth K (2012). A prefrontal cortex-brainstem projection controlling response to behavioral challenge. *Nature* 492:428-32. 5 Chung K, Wallace J, Kim S, Kalyanasundaram S, Andalman A, Davidson T, Mirzabekov J, Zalocusky K, Mattis J, Denisin A, Pak S, Bernstein H, Ramakrishnan C, Grosenick L, Gradinaru V & Deisseroth K (2013). Structural and molecular interrogation of intact biological systems. *Nature* 497:332-7. 6 Deisseroth K (2014). Circuit dynamics of adaptive and maladaptive behaviour. *Nature* 505:309-17. **PL5**

**307 Energy is Defined as Information – A Universe Built of Information Requires a Mind-Like Substrate** Klee Irwin <klee@quantumgravityresearch.org> (Quantum Gravity Research, Los Angeles, CA)

The materialist view is that reality is made of energy. And energy is defined as the potential for distance/angular change (work) among two or more objects composed of energy. This standard definition of energy equates it with information, not some material ‘stuff’. Ironically, the idea that reality is information is the antithesis of the materialist view that reality is made of a mystery stuff called energy – a stuff distinctly other than information. The recognition of this definitional problem and the deduction that reality is made of abstract information, leads to two puzzles. The first puzzle: If (1) reality is made of information and (2) if information is the communication of ideas using symbols and (3) if symbols are things which subjectively represent other things, how is it possible that there can exist an orderly mathematical behavior of nature based on a language of symbols with subjective meaning? Here we propose the notion of ‘geometric functional symbols’ – symbols representing only themselves. The second puzzle: What is the information based substrate within which these abstract symbols might exist? In order for information to exist, there must also exist a mind to measure/observe/compute such information into existence. We propose a primitive ‘quantum of consciousness’, called a ‘point of consciousness’ or ‘viewing vector’, as the mechanism by which a mind-like universal entity capable of embedding and running the geometric language emerges. These points of consciousness generate geometric functional symbols that are quasicrystalline ‘protiles’ of reality – Planck scale units of spacetime arranged in an ordered but non-periodic manner. Following principles of evolutionary emergence, via self-organization, macro-scale laws of nature emerge all the way up to the neural-network like cosmic mind, which was ‘always’ the substrate for the primitive points of consciousness from the ‘beginning’. Here time is not linear. The normal causal sequence of complex things emerging from simple things must be conceptualized as being ordered on a circle instead of a line, where the primitive characters of a geometric language exist within the highest order emergent mind-like whole – an emergent whole which exists because of the self-organizing behavior of the embedded primitive characters (an algorithmic language/syntax). **P2**

**308 Biological Research Findings Consistent with Panpsychism** Jonathan Lief [jonlief@aol.com](mailto:jonlief@aol.com) (Searching For The Mind – [Jonliefmd.com](http://Jonliefmd.com), Newton, MA)

Recent findings implicate mind interacting with molecules in the human brain, animal brains, plants, cells, microbes and viruses. The Human Brain: Neuroplasticity: thought triggers many different molecular changes simultaneously in wide ranging brain circuits: movement of mitochondria; receptor subunit exchanges; simultaneous alterations of pre synaptic neurotransmitter and post synaptic receptor; alteration of scaffolding molecules, myosin motors, post synaptic density and extracellular matrix. Lack of coordinating center in brain: most modules have extensive local and distant connections (rich club); most neurons multisensory; behavior of individual neurons; connectome processes are simultaneous with brain wave, nanotube and exosome communication. Sudden expanded brain capacities: virtual reality triggers out of body experience; psychedelics with counterintuitive increased mental activity and decreased brain activity; brain injury and TMS cause savant abilities; multiple triggers of religious experience and awe. Perception more determined by top-down neurons than bottom-up; determined by expectations; perception of social experience triggers genetic networks. Conscious choice: meditation effects on molecular genetics and immune; community service effects on immune function. Animal Brains: Animals with tiny brains have advanced cognition and social behavior; bees with advanced individual learning abilities, symbolic language, abstract concepts, mathematical abilities, human and bee facial recognition and kaleidoscopic visual memory; birds with verbal learning and syntax; lizards with high intelligence and advanced social behavior; empathy and mourning in animal kingdom. Plant Behavior: decision-making, complex multi step communication with microbes for nitrogen factories; communication at great distance through fungal wires; elaborate self-defense; future planned self defense; creation of complex proteins and RNA weapons in fight with microbes; mathematical calculation of amounts of sugar usage; engineering of surroundings to advantage. Microbe Brain-Like Capacities: decision-making from multiple inputs, group behavior, and advanced communication; self-edit/mutate genes to make proteins to combat viruses, other microbes, and plants; innovations to fight autophagy in cells; manipulate genes changing nerve cells into stem cells; individual amoeba cells change into multicellular; altruism, amoeba entering stalk only for family members. Virus Behavior: self edit, mutate DNA for complex proteins in battle; complex behavior, positive and negative relations with bacteria and humans; multi step hijacking of cellular processes, skin cells, nuclear pores, replication machinery, dynein microtubule transport; quiescence and reactivation; virus like particles with complex behavior. Cellular Behavior of neurons, immune and cancer cells: cellular self-editing; editing own DNA for errors; antibodies, SMH, T cell receptors; alternative RNA splicing. Cells develop individual immune systems for each brain region. T cell complex behavior: maturation with complex receptors; send and receive cytokine wireless signals; adjustment of attack strength of self antigens; direct all cells in CSF suppressing unnecessary inflammation; aids cognition sending signals to brain; with infection, stimulates decreased cognition, sick feeling, and inflammation; Treg curtail or enhance T killer cells; Treg inhibit attack on self antigens. Cell genetic networks responds to social perceptions. Conclusion Example: Mind interacts instantly, simultaneously, in six orders of magnitude: perception of social interaction, neuroplasticity changes in multiple cells; neuronal, hormonal, immune, and genetic networks. **P1**

**309 Proposing an Integrated Framework for Biopsychosocial Ideas Which Might Provide Additional Conceptual Tools to Explore Consciousness** Tom Weidig, Gilles Michaux, PhD Behavioral Neuroscience, Professional Psychologist, St. Theresa Clinic, Luxembourg and Lecturer, University of Luxembourg [tom.weidig@gmail.com](mailto:tom.weidig@gmail.com) (PhD Physics, Luxembourg, Belgium)

We claim that human sciences are still missing one overarching framework to conceptually unify all physical, biological, psychological, and social processes happening in the human system. We propose such a framework, which in our view provides us with additional conceptual tools to explore consciousness. Interestingly, our framework naturally includes the concept of memes. The traditional biopsychosocial view describes different types of processes affecting human beings: physical (e.g. blood pressure), biological (e.g. cell divisions), psychological (e.g. conditioning processes and cognitive processes, and social (e.g. relationships). This conceptual framework



barely passes as a fundamental and unifying model of humans, but is rather the explicit acknowledgement of the existence of separate biological, psychological, and social processes. Moreover, those processes are fuzzily defined in terms of mental constructs (such as “to love” or “to age”) and overlapping (loving and ageing use the same body and brain). We assume that 1. only a framework based on physical states can ever provide for holistic and operational models of the human system, and 2. humans are information gathering and utilizing systems (I.G.U.S.), and their brain’s informational content, apart from body and environment, drives our behaviour and experience. Our framework constructs overarching models of humans by slicing up the physical world into domains while considering the physical representation of information. The slicing method ensures that our description is complete. Our simplest human system model consists of four domains: 1. the environment (outside the human body), 2. the body, 3. the confined memories (“ames”), and 4. the communicable memories (“memes”). Important consequences of the model are: 1. Processes of any type (physical, biological, psychological, and social) always involve changes in one or more of these four domains. 2. To understand any human process, search for elements driving the process in all domains. 3. Psychotherapy is about changing the informational content of the client. 4. Mental constructs are stored within our brain and are the patterns that some types of recurring processes share. Please see our website: [www.bps2.com](http://www.bps2.com) for more details.

P1

## 5.0 Experiential Approaches

### 5.01 Phenomenology

**310 Mind-Wandering Through The Paint: How Artistic Expression Captures Conscious Impressions** Richard Harrington, Romerita Prates <[rjhrrngtn@hotmail.com](mailto:rjhrrngtn@hotmail.com)> (ICSM-CFSHR, Martinsville, VA)

Among the various terms used to refer to the phenomenal contents of consciousness (e.g., qualia), perhaps the most insightful term is impression. On the one hand, conscious experience is “impressive” in that the experience (e.g., the painfulness of pain) is immediate, vivid, intense, and real (in the sense that I know I am in pain regardless of what I know about the character or intentionality of pain). On the other hand, conscious experience is “impressionistic” in that it is transparent (in the sense of not revealing that it is anything other than the experience that it is), often fleeting, faint or elusive (e.g., some scholars doubt whether thoughts, as opposed to sensations, have qualitative feels), private (to the point that some scholars question whether consciousness exists), and perhaps even information-free (at least to those who consider consciousness to be epiphenomenal). Neither aspect is fundamental; rather they are mutually (reciprocally) embedded. Searching the conformational space of one aspect (e.g., the impressive aspect of pain) inevitably leads you to the conformational space of the other aspect (the impressionistic aspect of pain), and not to some putative deeper truth that underlies both. The two aspects are separable not because of an impenetrable boundary, but because the notion of a boundary is incoherent with respect to mutually embedded structures. Instead, they are non-orientable with respect to one another: orienting yourself within one aspect with the intent to explore the other aspect merely leads you to an orientation in the second aspect with respect to the first aspect that does not reveal how you came to that new orientation. Artists instinctively exploit this process: Works of art aspire to be both impressionistic (even if realistic, they are nonetheless suggestive simulacra, not merely quotidian replications) and impressive (they create a new reality for the viewer to embrace). The artist standing in front of a canvas can first orient herself in executive-control mode to facilitate the impressive, and then re-orient herself in mind-wandering mode to facilitate the impressionistic. At first, she pays attention to her real-world situated self as a painter engaged in actual peripersonal space performance (holding a paintbrush and applying paint to paper), and then she immerses herself in virtual peripersonal space performance (such that her hand continues to paint while her “self” inhabits and navigates the virtual-reality scenery of the painting). Even her feeling of agency can reorient between the impressive (she genuinely feels she is the author of her actions, controlling every brush stroke) to the impressionistic (feeling as if her hand is guided by a hidden

force). In this presentation, the authors will report on their own phenomenological experiences in artistic expression as they relate to this theme of consciousness-as-impression, and frame the phenomenology in neurobiological terms, with a focus on putative roles of haptic, vestibular and proprioceptive-kinesthetic processing, as well as vestibular cortex and angular gyrus function, as complements to visual processing in the course of artistic orientation, rendition and appraisal. **P2**

**311 Subject/Object Fusion and the Medium of Consciousness** Bruce Mangan <mangan@berkeley.edu> (Cognitive Science, UC Berkeley, Oakland, CA)

(1) During subject/object fusion we do not experience ourselves as a distinct observing subject looking out at a world of separate objects. Phenomenologically, we become the objects of experience: self and other merge. This can happen in many circumstances, and at varying degrees of intensity. It can occur in a strong aesthetic experience: "We become the music while the music lasts" as T.S. Elliot put it. The most celebrated and intense case of fusion is probably during the *kensho* experience in Zen, taken to be the first glimpse of the Buddha-nature: The world doesn't stand outside of me, it IS me! (Yasutani-roshi). In Western thought, recognition of the derivative nature of the subject/object bifurcation has been broached many times (e.g., dimly by Parmenides and Aristotle, directly in Neutral Monism and Heidegger's treatment of *Dasein*, recently by Strawson).

(2) So we can, at times, experience entities "in the world" without feeling that we are a separate locus of observation: In this sense knowing takes place directly at the thing known. Consciousness is often likened to a searchlight illuminating the objects at which it is directed. But in subject/object fusion consciousness is molded into the contents of experience like a sentient or self-knowing clay. (3) The process of molding disclosed by fusion reinforces the view that the phenomenology of subject/object separation is derivative. Even in the absence of fusion, the experience of an object is still molded: for our awareness OF an experience IS that experience. (As Russell says, without losing his sense of being a separate observing self: "My seeing of the sun is the sun that I see.") So molding can also account for the phenomenological separation of subject and object whenever this split occurs: the self-knowing clay of consciousness has divided into two representational complexes. On the other hand, if subject/object separation is taken to be fundamental, fusion becomes inexplicable. (4) While the clay analogy has a mystical resonance (e.g., the Brahman), it can be used to strengthen a biological analysis of consciousness: for it brings converging first-person support to what I have called the Medium Hypothesis: viz., that consciousness is an information-bearing medium. First proposed at Tucson II (Mangan, 1998), and treated then from a third-person standpoint, the medium hypothesis was an early attempt to tie notions of information and consciousness together in a biological context. For when treated as a medium, consciousness loses its peculiar isolation and joins a biological family: it becomes another information-bearing medium at work in our organism. In general, information-bearing media are molded; they bear their information as configurations of their own substance: Cochlear fluid bears its information as compression waves; DNA bears its information as base pairs; consciousness bears its information as experience. As sentient clay, the first and third person structure of consciousness unite. (5) Time permitting, I will consider two further points: How the medium hypothesis blocks homuncular regress, and how it strengthens Biological Naturalism (though in a way that Searle himself would not care for). **C22**

**312 Application of Red, Blue, and White Ocean Strategies in the Realm of Conscious Phenomenology** Madhulika Nemani, Somayajulu Nemani; Richa Satsangi <paul.madhulika@gmail.com> (Cal University, Johns Creek, GA)

Phenomenology is the study of conscious experience as experienced from the subjective or first person point of view. The paper describes the phenomena of higher order consciousness of spirit force on the lower order consciousness of mental and physical states. It portrays relationship between physical, mental, and spiritual consciousness with Red, Blue, and White ocean strategies of business world. The levels of consciousness described in the paper are on similar lines with Hierarchical Order Theory (HOT) propounded by Revered Professor P.S. Satsangi. In Red ocean, firm tries to outperform their rivals by grabbing greater market share and providing better product / service. The aim is to maximize profit and thus market place turns bloody due

to cut throat competition. Red Ocean is similar to physical or coarse body of human being. The outer layer of human body if not controlled will drag him towards lower levels of consciousness (Lust, Anger, Greed, Attachment, and Ego). In order to thrive, both firms and human beings have to achieve higher order of Consciousness and thus Blue Ocean strategy is indispensable. The Blue Ocean analogy describes the potential market space which is not yet explored and untainted by competition. Blue ocean is compared with Mental phenomena which is the Second stage of consciousness. At this stage, Wisdom guides human effort and creates novel products and or services through 'Value innovation'. This stage of consciousness has several advantages but the conscious mind has its limitations and sometimes decisions based on mental analysis turned out to be fatal for firms and for human beings. Thus the need for White Ocean strategy emerges. The White ocean strategy operates beyond the conventional wisdom. The firms falling in this category are highly sustainable not just profitable. In this stage, both firms and human beings encompass numerous challenges and risks, but it has the potential to be successful and benevolent. White ocean symbolizes "Super-consciousness" which is the highest level of consciousness and will lead to snow-white peaks and pinnacles of highest spiritual attainment. One of the main finding of the paper is that Red ocean stimulates lower level consciousness (feeling of apathy, grief, fear, anger, and pride), Blue ocean kindles middle level consciousness (feeling of courage, neutrality, willingness, acceptance), and White ocean strengthen higher level of consciousness (the feelings of love, peace, tranquility, harmony, and enlightenment). Human body has the portal to connect to higher levels of consciousness and these lower consciousness emotions can only be controlled and re-channeled by transcending into higher levels of consciousness with the help of a Guru or adept. Crossing Red and Blue oceans and attaining snow-white pinnacles of White ocean will be the highest accomplishment for firms and human beings. **P1**

**313 Spiritually-Inspired Quantum Vibrational Theory of Consciousness and Qualia Dynamics** Sukhdev Roy <sukhdevroy@gmail.com> (Physics and Computer Science, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Eastern spiritual traditions envision sound vibrations as the manifestation of consciousness. From the Vedic scriptures to the exhaustive descriptions of the Sant Mat and the Radhasoami Faith, the divine sounds have been explained to sustain different spheres of creation. Human form a perfect microcosm of the macrocosm is endowed with ganglia or chakras and nerve centres that are portals for communion with different states of the macrocosm, through resonance with different sound currents through yoga meditation. All sensory perception is by means of vibrations and resonance with the five tanmatras – subtle elements that have functional integrity with the five sensory organs, which allows us to perceive the external environment. Yoga Shastra (knowledge), Tantra-Mantra Shastra, Spanda Karikas in Kashmir Shaivism and Patanjali's Yoga Sutras also reflect on the vibrational aspects and teach conscious non-operation of the vibrational modes (vrittis) of the mento-emotional energy (citta) to experience higher consciousness. Vrittis are the outer valence vibrational modes of the conscious mind, i.e., the distortions created from the impact of the exterior mental subtler vibrations from the environment. In this paper, we consider the vibrational quantum nature of consciousness and propose a human being as a composite wavepacket endowed with intrinsic vibrational frequencies. We posit consciousness as primary vibrational pattern that is qualitatively different from the mind that can be likened to sub-tones. The knowing person is a composite of consciousness, mind and body, functioning as a reflective ratiocinative cognitive being. Embodied consciousness gets conditioned and mind-based manifesting in a variety of vibrational mental states, forms and modes. The degree of attention leads to flowing out of sensory vibrational currents to the object and we perceive qualia through resonance. Thoughts, feelings and actions emanate from the sensory inputs, internally generated imagery, memory, conscious and unconscious impressions and dispositions. Considering consciousness and qualia to have a non-local field character, focused attention leads to attachment that generates harmonics in the form of desires causing action, volition and thoughts, leaving traces in the mind in the form of vibrational patterns (samskaras) that fuel more thoughts. This results in qualia dynamics, i.e., transformation and generation of qualia through complex feedback loops of energy and information with the environment. We consider consciousness to have a dynamic aspect associated

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with it with higher levels becoming subtler, more refulgent, with greater energy and frequency. The vibrating power of consciousness increases when lesser vibrations of the mind that include thoughts, patterns and attachments to ideas have faded. Applying the principle of conditional forward causation, we consider propensities as vibrational dispositions, with the spirit generating intention (impulse) to give rise to mental propensities that make us perform actions. We consider mind to predispose physical/physiological potentialities in a quantum-like manner. We also propose a spirit-mind uncertainty relation based on the analogy with Fourier transform theory, i.e., reducing the spread in mental domain by concentrating on a frequency specific mantra, leads to an expansion of awareness in the spiritual domain. The theory opens up prospects of explaining yoga, meditation, non-local parapsychological phenomena and healing. **P1**

**314 Beyond Cognitive Phenomenology: The (Neuro) Phenomenology of Regarding Monet's Les Nymphes** David Woodruff Smith <dwsmith@uci.edu> (Philosophy, University of California – Irvine, Irvine, CA)

Phenomenal character extends beyond purely sensory consciousness (as in consciously seeing a blue expanse), and beyond purely cogitative consciousness (as in consciously thinking that Monet painted in his garden). Conscious visual experience is normally both sensory and interpretive, with a phenomenal character or content that fuses sensation and cognitive interpretation. Here I shall appraise a complex and dynamic form of phenomenal character that arises in a case of consciously viewing Monet's 1926 panels of painting called *Les Nymph's* (Nymphs) or *Water Lilies*. I'll dig into the phenomenology of such an experience, with Husserl and Merleau-Ponty in the background. And then I'll gesture toward the neurophenomenology thereof – in honor of the late Francisco Varela, who was active in the early days of the Tucson conferences. In Monet's panels of paintings, we are presented with a beautifully blurred distribution of colors and images of reflections in the pond's surface. The active viewer is presented with sensuously colored trees, clouds, a hint of a building, as reflected in the blue waters. In a first-person phenomenological analysis of my visual experience as I regard this expanse of painting: my visual phenomenal field evolves in a shifting Gestalt of figure/ground as colors and objects pop out and then recede into the background. Here we find a phenomenal character in the colors, but also in the meaningful sensory-intentional structure of the images of trees, building, clouds. The sensuous, intentional, and temporal flow of things in my visual field is a flow of this thing, then that, darting as if nymphs over the waters – even as the blue water keeps reasserting itself in a Gestalt shift. Experiments in cognitive science show that items pop out or fail to pop out in your visual field, as one thing captures or fails to capture your attention. In my visual experience as I regard the Monet painting, different things pop out in my visual field at different times. Let's borrow a gloss of the neural complexity of the visual system. In the underlying neural processing in my visual system, neuroscience now tells us, information flows from the retinas through the thalamus and LGN to the V1 regions of the two hemispheres and onward in feed-forward and feed-backward patterns reaching into the cortex, so that there appear, in the evolving visual field of consciousness, shapes and then colors and then meaningful objects (semantic values). In a Gestalt shift the visual cortex presents one image and then the other (as in the outlines that can appear either as a vase or as two opposing facial silhouettes). Thus: As the outlines of the neurophenomenology corroborate, the phenomenal character of my experience in regarding *les Nymph's* is rich in complexity, more than purely sensory, different from purely cognitive, virtually dancing among meaningful fusions of color and form in the shifting imagery I experience. **C22**

**315 Self-consciousness, Subjectivity and Projective Geometry** Kenneth Williford, Daniel Bennequin, Gregory Landini, David Rudrauf <williford@uta.edu> (Philosophy, The University of Texas at Arlington, Arlington, TX)

We propose a novel projective geometrical model of the core spatial structure of consciousness. The model captures several salient features of the phenomenology of consciousness: the interplay of pre-reflective and reflective self-consciousness, the sense of an elusive point of view, subject-object relationships, our capacity to assume or attribute multiple points of view in perception and imagination, and our capacity for self-location in a unified, multimodal sensory, conceptual

and action-planning space. According to the proposed geometrical model (first formulated by D. Rudrauf, first presented in K. Williford, D. Rudrauf and G. Landini (2012), and currently undergoing refinement by the mathematician D. Bennequin), consciousness, taken synchronically, is equivalent to the integration and rendering of multimodal information into a 3D projective space (our egocentric intuition of space or multisensory global workspace), which is itself a projection from a higher-dimensional vector space computed by the brain in real-time. Visual experience clearly involves a projective geometry in which the plane at infinity plays a key role, and in spatial imagination, operation on that plane activates the whole spectrum of projective transformations. The projective group PGL4 provides the geometrical rules for these transformations. Motor actions also involve a projective geometry, as do prehension, reaching, and directing or starting locomotion. The ‘finite’ compartment of the space correlates with the presentation of objects as projective shapes or manipulated frames. But this compartment is always bounded (at ‘infinity’) by a horizon. The model allows us to make sense of pre-reflective self-consciousness or subjective character through its properties of duality and spatial reciprocity. In consciousness, the origin of intentional aiming does not appear with a precise position. We are aware of the whole scheme of intentions and points of view. A simple solution (justified by comparison with the spherical structure of observation) is to locate the subjective vantage point at the center of a 4-dimensional ball and conceive of the direction of aiming as a line that passes through the origin of the underlying vector space. The homogeneity of the space implies that the plane at infinity doesn’t separate the space; this entails a topological gluing of antipodal points on the projective horizon (at infinity) through the origin. This makes the subjective vantage point itself to be both elusive and within the scope of consciousness, as a vanishing point from which the space also seems to emanate. The point of view is geometrically closest to ‘infinity’; it cannot be found in the ‘finite’ compartment of the space, in which, by contrast, projective shapes can appear. Nevertheless, it configures the space; it is a necessary structural feature of all conscious experience. We argue that the model is not subject to certain objections, e.g., from P.F. Strawson’s thought experiment about purely sonic beings with no sense of space, and from the clinical data concerning Balint’s Syndrome. The model also makes specific experimental predictions. **C2**

## 5.02 Meditation

**316 The Effect of Vocalized Sound on Higher Consciousness and Energetic States** Puran Bair, Susanna Bair <puran@appliedmeditation.org> (Institute for Applied Meditation, Tucson, AZ)

The complex vibration, spanning many frequencies, that constitutes an individual person can be readily affected by external vibrations which resonate within. (The mystic sees all of life as a system of reflection, a “palace of mirrors” in the realm of light, or a system of resonance in the realm of sound.) Realizing this, mystics deliberately participate in their own dynamic creation by self-generating sound vibrations that will interact with their signature vibration to promote desired aspects of the self. The factors of vocalized sound that can be controlled and utilized for this purpose are the pitch, or frequency, the harmonic content, the speed of attack and decay, and the rhythm of repetition. Combinations of these factors can produce sounds which physically vibrate the internal organs and nerves associated with the chakra system. Sounds for each chakra will be performed and taught, with explanation of which factors make a sound appropriate for its targeted energy center. An oscilloscope and audio spectrum analyzer will show the factors of sound in realtime. The ability to aim the sounds at particular chakras will be verified by sensing physical vibrations and a survey of self-observed changes in consciousness will be tallied to gauge the effectiveness of each sound among the participants. Aramaic, Hebrew and Arabic languages will be used for their onomatopoeia. The particular effects of specific vowels and consonants in these languages will be discussed. The presenters are co-founders of the Institute for Applied Meditation on the Heart and have been teaching this science of sound for over 40 years. **C16**

**317 Effect of Meditation (Surat Shabd Yog) on Quality and Duration of Sleep** Phool Chand Bhatnagar, Anjoo Bhatnagar; Vijai Kumar <anjooehrc@yahoo.com> (Theology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh)

This study attempts at scientific validation of benefits of meditation through measurement of physical parameters i.e. sleep quality and duration. Number of benefits from meditation has been claimed by those who practice various traditions. Among these are improved performance and decreased sleep need, but very few controlled studies have been done to prove this claim. This study uses well validated PSQI (Pittsburg Sleep Quality Index) to assess the effect of Surat Shabd Yog on sleep quality and duration. Surat Shabd Yog is the sound practice of listening internally to the ever reverberating spiritual sounds via meditation, as prescribed in religion of Saints. Consciousness is a fruit of evolution and our most prized possession. It takes us on incredible journey and gives us gift of insight and transcendence. Out of 5 different states of consciousness i.e. wakeful, dream, deep sleep, Turia and Turiyattita our traversing through the first three states every day does not make any difference in our attitudes and disposition towards life, much less in our spiritual or religious status. The path of self realization is entering into the state of Turia through withdrawal of spiritual current. The fifth Turiyattita is supreme consciousness, the True Self and beyond this is Nirmal Chetan State of realization of Ultimate Truth. 'Normally for practitioner of Surat Shabd Yog four hours of sleep is enough....such wakefulness is very beneficial. At night give some time to Surat Shabd Yog. If you don't have time then keep the index finger on 6th nervous center and go to sleep while doing same practice. This half an hour sleep would be more refreshing than that of 24 hours'. (Param Guru Sahab ji Maharaj). The observation and results in the three study groups (control, regularly meditating and irregularly meditating subjects, with subgroup of those who meditate or listen to music before sleeping) are presented. **P1**

**318 Meditation and Intention** Noa Latham <latham@ucalgary.ca> (Philosophy, University of Calgary, Calgary, Alberta Canada)

The aim of this paper is to show how two central forms of meditation, which I shall call concentration meditation (CM) and mindfulness meditation (MM), can be understood in terms of the notion of intention. Most practices termed 'meditation' that aren't purely analytical thought involve one or both of these. I argue that S is engaging in CM at t when (i) S intends at t to internally cause a given object to be at the focus of her consciousness over a period of time that includes t, and (ii) the object is chosen for its suitability for the practice of focus per se and not because it is an independently motivated task. Condition (i) provides the intention to be concentrating while condition (ii) distinguishes CM from concentration in general. Some may think a third condition is required (iii) that S is succeeding in concentrating at t. I do not think 'engaging in CM' is generally regarded as a success term like 'concentrating', but it is unnecessary to settle this linguistic question to understand the importance for CM of succeeding in one's intention to concentrate. MM, by contrast, involves an intention to notice what is at the focus of one's consciousness. While there can be intentional concentration without CM, it is hard to see how there can be intentional mindfulness without MM. MM involves the further complication that the intention is often not to notice whatever mental states arise but to notice mental states within a given range, e.g. bodily sensations. More precisely then, S is engaging in MM at t when S intends at t to internally cause herself to have simultaneous second-order thoughts of the mental states (sometimes restricted to a certain range) at the focus of her consciousness over a period of time that includes t. As with CM, some may think a success condition is necessary. I argue that no further conditions pertaining to posture, muscular tension, or phenomenology are essential to CM or MM. But there are plausible ways in which the intentional condition explains the reported tendency for the phenomenology of the meditative state to change as the subject gains experience in meditating. In the case of MM there is a tendency for all one's phenomenal states to become more poignant, supported by attentional blink studies (Davidson and Lutz, 2008). And in both cases there is a tendency for the meditation to appear less effortful. I disagree with Davidson and Lutz that much illumination of this is provided by a study that showed an initial increase in activity in certain regions of the brain with increase in hours of practice of CM, followed by a decrease in activity with very experienced meditators. I discuss ways of understanding effort in terms of the frequency with which one needs



to engage in volitional acts to return to the meditation when a distraction has been noticed, and in terms of the strength of competing desires to be doing something else. **C14**

**319 Effects of Mindfulness-Based Breathing on Employee Stress as Measured by Epi/gdv: A Mixed Methods Applied Study** Debra Lindh <debra@themindfuleffect.com> (The Mindful Effect, Maple Grove, MN)

**Objective:** This exploratory study attempts to identify the effectiveness of a mindfulness-based stress reduction (MBSR) intervention and compare the qualitative perceived stress data with the quantitative electrophotonic imaging gas discharge visualization (EPI/GDV) stress measurements within an applied environment of a F500 company and a start-up company. **Methods:** This study used a mixed-methodology convergent design; the quantitative method used a non-randomized quasi-experimental, pre-test and post-test, two group, short time series design. EPI/GDV stress measurements were captured before and after the "Sitting Meditation" for 3 consecutive months at 4-week intervals. The qualitative methods used a semi-structured post intervention participant free write and follow-up interviews. Managers participated in pre and post program qualitative interviews. **Results:** The quantitative information for the whole group in Month 1 and Month 2 is inconclusive. However, the MBSR was effective for Month 3 ( $p = .034$ ) and Month 1 Pre/ Month 3 Post ( $p = .114$ ). Company A findings were consistent with the whole group findings. However, Company B findings indicated the MBSR effective for all 3 months including Month1Pre/Month3 Post. The qualitative participant free write identified 5 stressors (organizational, personal, employee, favorable aftereffects, and unfavorable aftereffects) and the manager interviews data showed 5 themes (employee stress, coping, responsibility, intervention, and choices). The mixed methods data Pearson's  $r$  Level 1 correlation is inconclusive for all combined months as well as Month 1 and Month 3. However, Month 2 indicated a weak correlation ( $p = .055$ ). Therefore, the Level 1 analysis is inconclusive. The Pearson's  $r$  Level 2 analysis indicated a strong correlation ( $r = .824$ ;  $p = .000$ ). **Conclusion:** The results included several findings. First, participants and managers found the MBSR intervention effective in reducing employee stress. Second, of the effects were inconclusive, whereas some effects were statistically significant. These findings support the position that stress is personalized, as is the effectiveness of stress management interventions. Third, the quantitative and quantified qualitative data concludes that a correlation exists between the EPI/GDV stress measurements and the qualitative self-reported stress measurements. Fourth, the EPI/GDV device proved to be a convenient and practical tool to measure employee stress. Fifth, both methods of data collection and analysis were necessary to conduct a thorough analysis. Lastly, future research is needed with innovative concepts to develop new theories to better understand individualized perceived stress, as well as to address the global issues resulting from stress. **P2**

**320 Effect of Mindfulness Meditation and Consciousness on Intuitive Ability: An Experimental Study of Stock Market Investors** Rupali Misra Nigam, Sumita Srivastava, Abhishek Nigam and Anjul Dayal <rupali.misra@gmail.com> (Department of Management, DEI Dayal-bagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

Heuristic driven biases, non-sequential information processing, decision making without much reflection or conscious reasoning supersede executive stock market decision making. To put things in perspective, intuition or intuitive ability affects the efficacy of stock market investors. This research investigates a possible link between meditation, self-reported mindfulness, consciousness and intuitive ability of the stock market investors through an experimental design. It aims to determine whether mindfulness meditation improves intuitive ability of stock market investors. Researches reveal that meditation enhances executive functions and working memory capacity improving the efficacy of decision making. Mindfulness meditation develops attentional performance and conscious perception by screening out irrelevant information through sustained and selective attention. In a blinded design, a group of 34 live traders predict the prices of commodities and equity for one day, one week and one month time interval. These subjects are then administered to a meditation protocol following which were allowed to revise their pre-meditation predictions. The variability of the subjects' consciousness quotient, longitudinal meditation and mindfulness has interesting revelation on their intuitive ability with statistically significant outcomes. **P1**

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**321 Resting State Connectivity Correlates with Ego Development** Omar Singleton, Andres Fossas, Max Newlon, Susanne Cook-Greuter, Sara W. Lazar <osinglet@nmr.mgh.harvard.edu> (Psychiatry, Massachusetts General Hospital, Psychiatry, Boston, MA)

Among the most empirically supported theories of adult development is Loevinger's theory of ego development (1966), which provides a framework for understanding the development of the self throughout the lifespan. Despite decades of theoretical and behavioral exploration of this construct, no studies have investigated its neural correlates. Since traits possessed by individuals at higher ego stages are similar to those attributed to individuals at advanced stages of meditation practice, we hypothesized that meditation practitioners should exhibit higher levels of ego development. In a mixed sample of participants composed of 16 long-term meditators, 16 long-term yoga practitioners, and 15 demographically-matched controls, we investigated the relationship between contemplative practice and ego development with behavioral measures, seed-based connectivity analyses, and cortical thickness analyses. Our *a priori* regions of interest were the default mode network (DMN) and the insular network, based on previous findings relating these networks to self-referential processing and meditation. We performed cluster-wise correction for multiple comparisons using Monte Carlo simulations ( $n=10000$ ). The revised Washington University Sentence Completion Test (WUSCT) was used to assess ego development stage (Cook-Greuter, 1999). In resting state analyses, we found significant relationships between ego development and PCC functional connectivity at the  $p < .05$  significance level. In particular, we found higher ego development was characterized by increased connectivity between the PCC and right prefrontal cortex and PCC and right inferior parietal gyrus in meditators and yogis compared to controls. In addition, we found greater connectivity between the PCC and superior temporal and transverse temporal gyri in meditators and yogis compared to controls. At the whole brain level, PCC to prefrontal cortex connectivity approached significance for meditators and yogis compared to controls. As previously reported, in cortical thickness analyses, we found a significant positive correlation between cortical thickness and WUSCT score in the PCC/precuneus in the full sample. In the behavioral data, an ANOVA revealed a significant difference between the scores of each group on the WUSCT ( $p < .05$ ). Tukey post-hoc tests revealed that meditation and yoga practitioners scored higher on the WUSCT. Our data provide preliminary evidence that the PCC/precuneus, which is well-known to play a central role in self-referential processing and self-awareness, may also contribute to the self, as defined by the WUSCT. The areas identified parallel those found to change following MBSR participation (Holzel et al., 2011), suggesting that contemplative practices may help catalyze ego development at the neural level. C14

### 5.04 Other altered states of consciousness

**322 Interconnectivity of Expanded States of Consciousness** Francoise Bourzat <fbourzat@gmail.com> (CIIS, Woodside, CA)

This lecture explores the interconnectivity of expanded states of consciousness and Western models of psychotherapy. Various techniques for accessing expanded states of consciousness will be discussed, as well as the ways they create opportunities for healing and growth. Emphasis will be placed on the importance of maximizing the benefits of the experience of expanded states of consciousness through preparation and integration. C7

**323 What Can Psychedelics Teach Us About Consciousness?** Albert Garcia-Romeu <agromeu77@gmail.com> (Psychiatry/Behavioral Sciences, Johns Hopkins University School of Medicine, Baltimore, MD)

Psychedelic and other mind-altering drugs have for millennia allowed humanity the opportunity to explore firsthand the farther reaches of consciousness. Despite initial enthusiasm among scientists in the 1950's and 60's, research with psychedelics was largely discontinued by the 1970's due to various legal and societal pressures. However, a resurgence in laboratory research employing modern technology and rigorous scientific methods has recently emerged, offering valuable insights into the nature of consciousness. Studies examining the properties and effects of drugs such as psilocybin, Ayahuasca, Salvia divinorum, ketamine, and MDMA, have begun to shed

new light on the neurobiological underpinnings of high-level perception and representation. That these substances occasion profound but temporary alterations in mental processes has allowed for groundbreaking explorations of fundamental psychological constructs including body ownership, agency, and self-concept. The convergence of neuroimaging paradigms, psychometric and behavioral data, and verbal self-reports in examining psychedelics has continued to drive the development of innovative methodological frameworks towards the advancement of consciousness research. At the intercellular level, specific neurotransmitter and receptor systems (e.g., 5-HT<sub>2A</sub>, NMDA) have been linked to the manifestation of particular subjective drug effects (e.g., auditory hallucinations, dissociation). Nonhuman research has additionally advanced our understanding of the molecular actions, behavioral effects, and abuse liability of psychedelics. Results from biobehavioral laboratory studies carry significant implications for understanding affect, cognition, and mental health. Furthermore, the initiation of small-scale clinical investigations into the potential therapeutic benefits of these substances raises new questions about the usefulness and appropriateness of psychedelics and altered states of consciousness in medical and psychological settings. Studies in the treatment of addiction, end-of-life anxiety, obsessive-compulsive disorder, and post-traumatic stress disorder, among others, provide compelling evidence for promising psychedelic-based interventions as alternatives to traditional treatments. This presentation will summarize the most current and relevant findings in the field, highlighting the role of psychedelics in elucidating brain-based mechanisms associated with distinct contents and levels of consciousness (e.g., mystical experience), and the structural-functional connectivity of key modules contributing to higher order constructs such as self-concept. The integration of first-person accounts in scientific investigation, future directions for research, and implications for contemporary theories of consciousness will be discussed. **C7**

**324 Toward the Science of ASC: Shaping of a New Wisdom** Oded Maimon, Francoise Bourzat, CIIS <maimon@eng.tau.ac.il> (Industrial Engineering, Tel Aviv University, Tel Aviv, Israel)

Wisdom is the union between the theoretical knowledge and direct experience. Neither of them by itself is enough to fully comprehend reality. One develops concepts and the other one the deep understanding of them, and suggests new concepts. However through a joint framework, presented here, a fusion of both sides can be achieved. Science focuses on creating theories about the nature of physical reality and uses repeatable experiments to prove, strengthen and advance these theories. The subjective experience of reality, and not only of the conceived physical reality, through ASC, compliments the scientific theories and broadens our understanding of reality and together with it, the scope of science, too. We suggest a framework that can accommodate both aspects (Altered /Expanded States of Consciousness and regular state, including scientific 'objective' experiments), and thus can create the fusion from both sides of the fence toward the science of ASC, and shaping of a new wisdom. Human beings have been experiencing ASC for thousands of years. These ASC experienced by scientists today, help science to expand and to deepen its theories into new frontiers of understanding reality. We will also talk about ways to access ASC, such as trance dance, meditation techniques, and use of mind altering substances. For example in certain indigenous ceremonies consciousness expands and brings past sensory perception in unusual connections to the present, with learning effect. The consciousness model includes four dimensions, which are ever present and co-evolving: The internal world creation (ontology of entities and relationships); The play/life game in the world (experiences); The witness (observer of all aspects of the process generated in both of the above); The learning mode (inferential based and inspirational based), which brings integration of all aspects. The model describes how the consciousness operates within us (depending on our past, beliefs, culture, etc.) and externally, in both cases (ASC and regular state). We will explain the theory (axioms, definitions and conjectures), and present detailed cases of the witness behaviour in different ASC. We will also show how we can model the witness behaviour as a set of processes, and deduce from it. We conjecture that the second law of thermodynamics applies in both situations, operating in the above model for dictating the process of the co- evolution. **C7**

**325 The Concept of Semiosphere As An Explanatory Tool for Understanding Altered States of Consciousness** Vit Pokorny <pitvok@email.cz> (Academy of Sciences Czech Republic, Institute of Philosophy, Ceska Lipa, Czech Republic)

The aim of my paper is bind to the general theoretical interest in finding conditions of possibility of altered states of consciousness. Inasmuch as this kind of research proves to be inevitably transdisciplinary, I explore different perspectives to the study of consciousness, namely phenomenological, cognitivist and biosemiotic ones. In this paper, I will focus on a biosemiotic concept of semiosphere and I will attempt to use it as an explanatory tool for understanding various levels and states of conscious presence. Basically, I don't interpret consciousness as a process of self-reflection enclosed in inner workings of the mind that is detached from outer world. In other words, the default (but not exclusive) context for understanding consciousness is not a separate individual organism but rather activities of exchange and communication of individual organisms within heterogeneous and multilayered web of semiotic processes. Thus, I would like to discuss following issues: (1) Is it possible to frame a general concept of semiosphere based on works of J. Lotman, K. Kull, J. Hoffmeyer and other contemporary proponents of biosemiotics; (2) Could such a concept serve as a framework for understanding consciousness?; (3) Is it possible and useful to combine the biosemiotic conception of consciousness with the multistate paradigm – i.e., the notion that consciousness is not a unity of self-centred ego but, it rather occurs on different autonomous but interconnected levels of activity). Exploring these questions, I should come to a conclusion whether and to what extent could the concept of semiosphere become one of appropriate explanatory tools for understanding altered states of consciousness. **P2**

**326 States of Consciousness are Ruled by Time: How I Became a Spiritual Experiment** Ileana Tellechea <ilytell@aol.com> (Miami, FL)

What circumstances are capable of creating mystical states? On the night my ex-boyfriend appeared in a cognitive dream with terminal cancer, I was unaware a spiritual relationship would develop after his death. Many voices in our healthy mental states guide us throughout our lives. The consideration these voices are related rigidly to mental illness is a wrongful assumption which challenges the evolution of human consciousness. Our relationship began on 10/13/1993, the night I acknowledged the presence of his consciousness. After reiterative dream appearances, my experience of his consciousness became surreal as I began succumbing to deep, lengthy mystical states during sleep, (all occurring in the supine position). The most perfect state of being was waking up in his presence in spiritual ecstasy of universal knowledge and my body trembling in physical orgasm. One night he stated, "States of consciousness are ruled by time." The seduction of these states coupled with numerous paranormal manifestations made his presence unquestionably real. I began recognizing his 'voice' from incidents, such as when my daughter lost her pet turtle and he told me where it was. He would wake me up and say "It's 4:00 a.m.," and I'd find my watch had stopped at 4:00 a.m. He would move the day of the month forward on various watches if I acknowledged him in specific ways. He told me my watch would stop when I died. He appeared as a light in my bedroom. He made me go blind after I told him he was blind to my reality. I had no way to predict or reproduce his appearances. Learning to recognize him as the separate entity he was made our relationship grow majestically. Of all the phenomena he performed over the years, the disappearance of my ex-husband's suit from the closet was significant for various reasons: 1) it was the first; 2) I had foreseen the situation unknowingly in a cognitive dream; 3) he made the suit reappear a year later on our anniversary (10/13/1996); and, most importantly, 4) my husband, the professed atheist and non-believer, was a witness. This occurrence shook my understanding of the existence of consciousness outside the perimeters of the brain. On 11/1/1994, I had an altered state in which I perceived Sylvester Stallone in a profound state of distress and confusion. An explanation surfaced on Friday, 7/13/2012 when Stallone's son, Sage, was found dead. My exboyfriend (now a spirit) had died on Friday, 7/13/1990. I experienced five bilocation trances to the past, present and future. In one, I heard from the back of my neck and called it 'The Third Ear' (don't know if this is documented). I accepted the intuitions, meanings, reinforcements, dreams and altered states of consciousness while the circumstances aligned themselves perfectly in the domain of possibilities. **P2**

**327 The True Mirror – An Accurate Reflection of One’s Self** John Walter <jwalter@truemirror.com> (True Mirror Co., Highland, NY)

A true image mirror is created from placing two mirrors at a 90 degree angle to each other, and looking into the angle. Each mirror reverses the other, creating a double negative, or positive image. A surprising finding was discovered by John Walter more than 30 years ago – he found that the reflected true image was an accurate reflection of not only what he looked like, but also how he was feeling and how he expressed that feeling. He saw his real smile, and the happiness behind the smile for the first time, instead of a mirror image that always looked fake and was usually quite self-critical. Over the years, Mr. Walter perfected the optics, removing the seam between the two mirrors by using optical front surface mirrors and techniques to create a perfect 90 degree angle. It turns out that the seam is critical, because one’s eyes are right in the center, where much of our communication takes place. This optically perfect true image mirror is produced and available as the True Mirror. A traditional mirror reflects our selves incorrectly because we use our faces to communicate. Our faces and eyes are different on each side because our brains are sided – left is different than right. However, left belongs on the left, not on the right. When a traditional mirror flips our image, the information in our face gets altered, and subsequently our responses are altered. Often what happens is that natural expressions don’t look natural, and so they fade quickly. Natural smiles are the quickest to fade – a flipped smile just doesn’t look genuine -most especially in our eyes. Thus the desire for true communication with one’s self becomes very difficult in a mirror, and often people stop and just stare at themselves, or struggle through a filter that distorts what is being said. This unusual appearing person confronts us every day for our whole lives, creating a wide range of effects on our sense of self. None of these effects are typically challenged – mirrors just have always done this, and the effects are just accepted. In contrast, a True Mirror reflects the facial positioning and information correctly. Natural expressions look natural, and so our responses to them can be natural. There is a dynamic flow of information that matches what is real, so the viewer tends to stay animated and present. Instead of staring back, viewers are surprised and smiling, seeing things in themselves that are never visible in the traditional mirror. This simple yet profound concept can have significant effects in both correcting and reinforcing our sense of ourselves, in understanding our state of being, and understanding how others relate to us. **A1**

## 5.05 Transpersonal and humanistic psychology

**328 Correlational Study of Triguna Test with Myers-Briggs Type Indicator (MBTI) Test on University Students: Comparison of East-West Approach Towards Consciousness** Shobha Bhasin, Gurdev Roy; Shagun Dayal; Sukhdev Roy <shobha.bhasin@gmail.com> (Management, Rutgers University, Newark, NJ)

The Myers-Briggs Type Indicator (MBTI) assessment is a well-known standardized psychometric questionnaire designed to measure psychological preferences in how people perceive the world and make decisions. These preferences have been based on the typological theories proposed by Carl Gustav Jung. Jung theorized that there are four principal psychological functions by which we experience the world: sensation, intuition, feeling, and thinking. One of these four functions is dominant most of the time. However, eastern spiritual traditions reveal that all manifestation in creation, whether animate or inanimate and the constitution of mind, constitutes three Gunas (Trigunas) that are inseparable and simultaneously existing qualities, namely Sattva (pure, luminous and free from sorrow, binds us with happiness and wisdom), Rajas (passion arising from desire and attachment binding the self with compulsive action), and Tamas (born of ignorance, deludes all creatures through indolence and inertia). In this paper, an attempt has been made to identify the degree of correlation between these two approaches on consciousness states of University students. We considered the Vedic Personality Inventory (VPI) developed by Wolf that had Cronbach’s  $\alpha > 0.90$ . The tests were conducted on 280 University science students in India. We found evidence of construct validity as manifest in theoretically expected correlations with conceptually similar and dissimilar measures. ESTJ and ISTJ accounted for the majority of personality types with a greater contrast between Sattva and Rajas in ESTJ compared to ISTJ. Sa-

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togun has a relatively high correlation with ESTJ. Rajogun has relatively high negative correlation with ESTJ. In comparison to the earlier tests conducted on 57 yoga practioners in America and India, we found lower Sattva component in students, revealing the efficacy of yoga meditation on personality development. The study highlights the importance of multidimensional tests and/or multiple measures of a construct for consciousness studies. Since most concepts and phenomena in spiritual and transpersonal psychologies are complex, unidimensional instruments that assess these constructs as a global entity may not suffice for most research purposes. The above study would be useful for psychometric and transpersonal oriented studies. Results of ongoing testing of a wider group of subjects will also be presented. **P1**

**329 Life: A Unique Perspective through the Eyes of an Ontologist** Thomas La Framboise <admin@tjlonline.com> (Alanson, MI)

The objective is to convey an authentic understanding of the human condition from the transpersonal perspective. The amnesic effect associated with incarnation causes individuals to become overly attached to the human condition and thus unaware of their existence beyond the relative experience. Although being an inherent condition of the physical experience, it is a, 'necessary evil,' that is meant to be overcome as part of one's ability to achieve the greatest potential of the intended purpose for life. Left unchecked, the amnesic effect restricts the potential for development of one's physical and metaphysical aspects, often leading to the inability to overcome physical hardships and to achieve one's intended purpose for the given lifetime. Remembering one's purpose from the metaphysical perspective eliminates circumstantial distortions and empowers the individual to intentionally self-direct their experience toward their human and transpersonal potential. At the point of remembrance, the individual evolves. The experience of such knowledge is assimilated within the meta-mind, and reflected through the egoic mind within personal expressions and a more highly evolved way of living. Altering one's attention away from relative experience allows them to authentically remember other aspects of existence. There were four means used in the exploration and compilation of this material over a 30-year period: Hypnosis, Lucid Dreaming, Sensory Deprivation, and Entheogens. Through the years of exploration and study of the human condition from the transpersonal perspective, the assimilated knowledge is most succinctly stated as; life is a perspective of existence from a transpersonal point within phenomenal reality. It is an autonomously self-designed and generated experience to give the greatest potential of achieving one's and others' intended purpose toward evolution. During the life experience, the human aspect is in a constant and seamless relationship with the transpersonal aspect. To achieve the greatest possibilities within the life experience, it's not as important to focus on whom you 'think' you are or should be as it is in remembering what you are and discovering the purpose of why you are. In order to authentically understand and assimilate the nature of what is; to appreciate the beauty and magnificence of the life experience, it must be let go of through individual, transpersonal experience. Purpose is the beginning. It is the ultimate catalyst of the human condition, indeed, of existence. It is absolute and cannot be intellectualized. Discovering one's individual purpose through an authentic transpersonal experience frees the egoic mind and thus the physical potential from the quagmire of hypothesis and dogmatic philosophies. Life is only a mystery and 'suffering' as defined in the Buddhist traditions, when one becomes too attached to the human condition and subsequently fails to overcome the amnesic effect. Should more individuals seek to escape the confines of the amnesic effect and seek the understanding of purpose, the human species could truly evolve toward the stars. It is with trust that those individuals, who are motivated to explore the thoughts and ideas presented in this work, will find benefit. **P2**

**330 Transpersonal Experiences Among Women During Childbirths – After Effects and Spiritual Midwives** Kersti Wistrand <kwistrand@gmail.com> (Stockholm, Sweden)

I'm a Swedish retired psychologist, and teacher with academic studies in comparative religions, specializing in inuit shamanism. I was the co-editor of the first Swedish book on NDEs and OOBs, Medvetandet och doden (Consciousness and Death, ed. K. Wistrand & J. Pilotti, 1982), which led to more than one hundred interviews and also some short time therapies with persons who told their experiences near death, and in childbirth. Having lectures on NDEs (Near Death



Experiences) in womens organisations during 1983-1994 I came in contact with 34 women who told there experiences both during complicated and normal childbirths. They told about OOBES, NDEs, streams of energy, meetings with the light, and sometimes meetings with dead helping grandmothers etc. This was a new subject not earlier studied in psychology or psychiatry, and I needed to study a bigger sample, but was not allowed to do this in Sweden. As a research coordinator in the Swedish branch of IANDS (International Association of Near Death Studies) I got the possibility to bring the research to St. Petersburg in Russia, where I met the professor Leonid Spivak and PhD Dmitri Spivak, Human Brain Institute. Research started with childbearing women in maternity hospitals. Several projects were undertaken in 1992-2003. In the first project 202 healthy delivering women were interviewed on day 2 – 4 after normal childbirth. Winnicotts hypothesis of 'primary maternal preoccupation has therewith been supported by experimental data for the first time. I will present my research in Sweden and Russia, and give some case studies. I will also tell about how the women felt after their experiences, and how the medical staff, and their husbands reacted, and then focus on the after effects. Childbearing women with the deepest after effects, becoming one with the light, sometimes get healing abilities. Long ago this ability was used in the spiritual midwives profession in Russia, and Scandinavia. The persecution of 'witches' during medieval time exterminated the transpersonal knowledge connecting childbirth in the Western society. It is important to restore these phenomena in our collective mind of today.

P2

## 5.06 Psychoanalysis and psychotherapy

**331 Unconscious Memory and Affect; From Psychoanalysis to Neuroscience** Carlos Eduardo De Sousa Lyra <ceslyra@hotmail.com> (State University of Piaui, Sao Raimundo Nonato, Piaui Brazil)

According to the Freudian metapsychology, drive is only manifested, in psyche, as psychic representatives, which have two distinct natures: representation and quotas of affect. Psychic representations are inscriptions presented as mnemonic traces that only determine the qualitative factor regarding ideas and thoughts. Quotas of affect, in their turn, are the quantitative representatives of the psyche. Freud stresses the importance of affect for the psychoanalytic theory as a whole and, in particular, for the theory of repression. On the other hand, he did not sufficiently develop the issue of affect, leaving many questions about the concepts involved in this obscure region unanswered. Neuroscience, at Freud's time, was far from providing reliable instruments able to provide biological confirmation for the theories developed by the Austrian psychoanalyst. Freud, himself, has recognized some deficiencies in his description of mental processes, foreseeing for the future the substitution of psychological terms for physiological and chemical ones. As we know, neuroscience has surprisingly evolved over the past decades of the 20th century, and it now offers the possibility of observing the brain in its full functioning. Although the interests of neuroscience and psychoanalysis are differentiated, they can converge in some aspects, favoring the knowledge of mental processes that deals with subjectivity and the affective and emotional aspects. Thus, a dialogue between neuroscience and psychoanalysis seems to be possible, since that are safeguarded the epistemological characteristics of both areas. This dialogue would promote one better understanding of the nature of human mind, and also the appearance of new forms of treatment for its disturbances. This work consists of a revision concerning the concepts of unconscious memory and affect. The methodology of the study consists of bibliographical research: reading and analysis of texts, articles and chapters of books. It examines, initially, the Freudian metapsychology as well as psychoanalyst Andre Green's theory of affects. After that, the study approaches philosopher John Searle's point of view about intentionality and affect, and it also presents neurologist Antonio Damasio's proposal and neurobiologist Gerald Edelman's conceptions about unconscious memory, emotions and feelings. Finally, this work indicates some possible contributions of the neuroscientific theories for psychoanalytic theory and clinic.

P2

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**332 Beep Here Now: Descriptive Experience Sampling Provides A Structured Path Toward Mindfulness** Noelle Lefforge, Leiszle Lapping-Carr; Chris Heavey; Russell T. Hurlburt <nlefforge@gmail.com> (Department of Psychology, University of Nevada, Las Vegas, San Diego, CA)

Mindfulness-based therapies (MBTs) are widely used to treat many psychological disorders (e.g., depression, substance abuse, anxiety, suicide and self-harm, and psychosis). Empirical support for MBTs is growing; however, therapists frequently encounter clients who are unable and/or unwilling to develop mindfulness. Mindfulness practices are based on Eastern practices and tend to assume an initial comfort level with inner experience and the ability to sit with stillness. Mindfulness is paying attention purposefully to the present moment without judgment, thereby increasing awareness, clarity, and acceptance of present moment reality. As this basic ability is not common in Western culture, many clients discontinue the treatment because they become frustrated, impatient, and experience imperturbable judgment when they attempt mindfulness practice. Unfortunately, researchers have not developed techniques to address these common barriers. Descriptive Experience Sampling (DES), a phenomenological research method to apprehend inner experience, shows promise for filling this gap. Specific DES properties that may contribute to mindfulness development include its concern with discrete moments of inner experience, iterative understanding of inner experience, valuing inner experience as it is lived without interference, promoting self-awareness and meta-awareness, and clearly distinguishing inner experience from personal narrative. DES may also offer value as an initial assessment and diagnostic tool prior to beginning MBT. By apprehending experience in its unaltered state, therapists may have enhanced insight for prescribing one mindfulness exercise (e.g., visualization for an inner seer) over another (e.g., mantra for an inner speaker). **C22**

**333 Hypothesized Mental Mechanism as “Robust Repression”** Anupam Satsangi, Dheeraj Chadha; Bharat Agrawal <anupam2000@ovi.com> (DEI Dayalbagh Educational Institute, Agra, India)

A subset of the psychotherapists practicing trauma-focused therapy predicate their treatment on the existence of a newly claimed, powerful form of repression that differs from repression as used in the psychoanalytic tradition and from amnesia in any of its recognized forms. Recovered-memory specialists assist patients to supposedly retrieve vast quantities of information (e.g., utterly new dramatic life histories) that were allegedly unavailable to consciousness for years or decades. We refer to the hypothesized mental mechanism as “robust repression” and call attention to the absence of evidence documenting its validity and to the differences between it and other mental mechanisms and memory features. No recovered-memory practitioner has ever published a full specification of the attributes of this mechanism. That is, the properties it would have to have for the narratives developed during therapy to be historically accurate to any significant degree. This article reports a specification of the properties of the robust repression mechanism based on interviews with current and former patients, practitioners’ writings, and reports to researchers and clinicians. The spread of reliance on the robust repression mechanism over the past 20 years through portions of the clinical community is traced. While involved in therapy, patients of recovered-memory practitioners come to believe that they have either instantly repressed large numbers of discrete events or simultaneously repressed all information about abuse they may have endured for as long as a decade. Patients’ therapy-derived accounts are thought by some social influence, memory, and clinical specialists to be inadvertently created iatrogenic effects: inaccurate pseudomemories and confabulations produced due to patient-therapist interaction, the use of leading, suggestions, hypnosis, and the mismanagement of the dependent relation of the patient on the therapist. **P1**

## 5.08 Anomalous experiences

**334 Philip K. Dick, A Non Dual Fool?** Richard Doyle <mobius@psu.edu> (English/Information Sciences, Penn State University, State College, PA)

Few writers or artists have captured the uncanny feeling and flavor of 21st century life better

than Philip K. Dick. In scores of novels, hundreds of short stories and thousands of pages of *The Exegesis*, PKD danced and stumbled, comically and tragically, with the slippery nature of reality and life in a world increasingly saturated with the technologies and metaphors of information. While the sciences of information theory (Shannon), molecular biology (Watson and Crick), and physics (Bohm, Wheeler, Burks) all began to scientifically model the objective world as composed of information rather than matter, Dick found himself living a subjective experience he characterized as “nailed by information” where the fictional nature of self came into and out of focus. This talk will explore PKD’s massive 8000 plus page text *The Exegesis* through the lens of non dual experience, arguing that PKD’s fiction and metafiction must be understood as experiments in what Ramana Maharshi called *atma vichara* or self inquiry, experiments available for effective reenactment by contemporary readers. **C15**

### **335 Paranormal Phenomena as Expression of Quantum Theory, Indication of Nature of Consciousness** Jill Hanson <jill@qpsience.org> (Q.Psience Project, Gilroy, CA)

Anomalous human experience, AKA the Paranormal, can be described as a form of ‘dimensional bleedthrough’ which, when properly investigated and documented with significant correlations made through quantum physics, is an indirect means of witnessing aspects of the fundamental nature of consciousness. My aim through systematic inquiry, as well as direct and indirect investigative within the disciplines of physics, parapsychology and consciousness studies, is to answer the key question, “Is the paranormal, which is now being indirectly described by theories within the field of quantum physics, also indirectly evidentiary of the nature or quality of fundamental consciousness?” Currently, a foundation of research in this area is lacking due to several variables, including the newness of the field of Consciousness Studies itself, lack of substantial funding for qualitative research in general, as well as the persistent stigma attached to scientific exploration of the paranormal as a framing field; I insist that the time has come for such research to flourish, as Consciousness Studies is proving even among mainstream scientists to be the last yet undiscovered great frontier, and a huge resurgence of interest in the paranormal has coalesced in recent years and continues to gain momentum. While I approach this question with an open scientific mind, my hunch is that the phenomena described by today’s quantum physics can in fact be witnessed as other than just theory through the ‘anomalous’ human experience called the paranormal, and that this in turn makes grand implications of the nature of consciousness as an underlying, fundamental property of the universe. Research of my key question is academic and scholarly in nature, conducted through meticulous and exhaustive exploration of related contemporary scientific theories and established qualitative and quantitative data, in order to identify previously unacknowledged and significant correlations between fields in this vein. I believe that this inquiry specifically, as well as inquiries of its kind in general, are critical to unifying the New Science, and also for affirming the relevance and necessity of the field and future of Consciousness Studies.

**P2**

### **336 A Crack In The Cosmic Wall... Are Our Memories Located Outside the Body?** Eugene Ledezma <eugenio.ledezma@gmail.com> (Astrophysics, INAOE -National Institute of Astrophysics, Optics and Electronics, San Andrés Cholula, Puebla Mexico)

Currently, all kinds of human memory are understood with the basic idea that if synaptic connections can be turned off and on, then their functioning should be similar to the memories found in digital systems such as a hard disk. There is evidence that synaptic connections appear and are reinforced while memories are stored or retrieved. However, the type of encoding and the storage place are unknown. A description of the encoding in digital memories will be given, with the aim of pinpointing the impossibility that the same procedure could be followed by synaptic connections. Nevertheless, some processes similar to digital techniques such as cache memory and FAT (File Allocation Tables) may be used in human memory. A hypothesis considering the brain as a transducer, similar to a TV set, rather than a storage place was advanced by this author at the 2010 TASC (Ledezma, E. Abstract #127). Now, possibilities of the use of tagging, metainformation and cloud computing will be discussed. Also, it is argued that Neural Correlates are only indications that the organ in question is intervening in the memory process but it is not an storage place. In

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relation to memory traces, they could be considered as pointers or index entries to the real location of the information. The proposal of other non-material spheres, dimensions or intangible realities as a memory repository will be supported with several examples from the animal kingdom. The first is the recent paper on flatworms retaining memories even after decapitation (Shomrat and Levin, *J Exp Biol* 216, 3799-3810). Other prodigies includes the life cycle of the Monarch Butterfly and its long overwintering journey from Canada and the US to Mexico, with no individuals making the round trip. Between the starting and returning trip generations, two other generations occur. Then, how do they remember when, how and where to migrate? Some researchers think that their thoughts and memory are an epiphenomena resulting from the extreme number of neurons and its trillions of synapses, however, some organisms such as the Physarum Poycephalum Mold and the protozoan parasite Toxoplasma gondii, with no neurons at all, have shown behaviors resembling memory. The claims of the existence of intangible realms of reality are not new at all, and they may be as old as humankind and are a central part for most religions. However, mainly in the last 400 years, through the use of the scientific method, we have got rid of thousands of these false hypotheses. The existence of additional dimensions have been theorized or imagined by many artists, authors and scientists. The case of instantaneous review of their whole life in Near Death Experiences, or the interesting situations narrated in the novel Flatland (Abbot, 1884) will be presented. Also, a discussion on meditation as a possible way to solve this riddle will be presented. Finally: How a physical train of action potentials from the senses gets transformed into a non-physical memory? This may be a "crack in the wall" that separates us from many universes!

**P2**

**337 On the Origin of Consciousness** Borje Peratt <borje@peratt.com> (Visam AB – Humanism & Knowledge, Stockholm, Sweden)

My title is a parallel to Darwin's *On the Origin of Species*, the question is if there is an origin of consciousness or if it is eternal but availability is limited by senses. A car accident 1987 opened my attitude to the possibility of 'independent senses'. The circumstances around the accident involve varieties of extra sensory perception, which I then in my skepticism ignored. It almost cost me my life and a long convalescence reflecting on what happened. At the same time it boosted paranormal resources. With a damaged body, I came to understand more of the possibility of the mental resources. Leaving my postgraduate thesis, IT-communication, in 1999, changing to a private research induced by own experiences of Near Death Experience (NDE). I found that NDEs contain convincing evidence that we have an independent mind. Independent senses make it possible to perceive even if the normal senses are not in use because of anesthesia, unconsciousness or coma. I also tested the ability of healing in close to a clinical study run by a team of medical professionals (1999). This raised questions. How can you assess visions as the condition of internal organs with only the mind? Independent Senses can explain all forms of so-called paranormal experiences. I also got visions so remarkable that I thought they were only fantasies. As a film director I presented some of my visions in scripts and media before such events occurred in real life. Because of the number of pre-reported cases and their details, it can be considered as more than simple anecdotes. As an example, the Swedish Government ordered a scenario for a Civil Defense Exercise, and I made a slideshow with a ferry sinking in the Baltic Sea. Some months later, on the 28th of September 1994, there was a wreck of the ferry Estonia, where 850 persons died. I also received other visions such as the cause and the place of the Tsunami in Bay of Bengal 2004. In my lecture I will tell about some experiences, and also a hypothetical theory on consciousness. It contains of a Life Compass Based Learning (LBL) where Succubo, a created word from Latin, means expectation of success and can be compared with placebo in the healing system. It introduces a categorization of mind and a classification of perception putting the ancient physical senses in a new context: the 'central' senses within the body (ECO: emotion, communication, orientation), then developing into 'elementary' senses (sight, hearing, taste, smell and touch). Above these are 'independent' senses leading to 'independent consciousness', which is infinite, beyond natural laws, as we know them. It also brings up the questions of spirit, soul and mediumship. The third part of my research (not yet published) questions the concept of trial and error, assuming that the experience of success is necessary and conducive to learning and devel-

opment. It also releases a theory presenting stages of mind evolutionary to answer the embedded question in *On the Origin of Consciousness*. **P1**

**338 Resolution of Cognitive Anomalies through Scientific Study of Yoga Is the Key to the Consciousness Puzzle** Sant Saran, Sukhdev Roy <santsaran1@gmail.com> (Electrical Engineering, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The past quarter of a century has witnessed an explosive multidisciplinary interest in studying consciousness. The interest has ranged from artificial intelligence and computational and information processing in cognitive science to the philosophy of mind. Human beings as conscious subjects function at two levels, i.e., their awareness directed outward towards objects and events, and also focused inward to one's thoughts, feelings and being. Sharing experiences leads to the distinction between objective and subjective experiences. The primacy of the first or the second respectively, constitutes the distinction between the Western and the Eastern approaches. An important question that we confront is whether the scientific method that appears to adequately reveal the outward can be applied to the inward experience as well. Attempts to apply the logic of objectivity in the realm of inner awareness have led to reductive exercises designed to translate inner experiences into outwardly observable phenomena. Although the favored scientific approach is to determine the neurocognitive correlates of all conscious experiences, there are cognitive anomalies or parapsychological phenomena that resist all physical and neurobiological explanations. These phenomena have two attributes, the receptive that includes, extra-sensory perception, precognition, telepathy and clairvoyance, and the expressive that includes psychokinesis. Although tremendous effort has been made in the West to understand the wide variety of parapsychological phenomena, they have not met with appreciable success in science. This could perhaps be attributed to the lack of necessary conceptual and methodological tools required for understanding them. In this context, yoga acquires great relevance for psi and consciousness studies. Yoga as a psychic discipline accepted by all Hindu systems has now acquired universal relevance by spreading to the west. According to yoga, psi is both real and natural rather than an anomaly and the acquisition of siddhis or psi phenomena are natural outcomes as a person progresses through different stages of psychophysical development. Systematic disciplined meditational practices lead to realization of higher states of consciousness. Mind itself is considered subtle material without being grossly physical. Yoga considers spirit, mind and matter as differentiated forms of consciousness. Scientific study of yoga meditators has already become important in neurophenomenological studies, as subjects with good concentration are required to establish neural correlates. Although, yogic norms forbid practitioners to reveal and use psi capabilities, experiments can be conducted on, for instance, Tibetans who generally accept precognition in the form of oracles and divination performed by lamas and also clairvoyance as a means to locate reincarnated monks. Unprecedented progress in our understanding of nature has taken place when anomalous phenomena have been resolved in science. Hence, scientific study of yoga meditational states that lead to development of extraordinary psychic abilities can be of great importance in resolving cognitive anomalies. In this paper, we review the various recent scientific studies undertaken on precognition, telepathy, psychokinesis on living and inanimate systems, clairvoyance, and psi and meditation that provide evidence for psi phenomena and also present a prospective work plan for future progress. **P1**

## 5.09 Parapsychology

**339 Anomalous and Replicated High Amplitude Photon Bursts Associated with Specific Hypothesized Spirits** Gary Schwartz <gschwartz@spamarrest.com> (Psychology, The University of Arizona, Tucson, AZ)

Previous research in the Laboratory for Advances in Consciousness and Health at the University of Arizona has observed replicated effects of hypothesized spirit presence on measures of photon activity using a Sensi silicon photomultiplier system (Schwartz, EXPLORE 2010) and Princeton low light cooled CCD camera system (Schwartz, EXPLORE 2011). In addition to obtaining significant main effects of hypothesized spirit presence versus matched baseline control trials, we have observed replicated individual difference effects between hypothesized spirits (for ease

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of communication, from herein hypothesized spirits will simply be called spirits). In Schwartz (2010) using the silicon photomultiplier, two spirits (called Sophia and Harry) produced reliably larger magnitude effects on photon bursts compared to matched baseline control trials than two other spirits (called Susy and Marcia). In a follow up series of experiments using the silicon photomultiplier focusing on Harry (Schwartz, 2013, submitted for publication), replicable large magnitude effects on photon bursts were again observed. In Schwartz (2011) using the low light CCD camera, Sophia and Susy were re-tested using a completely computer automated system (i.e. no experimenters were present when the data were collected). In two separate experiments, Sophia produced significantly and substantially larger magnitude photon effects than Susy. In the present experiment, eight different spirits were given the opportunity to be individually tested using a Hamamatsu photomultiplier tube with a Fluke frequency counter and Timeview 2.1 software running on a PC. The photomultiplier tube was housed in a completely dark Faraday shielded subject room; the frequency counter and PC were in a separate room. The experiment was conducted at the California Institute of Human Sciences; the data were collected by Dr. Gaetan Chevalier and witnessed by Schwartz and a research medium. Included in the sample were Sophia, Harry, Susy and Marcia; baseline control trials were collected as well. Once again, Sophia and Harry produced larger magnitude photon bursts than Susy and Marcia. Also Sophia showed a particularly high anomalous value (larger than any that Chevalier had seen in two years using the equipment). Based on certain characteristics observed in Sophia, we predicted that a spirit called Gabriel might produce similar high values; this prediction was confirmed. In a final set of observations involving the measurement of high frequency photon activity at the University of Arizona using a Vernier radiation detector, Sophia again produced particularly high anomalous values. The importance of carefully considering individual differences in hypothesized spirit presence research is discussed. Implications for materialist and post-materialist theories of consciousness and brain are also considered. C23

## 5.10 Contemplation and mysticism

**340 A Proposed Spiritual Axis of the Body/Mind: How the Reticular Activating System (RAS), Vagus Nerve, and the Alta Major Chakra Axis May Be the Nexus of Body/Mind/Spirit Consciousness** Tiffany Barsotti <tiffany@healandthrive.com> (Heal and Thrive, Encinitas, CA)

Neuroscience frames the reticular formation, which contains the reticular activating system (RAS), as the gateway to conscious awareness. The RAS responds to stimuli from all sensory systems through its afferent and efferent pathways, regardless of the state of consciousness. These pathways integrate sensory, visceral, limbic, and motor functions. Reticular circuits branch throughout the central nervous system and exert important influences on autonomic regulation of vital organ systems, levels of alertness, sleep cycles, somatic motor activities, pain modulation and behavior. The RAS, acting in concert with the vagus nerve (CN X), directs and modulates these functions throughout the body to maintain a dynamic balance – both with respect to the external environment and the body's internal environment. The vagus nerve (Latin for “wandering”) originates in the medulla oblongata and is dorsal to the RAS. This unique, wandering nerve has a more extensive course of distribution than any of the eleven other cranial nerves. The vagus is composed of both motor and sensory fibers, which communicate information bi-directionally between the brain and body. Less well known to western medical scientists is a system parallel to the physical body that develops in the subtle energy body of the human being. This ‘energy body’, while not visible with current western and mainstream technology, has been recognized and respected in most of the ancient esoteric traditions of the East. Two of the main circuit centers (chakras) within this energy body, the heart and base chakras respond to the signaling of vagus nerve. During spiritual awakening these two chakras catalytically serve the head chakras, including the alta major chakra located at the back of the head. When the head, heart and base chakras are synergistically activated, they entrain the activity of the vagus nerve and subsequently the fires (kundalini) of the body are raised. Thus, as the human being develops from a state of ordinary sensory consciousness toward a condition of spiritually aware consciousness, the locus



of control over the functions of the bodies (physical and subtle) shifts from the physical brain alone to a higher mind within the energy body. This shift occurs only after activation of the alta major chakra, which is located in the same region of the RAS and has significant connections to the cerebellum, the medulla oblongata, the spine and the vagus nerve. When the alta major chakra is fully activated it serves as a primary center of communication between the vital energy of the spinal column and the energy of the head chakras serving the pineal and pituitary. This presentation discusses the RAS-Vagus Nerve-Alta Major Chakra Axis as a nexus of bodymind/spirit consciousness. The presentation brings awareness to the overlap of conventional neurophysiology/biology with energetic physiology, and the kinship between physical consciousness and spiritual physical consciousness necessary for the purposes of balance, health and creativity. The RAS-Vagus Nerve-Alta Major Chakra Axis speaks to the anatomy of the spirit in the self. **P1**

**341 Cognito-Cosmic Harmonics: Transfiguring Ontologies** Kala Perkins <quasar9@mac.com> (Bioethics, Graduate Theological Union, Woodside, CA)

Our cosmic encounters dwarf the roots and rational of those disputes and conflicts that challenge our very existence as a species. What does it mean for human culture and cosmos that tiny organisms on this jewel-sized lapis lazuli planet are learning to sing and create in harmony with its etudes? Our cultures arise at the nexus of interacting matrices of complexity, giving rise to systems and organisms through multidimensional resonant emergence. The contributions of this newest cosmic encounter in transforming global culture may be among our greatest achievements. Bringing the unifying dimensions of cosmos to the global community, sharing the wonder and calling forth the unparalleled ability of integrity to dwarf our disputations, open our hearts and to propel us in new harmonic expressions on this collective universal adventure, are at the nexus of evolutionary ontology. Exploring the generative role of cosmology and cognitive neuroscience in the emergent holistic integrity of collective human culture and design, the deeper we penetrate into the fabric and dynamism of cosmos, the more profound becomes our appreciation and understanding of the radical subtlety of universal processes that give rise to and sustain the existence of life, consciousness and co-creative expression. The plunge into cosmic depths parallel the advancing depth of exploration into our own psyches and creative processes. This dynamic inquiry is invoking an astute ethical ontology toward life practice. To comprehend the complex integral contributions of cosmological labor inherent in the successful communication of biological and neurological systems inspires awe and respect for living systems. From the neural network of cosmos to the neurotransmission between axon synapses signaling sentient interplay, a logical tension informs the universe. With an ontology of absolute integrity, trespassing on the life-force, rights and beneficent, autonomous justice of any aspect or entity of the absolute become imprudent. Equality and integrity become singularity; right action derives from logical monism. At the convergence of magnetism/ gravity, cultural linguistics and consciousness is the sought for formula offering the cosmo-harmonic integer of co-creative evolution. There is a direct continuum from the substantial "physical" to the substance of consciousness, transiting through gravity in dimensional magnetic fields on progressive mathematical scales, to that which is whole-y ground or the ungrounded insubstantial, the Motionless Mover of ancient thought. In this presentation, we explore the transformative artistry and choreography of the cognito-cosmic living topography. **P2**

**342 Effect of Personality on Higher and Lower Consciousness** Archana Satsangi, Shabdaa Joshi, (shabdaaj04@gmail.com; Student, Department of Psychology; Dayalbagh Educational Institute; Dayalbagh; Agra. <archanasat70@yahoo.co.in> (Department of Psychology, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

The purpose of the present investigation is to measure higher consciousness i.e. Spiritual Belief and lower consciousness i.e. Egotism and the types of personality. The essence of human life is spirituality which guides thoughts, feelings and behaviors of an individual and that can be expressed religiously and non-religiously. A higher level of spiritual consciousness can be attained through breaking the barriers of the body and five elements viz Kaam, Krodh, Lobh, Moh and Ahankar (Ego). Egotism is an inflated sense of 'importance' and 'greatness'. An egoist is someone who is stuck on him or herself and feels superior to everyone in all aspects of life. Per-

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sonality is the 'costume' worn by the soul as it operates in the material world in human form. It is observed that no two people can ever have the same experiences of life, the same perspective, the same mind even the same personality. Therefore the present investigators are curious to know the effect of personality on spiritual belief (higher consciousness) and egotism (lower consciousness). The sample of the present study consisted of 200 cases of 40 to 60 years of their age group. Both male (50 extroverts and 50 introverts) and female (50 extroverts and 50 introverts) respondents have been selected. In this study Introversion- Extroversion Inventory, developed by Aziz and Gupta (1923), Egotism Scale, constructed by Das and Sisodia (2011) and Spiritual Belief Scale, developed by Deshmukh and Deshmukh (2012) were used. Result indicates that the obtained Mann- Whitney U value ( $Z_u = 2.369$ ,  $p < 0.05$ ) is significant at 0.05 level. This shows that there is significant difference of egotism between extrovert and introvert personality. The mean value shows that Extrovert Personality has considerably high Egotism ( $M = 13.68$ ) as compared to Introvert Personality ( $M = 11.47$ ). Further obtained Mann- Whitney U value ( $Z_u = 7.869$ ,  $p < 0.01$ ) is highly significant at 0.01 level which shows the difference of Spiritual Belief between Extrovert and Introvert type of personality. It signifies that there is significant difference of spiritual belief between extrovert and introvert personality. The mean value of spiritual belief shows that the people of extrovert personality have more spiritual belief ( $M = 130.58$ ) than the people of introvert personality ( $M = 110.62$ ). **P1**

**343 West Meets East Meets West: The Functional Psychoneuroanatomy That Underlies the East-West Discourse and Points to a New Scientific, Cultural, Philosophical, and Spiritual Synthesis** William Stranger <bstranger@dharmacafe.com> (DharmaCafe.com/The Calistoga Institute, Cobb, CA)

The encounter between Oriental mysticism and Western scientific culture over the past one hundred years is typically viewed as a clash between two perhaps complementary but principally opposite influences, which indeed it has largely been. The Tucson Conference was created, at least in part, out of the promise that the meeting of these two worlds would result in a cultural synthesis suitable for our now globalized world. Yet that synthesis has yet to attain truly significant cultural force, and today Western scientific and political materialism predominates throughout the world, even in the East. Missing from the discussion until now has been the point of view of westerners who have traveled East, successfully practiced various forms of Oriental spirituality, but who have done more than simply adopt and adapt to Oriental mystical views and practices. Although such westerners have certainly provided independent validation of central features of Oriental mysticism, they have also on occasion challenged some of its longstanding presumptions, proposed new syntheses of Eastern and Western approaches, and in one outstanding instance provided an original and compelling understanding of the functional esotericism and philosophical underpinnings of the esoteric spiritual process that underlies all the great mystical paths, Eastern and Western alike. As we will see, the master key to this discussion is provided by the human body-mind itself. In this poster session I draw upon the work of Lewis Thompson, E. Graham Howe, Adi Da Samraj, and other Western-born individuals to revision the East-West encounter. By mapping Western neuroanatomy (especially the bicameral brain and bipolar nervous system) onto classical Indian esoteric anatomy, I will be able to present a greatly expanded and philosophically sophisticated understanding of the complementarities between East and West. These not only offer us a more complete vision of human growth and spiritual development, but also enable us to see beyond limiting orientations of both East and West in a manner that presages an entirely new foundation for human life. To this end, I will especially examine the implications of the assertion by two of the twentieth century's greatest Sages of Advaita Vedanta, Bhagavan Ramana Maharshi and Sri Atmananda (Sri Krishna Menon), and two leading American cranial-sacral workers, Hugu Milne and Charles Ridley, that the "seat" (or primary source-point) of consciousness in the human body is located at the heart's sinoatrial node and not in the brain's corona radiata (or "sahasrara"). This issues a profound challenge to the prevailing view of both scholars and spiritual practitioners that the so-called kundalini spirit-current is the human body-mind's most senior esoteric structure. I will further show how the Western-born Great Sage Adi Da Samraj's description and demonstration of "the Spiral Current" (or "Atma Nadi") not only supersedes the kundalini system but also

provides a unique basis for the long-awaited synthesis of East and West. This discussion will also allow me to introduce a critical distinction between “attention”, or focused awareness, and “consciousness”, which is non-directional and non-intentional, that I believe has profound implications for consciousness studies. **P1**

## 5.11 Miscellaneous

**344 Can People Control a Brain-Computer Interface Unconsciously?** Doron Friedman, Jonathan Giron <doronf@idc.ac.il> (Head of the Advanced Reality L, Herzliya, Israel)

We have conducted an experiment whereby subjects controlled a brain-computer interface (BCI) without being instructed to control it. Our method uses the steady state visually evoked potential (SSVEP) paradigm, which is based on detecting occipital activation that resonates with flickering visual stimuli. The main goal was to find out whether subjects would realize that the application is responding to their brain activity. Our generic platform allows easily turning any object in a virtual environment into an SSVEP flickering target. The stimuli were presented in an immersive virtual environment displayed on a back projected large screen (“power wall”) using a 120Hz refresh rate projector using a high-end graphics card. SSVEP classification was calculated using a well-known algorithm. We recorded EEG signals at pO7, PO3, POz, PO4, PO8, O1, Oz and O2 locations, using the g.USBamp amplifier (Guger Technologies, Austria). We tested two conditions: ignorant (11 subjects) and sham (10 subjects). The experiment included three parts. In the first part (training), the system computed a classifier of the EEG patterns elicited by the stimuli (stars). Each of the training sessions included 20 stimuli, 5 times of each frequency (8.57Hz, 12Hz, 15Hz, and 20Hz) in pseudo-random order and location on the screen. In the second stage the scene included an immersive experience of deep space with small stars moving towards the subject. Occasionally, larger stars would appear, all with the same texture (there were up to four large stars simultaneously on the screen and never more than one with the same frequency). When an SSVEP response to a specific star has been detected in the participant’s online signal, the star began moving towards the user. Each trial in this stage lasted 155 seconds of free choice BCI, and every participant went through four such trials. In the first three trials the subjects were not told that the experience is responding to their brain activity; only before the last trial all participants were divulged about the nature of the interface and asked to do their best at moving the stars. The only difference between the experimental (ignorant) group and the control (sham) group was that in the sham condition, in the first three trials, the stars moved randomly, without any relation to the subject’s EEG. The frequency of the star motion was made identical to that of the experimental group. In order to validate model fit the experiment included a third stage of validation for all subjects, which was constructed similarly to the training trial described above. Out of the experimental group three subjects realized that they were controlling the application, and the rest (seven) did not. Subjects in the experimental condition reported significantly higher levels of agency than the sham group. A possible (controversial) interpretation of these results is that the subjects in the experimental condition had some partial sense of agency, indicating a continuum between complete ignorance and complete awareness, rather than a binary dichotomy between conscious and unconscious states. **C6**

**345 Artists Between Species** Rob La Frenais <roblafrenais@gmail.com> (The Arts Catalyst, London, United Kingdom)

Society is now at a point in scientific and medical development where, while it is even more dependent on research involving animals to cure once-incurable diseases and to make advance in neuroscience, scientists are finding out that some animals – especially the higher primates – have more highly developed consciousness. The area of animal research itself is particularly polarised, with the interests of acute patients and people with disabilities appearing to be positioned against the animal rights activists – those who believe the lives and welfare of all other species to be sacrosanct. Many believe that humans, themselves primates, have abused their power as top species. Can artists’ work with different species can be a form of collaboration, or simply centred around the interests of the artist/human? Donna Haraway challenged our thinking about interspecies

## 5.0 Experiential Approaches

relations book 'Where Species Meet'. In her exploration on the 'companion species' i.e. dogs, she posits, half-humorously that "reversing the order of invention, humans didn't invent dogs, dogs invented themselves and adopted humans as part of their reproductive strategy." Artists Nicolas Primat, in his intuitive work with baboons, monkeys and higher apes, reflects this wolf-boy reversal in the way he has worked with tribes of such primates intensively over a period of time. Primat started to work with farm animals at the age of 14 as a young farm-worker and thus made early intuitive contact with sheep, cows horses and goats, becoming aware of the symbolic use of animals in art, from animist beliefs and shamanism. He finds it difficult not to see the animal in all of us. As he points out, once you start working with monkeys you can see the monkey in every human. The late Nicolas Primat was one of a small band of artists, working on art/science collaborations, who actively question the accepted approach of assuming that the human species is the focus of creation. Another is US-based Rachel Mayeri whose project *Primate Cinema* I have presented in several contexts. She makes movies for chimps and found that chimpanzees can react to movies, perhaps as humans may once have panicked from the first known filmed images, as in the urban myth about the reaction of Paris audiences to the first Lumiere brothers movie 'Arrival of a Train at La Ciotat' where the life-size image of a train approaching was said to have caused people to scream and run to the back of the cinema. Rachel Mayeri's 'Primate Cinema: Apes as Family', made partly at the Budongo Trail at Edinburgh zoo, tries to get inside the heads of chimpanzees and discovers as much about humans as our closest relatives. In this presentation I will compare the work of Primat and Mayeri in understanding chimpanzee behaviour and how these artworks reflect on human consciousness. AI

**346 Consciousness and Happiness: An Experiential Study Using Maslow's Hierarchy of Needs Theory** Sumati V, Chellapilla Maharaj Saran <vsumati.29@gmail.com> (Department of Physics and Comp, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

Consciousness is defined as a term that refers to the relationship between the mind and the world with which it interacts. Most theories relate it to subjective awareness. Happiness is a subjective concept having a relativity variable attached to it (reality minus expectations). Happiness has always been chased and pursued hard since times immemorial. Wisdom or inner awakening dawns upon an individual when happiness is not achieved as per the desired notions. In this paper we attempt to relate happiness and impact of higher order consciousness in achieving happiness. Research has slowly progressed from doubting the concept of consciousness to defining the conceptualization and progressing to latest theories on artificial neural networks and Artificial Intelligence where digital computational programming is being used to simulate consciousness. Recent research with brain waves during meditation has shown a distinct difference between those corresponding to ordinary relaxation and those corresponding to meditation. Study of conscious awareness is the latest area where emphasis is being laid. On the other hand, across the world, human happiness index is falling. India in the words of Mark Twain is the cradle of human race in matter ranging from knowledge and culture to religion & civilization is not featuring anywhere in the top of the happiness index. While the reasons to ponder galore, few areas where it is lagging could be the understanding what actually is 'happiness' and how to realise happiness which is a state of mind. Abraham Maslow's Hierarchy of Needs model (1943) has been taken as the base of this study. This theory, a framework of human motivation talks about hierarchy of needs. Now the problem area for the research is how do we decide on the time frame to be spent in each stage of the pyramid? If one stage of the pyramid is completed, the question remains, whether the individual should revisit the same stage at a later point in life. Maslow's theory has a limitation in not explaining the concept of consciousness, and the impact of the same to achieve higher order needs although he talks about self actualization at the pinnacle of the pyramid. In today's world with multitude of ills and issues, man has the option to exercise his wisdom gained over a period of time to prevail over the situation to achieve an objective solution. This necessarily can happen by virtue of the strength of his consciousness. This is an experiential study on human values, happiness and the consciousness theory based strongly on experiential and experimental learning. PI

**347 A Systematic Approach – Religion and Spiritual Consciousness** Asha Vadapalli, Murthy K. V. ; Prakash K. V. <ashasatyavolu.dei@gmail.com> (DEI Dayalbagh Educational Institute, Bangalore, Karnataka India)

The fact is that a man is the noblest and the most superior being in the creation here and he has been given absolute authority and control in this world. The supreme father's grace and mercy (unbounded as they are) are distributed equally over all, but the difference lies in every one's capacity to receive and enjoy the same. The behaviour, nature and understanding of man's mind and the structure and form of its thoughts depend on the associations of the man. In other words one way of life, understanding, nature, thoughts, habits of dining and dressing etc., as well as liberality, humility, miserliness and arrogance would be in conformity with the powerful association he gets from the beginning. The difficulty is that this aim appears only to a human being who possesses the ability or appropriate 'Samskaras' to receive that valuable gift. The valuable gift i.e. Religion a seeker should proceed in his search for a religion which may help him in the attainment of the highest object of life i.e. emancipation and communion with the Supreme Being. The success of a person is not because of knowledge or family background, but because of their ability to see gaps in a given opportunity and passes through and creates his own path for growth just like a creeper. Growth has no sufferings and resistance to suffering creates suffering. The object in view is to realize the highest degree of consciousness (spiritual potential) invoking the meditational practice of "Surat Shabda Yoga" of unifying spirit force of man with the 'characteristic' sound currents emanating from spirit centres at various levels of consciousness. This requires rigorous practice and guidance of a Guru. **P1**

## 6.0 Culture and Humanities

### 6.01 Literature and hermeneutics

**348 Meta-Representation, Contemplation and "Ordinary" Consciousness: Examining Links Between Alphabet, Number, Language [Self] Consciousness/Self-Reflection as Methods of Altering Consciousness** Sally Annett <annett897@btinternet.com> (Sally Annett, Bedford, Bedfordshire United Kingdom)

An idiosyncratic feature of human consciousness appears to be our capacity to have thoughts about other thoughts; to have beliefs about other beliefs, other peoples' and our own beliefs (speculation, about speculation, about speculation...). This awareness is structured by various factors; some immediate, individual, physical, instinctive or advantageous, some which lead, through action and external process, to a longer term, social, collective advantage, driven by belief. This is generally termed meta-representation but what is its function and relation to language and memory? Our oldest Western alphabets are shared culturally, as are our languages and originally, religious systems. All are constructs. Speech, writing, alphabet, lexicon, number, visual, artistic, subconscious, conscious, all are ultimately associations of symbol and sound to a shared abstract idea/concept. Symbol or utterance originates not in a platonic, material form, but as pure cognition, as thought, perhaps attached to an object, but more often to an emotion or experience which, is hypothetically, less tangible. In speaking and writing we make manifest in the external world an internal concept or comprehension. Human consciousness in its "normal" state can be neurochemically altered and our perceptions of the outside world may change radically. This is a sensory and cognitive illusion, it is not the outside world, which changes, but the chemistry of our brains. It is the inside, which has changed, our subjective experience, therefore, how can we be sure that what we see, feel or think ordinarily is "normal"? Our senses and material self are in a constant state of flux, it would be reasonable to suggest that so is our consciousness. There is little to bridge the psychological and physical gaps here, we lack "laws" and sophisticated understandings, but explore and devise entire paradigms to try to share and convey our experiences. We construct our world with languages of different kinds, from an MRI scanner image to a Tarot card, we attempt to create systems and pictures to predict and explain the outside world. Alphabet and writing relate directly to ideas about externalised cognition. This capacity to make self-reflective conscious-

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ness, and processes of storing and substantiating our internal subjective cognitive memories and beliefs externally by associating them with external and objective symbols, e.g. alphabetically, is a meta-representational ability and are linked to predictive processes. This presentation explores the results of a series of arts interventions, which, mirror this process, and through contemplation, explore the use of symbol and number to structure a process of self-reflection. It attempts to categorise several differing states of consciousness within a “normal” neurochemical range using a methodology which directs a sequence of thought processes from 0-11 and specific questions to establish an internal conversation or dialogue with an individual’s “inner voice” alongside some sensory deprivation techniques [as opposed to psychoactive agents] in parallel with structured interviews and questionnaires which focus on archetype. This research is supported by the Arts Council England. **P2**

**349 Journey of a Soul from Lower Consciousness to Higher Consciousness with Reference to Inferno, Purgatorio and Paradiso** Namita Bhatia, Mr. Soami Das Bhatia <drnamitabhatia@gmail.com> (Department of English Studies, Dayalbagh Educational Institute, Dayalbagh, Agra, Uttar Pradesh India)

It is mysticism that deals with the transcendental and peak experiences in the field of consciousness as an expansion of normal consciousness. The mystics believe that man has the hidden potential for awakening higher levels of consciousness. But it is not a physiological or psychological phenomenon. Hence it is beyond sense perception and manifests inwardly. It is associated with the bliss of extraordinary intensity culminating in the ecstasy of an experience of union with God – the Supreme source of consciousness and spirituality. Dante’s Divine Comedy, representing an unforgettable visionary journey through Hell, Purgatory and Heaven, reflects this development of the Consciousness. Dante Alighieri was an Italian poet, prose writer, philosopher and a political thinker in the first half of the 14th century. In Dante’s time the culture of the European nations was a medieval one and societies were greatly influenced by the Christian beliefs. The model for existence was that people lived on earth during life and then were sent to either hell or purgatory and heaven after death depending on their deeds. This model was so entrenched in human psyche that it was depicted in all art forms as a preoccupation. Dante used the same model as the basis for his masterpiece. The work is divided into three major sections – Inferno, Purgatorio and Paradiso – which trace the journey of a man from darkness and terror to the revelation of the Divine light, culminating in the beatific vision of God. Inferno stands for Lower-Consciousness where human life is shown as seen among ill-doers, the sinful and the wicked. It represents a false start during which the Self must be disabused of harmful values that somehow prevent it from rising above its fallen world. The journey through the Inferno primarily signifies a process of separation and thus is only the initial step in a fuller development. In Purgatorio, the state of Self-Consciousness, human spirit is purified and becomes worthy to ascend to Heaven. Dante speaks of human life as seen in those who are struggling towards the light. They are trying to lead good lives but are overburdened by hereditary flaws, faults committed, bad habits formed, unfortunate surroundings and other adverse circumstances. Paradiso is the New World of Cosmic sense – the Kingdom of God. The desire for God leads a man from Self to Cosmic-Consciousness and that revolution when effected is eternal. Dante finally understands the mystery of divinity and humanity and his soul becomes aligned with God’s Love: But yet the will rolled onward, like a wheel In even motion, by the Love impelled, That moves the sun in heaven and all the stars – The object of the whole work is to make those who live in this life, leave their state of misery and to lead them to a state of Eternal Happiness. **P1**

## 6.02 Art and aesthetics

**350 Art and Innovation Key to Creative Minds** Parul Bhatnagar, Radhika Seth, Meenakshi Kumar Seth <parul@dei.ac.in> (Drawing and Painting, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Art in the context of Innovation is crucial to continuing success of any organization it can play a very significant role in finding appropriate solutions to its problems. Art by its own nature is



creative, collaborative, and multidisciplinary. The methodology of how art is learned by hands on experience can make a big difference to the process of learning different subjects at school level. The process involves knowledge gathering, analysis, discovery, and conceptualization resulting in a problem solving activity and this in turn leads to experiential learning, which in turn brings sensitivity and awareness to “Arts, Crafts, Culture and Environment”. Art can help to develop values, attitudes, sensorial skills and critical thinking it can help one to realize their creative and innovative potentials. Art and Innovation can make a big difference to the growth of creative minds. **P1**

**351 Phenomenological Model of Consciousness Altered Through Dance: Implications for Phenomenal and Content Questions of Consciousness** Shannon Deets <sld-lpc@live.com> (Meadville, PA)

Within consciousness research one question is paramount, that is, separating the content of consciousness from the experience of consciousness to avoid confusion. The content of consciousness is sometimes called the “easy” problems of consciousness as it is able to be tested through the reductionist methods of science. Research exploring the content of consciousness looks toward identifying specific neural structures which can then be understood to explain the functions of consciousness. The “hard” problem of consciousness is largely considered to be one of explaining the subjective experiencing of consciousness. Multiple theories including quantum mechanics, nonlinear dynamics and chaos, and non-algorithmic theories of the mind have been discussed as a means of understanding the phenomenological experience of consciousness. Chalmers (1995) suggested that these theories and others which attempt to explain phenomenal consciousness all share the same tragedy, that of the failings of a reductionist theory to explain a non-reductionist concept. Chalmers (1995) instead suggested that the subjective experiencing of consciousness be considered to be a fundamental entity of consciousness and as such allows researchers to avoid the bind of reductionism. This paper supported this assertion and through non-reductionist phenomenological research methods explored altered phenomenological consciousness induced through movement. A difficulty lay in the realization that altered consciousness is an even more complex research subject than consciousness itself. This is largely due to the increased difficulty in operationally defining altered consciousness. Rock and Krippner (2007) discussed that traditional definitions of altered consciousness tended to mire the understanding of the difference between consciousness and the content of consciousness, that is, the difference between hard and easy questions of consciousness in general. They (Rock & Krippner, 2007) therefore suggested that these experiences would more accurately be referred to as altered patterns of phenomenal properties. This paper discussed the altered patterns of phenomenal properties experienced by individuals who engaged in dance as a means of producing these altered patterns. It was the culmination of an existential-phenomenological study oriented around the key question: What is the phenomenological experience of individuals who engage in dance as a means of altering their phenomenological consciousness? Data resulted in 21 constituent themes and 6 processes which could be holistically understood as composing a phenomenological model that was harmonious within consciousness research across multiple disciplines. The resulting model was first examined as a rudimentary description of phenomenological consciousness as a fundamental entity of consciousness. However, clarifying the description of a fundamental entity of consciousness also influences the research exploring the content questions of consciousness. This is likely the reason that consciousness research becomes confused between content and phenomenology. To further delineate between content and phenomenology, the phenomenological model was also discussed in how it could be understood within the context of research surrounding content aspects of consciousness as well. Chalmers, D. (1995). Facing up to the problems of consciousness. *Journal of Consciousness Studies*, 2(3), 200-219.; Rock, A.J. & Krippner, S. (2007). Does the concept of “altered states of consciousness” rest on a mistake? *International Journal of Transpersonal Studies*, 26, 33-40. **P2**

**352 Freedom Laboratory: The Liberator Power of The Virtual Thought. An Immersive Installation: Between Art, Neurosciences and Buddhism** Sylvie Herrouet <herrouet.sylvie@neuf.fr> (Arcueil, France)

This immersive installation of twelve meters long and three meters large made of white, light and translucent material, invites us to walk inside the convolutions of the brain, within the organic

matter containing all the liberating alchemy of the neurons. The supposed transformation of our consciousness takes place both inside the organic incarnation, submitted to the law of gravity, and in the virtual thinking as the results from the will to extirpate yourself of this gravitational heaviness. After taking off our shoes, we penetrate into the structure, walk through the convolutions, touching them while videos of nervous cells are projected inside. The very small landscape of nervous cells looks like the macro world of planets, galaxies as a psychoactive multicolored cocktail enables ourself to experience alternative realities, who influences the emotions and the mental representations. Scientists often thought than the paradigm of rationality is generally assumed to be independent of emotional thinking. But evidences are accumulating in the cognitive psychology and neurosciences, evidences that emotions and rational thinking are closely intertwined. The role of emotions is to regulate the adaptive control, and help the competence in a self-regulatory architecture. But the question is: how to extirpate from this heaviness, the one of these organic nervous cells, when destructive 'motions' can't permit a open minded view of life? Proposing a patch to experiment the three Buddhist concepts of interdependence, impermanence and vacuity, a different way of view for a transformative state of consciousness is suggested: this one of a more holistic consciousness of our existence. Three paintings made with mixed material invite us to imagine the three states of the consciousness: The interdependence of the neurons with all the possible links we could imagine, the impermanence with all the constant changes of the links, and the vacuity with the chemical and electrical phenomena. As a laboratory where we can examine all these phenomena of consciousness, these paintings are like large-scales of microscopic views under glass. To the question how not to be lost in the labyrinth of our convolutions, a fine red link like the Ariadne's thread symbolizes a possible way. This way which is only a point of view, is at the end of the installation, represented as the painting of the Himalaya on a pinhead; it has been made with a single hair of a brush. The exercise is very difficult because the only way to paint the infinity on a such small space, is to control one's breath, meditating. This work invites to meditation as a way towards consciousness. **A1**

**353 Notes on the Prehistory of the Center for Consciousness Studies** J Laukes <laukesy@yahoo.com> (Chicago, IL)

Building upon interdisciplinary interests and contemporary research into perennial questions regarding consciousness, the Center for Consciousness Studies was officially authorized at the University of Arizona in early 1999. Observations and accounts of this generative process will be outlined including the earliest Tucson conferences, the some key people and how funding was secured. Goals and objectives of the project in those stages will also be highlighted. This account begins, after a brief prologue, when three University of Arizona professors, Stuart Hameroff, Alwyn Scott and Alfred Kaszniak – with help from some friends – met in February 1993 to plan a conference to be held in April 1994 which later became known as Tucson One. **C15**

**354 EEG: EGG – An Interactive Art Installation Piece for Self-Awareness and Mindfulness** Lia Min <liahong@umich.edu> (University of Michigan, Ann Arbor, MI)

Human consciousness is inseparable from self-awareness. The recognition of the present self as a separate being from the environment and other individuals forms the basis of complex cognitive processes such as planning, expressing, and interacting with others. However, the idea of self is so intuitively accepted (i.e., everyone knows that there is 'I' in the center of our very being) that it is hard to come up with a way to probe the concept of self. Cognitive science faces a unique challenge due to the duality of self as it exists as an appearance to others and as an intrinsic phenomenon. This art project invites the viewers to contemplate on this issue of self-awareness by helping to strip away sociological and biological factors, which are not 'I,' but contribute to how we perceive self. The artwork, whose structural frame takes the form of an egg, resembles a lotus bud on the outside. The lotus flower is widely recognized as a symbol of purity and enlightenment in many religions and cultures. In this piece, the viewer enters and become part of the flower bud. Upon entering, one can notice how the interior space takes the form of an egg. This makes reference to the time prior to the beginning of this life; before cultural construction of 'I' occurs. The space also is the world that one lives in, which must be destroyed in order for one to hatch (a reference to *Demian* by Hermann Hesse). In this installation, the viewer is invited to participate

in a simple session of self-guided meditation. A simple EEG headset (MindWave from NeuroSky, Inc.) is provided to the viewer as one enters the space. Sitting down in the center, one can see his/her reflection off of a two-way mirror placed on the opposite wall that fades in and out based on the EEG signal it receives. As one becomes more relaxed and enters a meditation-like state of mind, the self-image starts to fade away, representing the Buddhists' idea of Emptiness. The dissolving self-image also represents the process of eliminating one by one, our attachments that are associated with the self, which, however, are not the self such as name, gender, social status, age, appearance, and history. The work poses a question, 'what is left of the self once all the elements that are not the self are removed?' **A1**

**355 Consciousness and Signification – Contemporary Human Sign- and (Digital) Toolmaking** Patrick Palucki <datapalucki@mac.com> (Berlin, Germany)

Line of work of the artist and communication designer Patrick Palucki that deals with consciousness and signification processes. Palucki observes contemporary human sign- and (digital) toolmaking. He has gathered various artefacts from that field and has created works about such. A central idea is that any communication-technology, such as language, must reflect the conceptual systems of its maker(s). Therefor the semiotics of our artefacts will contain information about the status and the transformation of 21st century human views of the world and of the human position within it. As we are (successfully) striving to ever extend and transcend our physical reach and as we are continuously transferring communication and activities into the virtual realm and processing agency through it, we may look at what kind of signifiers are in use. While our digital tools often suggest a functional horizon of endless possibility their semantic suchness, i.e. design, displays anthropo-morph and -centric perspectivity as well. On the other hand we find an amount of symbols and signs that refer to holistic, philosophic or spiritual concepts or to extended inter-relatedness (being used to f.i. promote technology and commerce, propagate lifestyles or illustrate creativity and possibility). The semantic effect of signs and tools represents the potential to recursively shape our concept of reality. So, it is of interest how ideas are created and perpetrated through the semiotic suchness of the things we create – aside to a readiness or inevitability of progress or evolution. Therefor the question of reality and belief systems is central to this cyber-anthropological work. The work specifically aims to raise questions about primordial content, changes and novel items within consciousness. Some instances offer the occurrence of emergence or quantum properties able to be witnessed in the realm of signification. **A1**

**356 Cult of the Head: Alternative Models of Consciousness and Creative Works as Vehicles of Aspects of Consciousness Such as 'Spirit' – Described by Artists, Musicians and Other Creative Practitioners** Pam Payne <pam@brickhaus.com> (CAiiA, Planetary Collegium, Plymouth University, England, Brooklyn, NY)

As an artist investigating the nature of consciousness, I am interested in creative works that are said to be particularly enigmatic; that have an aura, or take on a life of their own. Reports throughout history tell us of inanimate objects said to contain a spirit or soul. What is it about these objects that compel people to identify them with an aspect of consciousness? And not just any, but the most difficult aspect of consciousness to define? Disembodied human heads were venerated in ancient Europe for their spiritual potency and referred to as the "Cult of the Head" by archeologists and historians. Our fascination continues today as we focus upon the brain as the center of consciousness in various disciplines of research. We know as much about the brain as a container or generator of a spirit or soul as we do of these inanimate objects. The ancient Egyptians used multiple, refined terms for aspects of the "soul", and during embalmmnt discarded the brain in favor of preserving the heart and other organs as more closely related to the "soul". It has been suggested that alternative centers or aspects of consciousness and the nature of awareness associated with them are not easily articulated precisely because their nature is not of the intellect. What insights might be gained by looking at alternative models of consciousness? Artists tend to know whether or not one of their works is a successful vehicle of not only emotion, but of a state of being, a condition, a spirit. How would they identify the qualities of a particularly soulful or soulless work? What insights might be gained by looking at creative works such as art, music and literature as containers, generators, "pointers-to" or collaborators of consciousness? **P2**

**357 Drawing as Mediation Between Reality and Consciousness** Ana Leonor Rodrigues <ana-leonor.rodrigues@gmail.com> (Technical University Lisbon – Faculty for Architecture, Drawing and Visual Comm, Lisbon, Portugal)

When drawing from life, in each instant I am choosing one particular version of reality from among all other possible ones. “When we draw, the experience of seeing is profound and intense. Looking at an object and drawing it implies organized and disciplined observation, clearly different from the distracted, wandering gaze with which we normally observe things – it requires an active, engaged observation of what is being drawn – of what we choose to see. In this way drawing is a method for acquiring knowledge and investigating what is seen by the eyes. Under our gaze, the object being drawn unrobes itself of an obscuring mist and acquires a clearly defined visual percept. We draw because we have eyes, which is to say, information sensed by way of our visual mechanism is perceived on our brain, and we call these registrations visual images. If instead of eyes we had radar-emitting organs – perhaps we would not draw; perhaps drawings would be replaced by sonorous events for which we have no name, no equivalent to any known graphic representation. In this case, the idea of a visual image, or the hypothesis of drawing, would be so strange to us that we could not even imagine such a thing as a drawing. We draw because our brain identifies profiles and contours, but it could register things in a completely different way, and the notion of contour would be inconceivable. We draw because we recognize and accept a representation in place of the original object, the one that has been drawn; we understand that the tangible, present drawing refers to what is in fact not present. Perhaps we also draw because we retain within us some vestigial echo of what it is to be a cell, what it is to be two-dimensional – two dimensions sliding around in a world of invented depth. We draw because we draw. Drawing results directly from our particular way and equipment for registering the world, our kind of thinking, thinking in contours and abstractions. And we draw for the pleasure of drawing! To see the desired lines appear, to construct for ourselves shadows and shadows underneath our hands, and to see in the drawings of others this same weaving of lines, reliving his or her same pleasure. While drawing, we acquire a very personal and intense consciousness of reality. A1

**358 Physics of the Mind** Barry Urie <barry3rdi@gmail.com> (Oshawa, Ontario Canada)

The sciences have seen various attempts at postulating a physical theory of the mind. Different scholars have variously explored the questions of cognitive computing and artificial intelligence. Many of these discussions have been stimulating, but they are often based on a computer model, that is, rooted in the binary mode. The purpose of this paper is to present a physical theory of the mind which incorporates both optical physics and philosophy which can be named ‘Philosophical’ © . The goal of ‘Philosophical’ is to contribute to a physical theory of the mind through the development of a system to organize information qualitatively and intuitively, based upon color, line and form (the alphabet of imagery) as well as geometry while still being able to conform to the mandate of ‘General System Theory’. This paper offers a discussion of optics in terms of the Prism, Light, Focus, Direction that can be related to the way in which the brain interacts with the physical world. We will consider the differences between the brain and the mind, between the deductive and the inductive, between the binary and the analog. ‘Philosophical’ is not intended to be a ‘Complete Theory of the Mind’ but an essential piece of the puzzle which the sciences have overlooked. A1

**359 Self-Directed Merging of Real and Virtual Experience Toward Preservation of Personal and Cultural Identity** Tonia Walters <twalters@noumenart.org> (NoumenArt Inc., Kingston 2, Kingston Jamaica)

Tonia Walters invites you share her memories by spending a bit of time in the special places of her mind through the virtual environment of her alter ego, Xhyra Graf. Tonia uses current open-source technology for developing virtual environments that archive and safeguard her most important qualitative experiences. The ‘ineffable’ nature of some altered states of consciousness destabilize a complete acceptance of the concept of duplicating or reproducing an individual mind to exist in some future technologically advanced substrate so effort is made to preserve the subjective interpretation of those states. The simulations within the virtual environment are comprised of

digital representations of her memories of real life experiences such as peak performance within the creative act, insight, spiritual or nondual mystical experience. These are the experiences that form the ‘essence’ of personhood and cultural identification – the “what it is like to be” Tonietta Walters. In conjunction with virtual shared experiences (either built or impromptu) within the development and continued existence of Xhyra Graf these will contribute to a higher probability for preservation and continuity of identity. Environments and procedures for creative work and meditation will have a parallel correspondence in both types of existence (real and virtual) with dedicated attention to allowing ‘bleed through’ for continued adjustments and modifications. The consciously directed merging of the two modes of existence/reality will aid in the transition from the normal substrate to a more technologically advanced substrate. As stated above, these experiences will be the markers of personal and cultural identity – habituated to become like the autonomous background processes that coalesce in the time between sleeping and waking so one becomes effortlessly aware of being themselves. By proactive acclimatization these essential cognitive and perceptual processes through immersion in a virtual existence “what it is like to be” Tonietta Walters is expanded to include Xhyra Graf who already exists in a technologically upgradeable form. The virtual environment and avatar provide a self-directed training ground allowing the uploaded mind to easily sift through or assimilate memories thus retaining parity in the adaptation from current substrate to future substrate. **A1**

**360 Consciousness and Expression: Life Consciousness and Artistic Expression In Chinese Art Songs** Lu Zhang <luzhang11@lzu.edu.cn> (College of Literature, College of Literature, Lanzhou University, China, Lanzhou, Gansu China)

The art song is a perfect combination of the elegant music feelings and the poetic literary wisdom of human beings. As an important part of the art song, Chinese art songs are widely known as a great form of art. They integrate the spirit of Chinese philosophies (such as Confucianism, Buddhism and Taoism), the elegant charm of art, the poetic character of literary, and the national style of music as well as the characteristics of the Chinese singing performance. Through a variety of Chinese cultural prototypes and artistic expressions that come of the collective unconsciousness, Chinese art songs represent the perception and understanding of the universe and society as well as the pursuit of the ultimate values of spiritual life by different individuals at different times and places, and thus show the common spiritual and emotional experiences of the Chinese people at different times and places. Chinese art songs have been ardently studied mainly from two major perspectives, one of which focuses the attention to the professional theories of the music composition and singing, the other of which concerns their artistic values and aesthetic functions from the perspective of aesthetics. Taking a wider perspective of the artistic anthropology by combining the above-mentioned two traditional perspectives, this paper explores how Chinese art songs elucidate the Chinese unique consciousness of the universe and society as well as the national poetic expression, by the original application of the methods of archetypal criticism, sociology and psychology, with the help of views of music aesthetics, symbolic aesthetics, literary anthropology and phenomenology, so as to provide some new theoretical thoughts in the study of Chinese art songs. **P2**

## 6.03 Music

**361 A Theory of Musical Consciousness** Kenneth Alewine <kmalewin@utmb.edu> (Institute For The Medical Humanities, University of Texas Medical Branch, Texas City, TX)

Is consciousness musical? If so, in what way does a theory of musical consciousness, informed by the medical humanities and neuroaesthetics, explain the historic fissure between emotion and reason? Contemporary scientists like Oliver Sacks have explored various links between music and consciousness, borrowing from the work on musical dreams and language by humanists like Irving Massey. Still others like Antonio Damasio and Walter Glannon have imagined a distributed mind that is rendered in real time across vast neural networks, suggesting that emotion and decision-making processes may be more integrated than previously thought. This presentation will explore how the idea of musical consciousness may resolve the artificial divide between

emotion and reason, thus signifying, as T.S. Eliot anticipated with his “dissociation of sensibility,” that a thought may be a feeling and a feeling be a thought. The fabric of consciousness is intensely musical because like music it is abstract and undefined. Unlike words and visualizations in dreams, music does not need to be translated or interpreted from the unconscious because it is experienced the same way in dreams as it is in wakeful states. As Massey has recently argued, music precedes language and visual forms of dream mediation. This presentation will propose that music functions like consciousness as a creative substrate that may stimulate dream-like visualizations in the mind. This may be demonstrated by what I call sound blots (audio Rorschachs) that are generated randomly by a musical automaton I built using a visual programming language in a virtual environment for constructing musical instruments. This musical automaton is a virtual synthesizer that randomizes digital tones across selectable music scales that have been historically associated with mood. During a recent musical reflection exercise at a major metropolitan hospital, this synthesizer enabled cancer patients in a support group to visualize calmative scenes that were uniquely connected (at times synchronized) to the random music patterns generated by the synthesizer. The reflection exercise and the musical automaton suggest that music may produce vivid images during wakeful states similarly as consciousness produces images in dreams. Music visualizations stimulated by live music randomized across various scales may also augment mood among those suffering catastrophic illness. Ancient Greek philosophers taught that music structured the universe. Hebrew prophets believed songs created the world. Music ultimately has a logical structure that is also emotionally expressive and thus especially cathartic during periods of extreme suffering. The dissociation between reason and emotion that has existed in philosophy as an abstract construction has influenced the binary structures of medical taxonomies for hundreds of years, thus revealing, for instance, why the schizophrenias have been linked to the mind and thus to disorders of reason, and why the depressions have been linked to mood, and thus to disorders of the emotions. A neuroaesthetics of music may help illuminate (even mend) this historic rift between mood and intellect, as it is a musical consciousness that synthesizes the mind and the emotions, that views them as integrated realms. **C16**

**362 Musical Consciousness Test Based on Indian Classical Ragas** Pritam Pyari, Saran Pyari Roy; Sukhdev Roy <sukhdevroy@iitdalumni.com> (Music, Dayalbagh Educational Institute, Prem Vidyalaya Girls Intermediate College, Agra, Uttar Pradesh India)

There is a profound impact of music on our consciousness. In the Classical Indian Music tradition, music is the means to enlightenment. Eastern spiritual traditions that describe Shabda (internal sound currents) and Anhad Nada (unstruck music) as the very nature of the spirit and consciousness and which sustains the entire creation, have inspired Indian music in the form of Ragas (musical compositions) and the various percussion, string and wind instruments. The Sanskrit word Raga uses a series of five or more musical notes upon which a melody is constructed. It is defined as ‘the act of colouring or dyeing’ (the mind and mood/emotions in this context) and therefore metaphorically means ‘any feeling or passion’. Renowned musicians and yoga practitioners have identified different Ragas that have an impact on different Chakras or energy centres as each Chakra is associated with a seed syllable, color and number of petals or currents emanating from them. The healing effect of Ragas has also been well established. In this paper, we report the results of a pilot study undertaken to design a musical test to ascertain the consciousness level of an individual. Four 5 minute instrumental flute compositions of Alap form of Ragas, namely, Ahir Bhairav, Jajaiwanti, Bhupali and Darbari that affect the Anahata (heart), Vishuddha (throat), Agnya (third eye) and Sahasrara chakras respectively, were carefully chosen. A group of 52 old male and female experienced devotees (50-80 years) were made to listen to three Raga compositions pertaining to the upper three Chakras after evening prayers, whereas, a group of 320 college/university students to the three Ragas pertaining to the lower three Chakras. The order of the Ragas was not in the progressive order of the chakras. The responses were recorded through a questionnaire by noting their order of preference and the qualitative effect in terms of feelings, imagination, color perception etc. Majority of the older group members preferred Bhupali, followed by Darbari, whereas, the students’ preference was for Jajaiwanti followed by Ahir Bhairav, indicating that the older groups’ consciousness level was at the Third



eye and above, while that of the students was at the throat and the heart level. The subjective experience pertaining to the perception of feelings and colors in most of the individuals also corresponded to that attributed to the different Chakras. The study highlights the impact of Ragas on the consciousness of an individual and the usefulness of designing musical consciousness tests to ascertain consciousness levels. A musical test can be invaluable for consciousness measurement and can also be subjected to illiterate individuals. It also overcomes the difficulty of getting honest responses through written psychometric questionnaires. The Ragas can be invaluable not only to measure but also to tune consciousness to higher levels. To the best of our knowledge the test is a first of its kind. The results of further ongoing tests being applied on a wider range of individuals will also be presented. **P1**

## 6.04 Religion and spirituality

**363 Atman – The Entity with Creational Attributes – Is Beyond Entropy** Prem Kumar Dantu, Saran Dayal Bhatnagar <premdantu@gmail.com> (Botany, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Structured crystals and life are able to maintain themselves over extended periods. They seem to be unaffected by the universal law of increasing disorder, viz., the Second Law of Thermodynamics, according to which disorder (i.e. entropy) increases (or never reduces) with time, in any closed system. These structures, such as crystals and life, probably keep themselves organized by increasing the level of disorder in their surroundings and thus they reduce entropy within. However, over periods of variable lengths, these structures (crystals and life) are eventually overcome by entropy, and ultimately break down and mix up with their surroundings. Because of entropy, an isolated system over a period of time will not be left with sufficient energy to perform any work. This is because entropy is the ratio of change in heat to temperature and all closed systems lose an amount of energy as heat, which increases with temperature. Also, entropy increases as time progresses. The Second Law of Thermodynamics thus indicates that when temperature is at absolute zero, entropy will be zero or minimal. This is further specified by the Third Law of Thermodynamics, which states that the entropy of a perfect crystal at absolute zero is exactly equal to zero. A corollary of the Second and Third Laws of Thermodynamics together implies that a hypothetical isolated system can maintain zero entropy in a finite number of steps and can still accomplish work, if it is not affected by temperature and does not produce heat. In the present paper, it is proposed that Atman (i.e. soul) is one such entity. Atman, which is attribute-less, and formless, is perceived as immortal. Atman is a form of energy and has been associated with sustaining different life forms for uncountable years. Though the Atman has been performing the life supporting act for several millennia its energy does not appear to have diminished. Therefore, it is proposed that Atman is beyond entropy, a phenomenon because of which systems over a period of time are not left with sufficient energy to perform any action. It is further hypothesized that the Atman is able to defy entropy by reversing the Second and Third Law of Thermodynamics. Atman includes the essential component consciousness, which differentiates living beings from the non-living. The following is hypothesized: 1. Atman does its creational work without getting affected by temperature and without generating heat and is, therefore, able to maintain zero entropy. 2. Atman creates and sustains structures such as crystals and life that survive for a finite period of time during which they generate entropy in their surroundings. Thus Atman is able to keep its own entropy to the minimum through these actions. In this paper, a model about nature of the immortal Atman is proposed, supported by evidences based on scientific studies, experiential knowledge, and other philosophical and religious sources. **P1**

**364 Egotism and Attachment as Predictors of Stress** Ira Das, Archana Sharma <ira\_das.profdei@yahoo.com> (Department of Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

A correlational design was made to see the contribution of two Vikaras of mind (1) Egotism and (2) Attachment in the determination of stress. Vikaras of mind are the evil tendencies of mind. The sample consisted of 200 married male and female adults between the age range of 30 years to 50

years from Agra and Bharatpur in India. All cases were from middle socioeconomic status and were at least 12th class pass. For measuring the level of Egotism ( Ahankar), a scale for measuring Egotism 'Know Yourself (Part I)' and for measuring Attachment (Moh), a scale for measuring Attachment 'Know Yourself (Part II)', constructed and standardized by the investigators were administered. Stress was measured by ICMR Psychosocial Stressor by Srivastava. Results indicate a positive correlation between Egotism and Stress and a low but negative correlation between attachment and Stress. Multiple Regression Analysis indicates that the predictor variable Egotism has high positive contribution in the determination of Stress, (regression coefficient,  $b = .207$ ) where as attachment has negative but low contribution in the determination of Stress (regression coefficient,  $b = -.141$ ) It is therefore concluded that as Egotism increases, Stress also increases. When a person feels he is superior to other persons, an evil tendency called Egotism enters his mind. Since all his worldly possessions including his body and his attributes are doomed to decay, he is always in fear of losing his superiority. Hence Egotism creates Stress in his mind. So in order to remain free from stress, individuals are suggested to keep themselves free from Egotism. Attachment to individual's family members or fellowmen creates bonds which are necessary for survival. So love for humanity and attachment to a certain extent does not lead to stress. **P1**

**365 Inclusive Consciousness** Vasanta Kumari Devulapalli, Deepa Kasturi <vasanthakumariravuri38@gmail.com> (Faculty of Education, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

All the human beings are children of the Almighty, the ever-glowing Omnipotent Sun. We all are the tiny particles of His rays and it is our social and moral responsibility to treat all the rays equally without any discrimination of caste, creed, organ, system, religion, language or region. All children are children first no matter what their special needs may be. "The love for all living creatures is the noblest attribute of man." (Charles Darwin). Education nowadays is like a straight road without any jerks, curves, turnings, holes or ups and downs. It has no concern to the heterogeneity found in each student as they differ individually. No two children are alike and these diversities mark some students as Children with Special Needs (CWSN). The teacher's teaching, training, assistance, adaption and rehabilitation should cater the diverse needs of the students in a desired, appropriate and inclusive manner. Teacher's role for heterogeneous diversified groups should be molding and befitting. Even in our families all the members lead contented lives just because of their heterogeneity. Here diversity becomes our strength. There are many examples of disabled exceptional individuals like Asthavakra, Agasthya, Socrates, Einstein, Stephen Hawkins etc. whose consciousness is at a higher level than the normal ones of that time. Inclusion does not mean to provide physical space to all the diversified children but it is to a condition or state of being aware or conscious to accept, welcome, enrich and enhance their innate capabilities. Inclusion is the act of creating an environment in which any individual or group can feel welcomed, respected, supported and valued to fully participate in all the activities. Inclusion is an educational approach or philosophy and an effort to make sure that diverse learner with disabilities, different languages and cultures, different homes and family loves different interests and ways of learning. Inclusion is more than education, it is a sense of belonging, a belief of brotherhood of man and Fatherhood of God. Inclusive Education is an active intentional and on-going engagement with diversity in people, in the curriculum in the co-curricula, in intellectual, social, cultural and geographical communities with which individuals might correct in ways that increase one's awareness in content knowledge, cognitive sophistication and empathetic understandings of the complex ways individuals interact within system and institution. (Clayton Pedersen). Inclusive Consciousness is to recognize the inherent worth and dignity of all the people and its empowerment. Inclusive consciousness directs institutions to be more qualitative, natural, altruistic, spiritual, inclusive, impersonal and universal. Philosophy of Inclusive Consciousness: (1) All children have the right to learn together (2) No child be left behind to segregation/discrimination (3) Children themselves are aware of their disabilities. (4) Teachers and communities understand their issues and try to solve them. Development of Inclusive Consciousness is a long journey and not a destination and it believes in the principle that children who learn together learn to live together. **P1**

**366 Jaina Perspective of Consciousness** Chhavi Gupta <chhavigupta61@gmail.com> (Lecturer, Dayalbagh Educational Institute, Dayalbagh, Agra, Agra, Uttar Pradesh India)

Our soul, which is engulfed in the mud of karmic matter from time immemorial, has finally got to get rid of its dross; so as to shine forth in its intrinsic purity of infinite knowledge, intuition, bliss and potency. Man nonetheless, has got freedom of will to improve his lot and rid himself of the cycle of birth and rebirth. Thus, according to Jainism, man is capable of making himself God. It is up to him to choose between the present state of bondage and the ultimate state of perfection i.e., Kaivalyajnana which is Knowledge of the highest order that is gained when one transcends ones ordinary self and becomes a Jin or Kevalin. The Jaina acharyas have delineated the stages of the spiritual journey for us, called gunasthanas which give us a complete picture of the spiritual development of the soul from the beginning to its final liberation. – all along fighting against karmas, which have held the soul in bondage from time immemorial. The Jaina scheme of self-discipline, its moral code and particularly its doctrines of the binding nature of karma, the sovereignty of Ahimsa or non-injury to any living being will as well be discussed. The dominant points of interest being: 1. Moksha, release from worldly bondage or salvation, and 2. Marga, the way leading to salvation. **P1**

**367 A Physicalist Explanation and Understanding of Spiritual Awakening and Enlightenment** Frank Heile <frank@heile.org> (Retired, Santa Clara, CA)

The hypothesis that there are two conscious entities in the human brain provides an explanation of spirituality, spiritual awakening and enlightenment. These two entities are the primary conscious (based on the sensory representational systems) and the language consciousness (based on the language representational system). The existence of these two separate entities would be a consequence of the hypothesis that consciousness arises when an agent: senses and manipulates the world to achieve its goals and forms a rich and complex internal representation of the world and of itself in that world to help it achieve its goals. The degree to which consciousness develops in that agent would depend on the richness and complexity of the representational system. Note that a quantitative measurement of the richness and complexity of the representational system, and therefore of consciousness, could be provided by something like the “Integrated Information Theory” developed by Giulio Tononi. The very different characteristics of these two conscious entities will be described. Evidence in favor of the two conscious entities hypothesis will include: the theory of mind, split-brain experiments, blindsight, the priming effects of non-conscious sensory experiences, emotions in general, Libet’s results on the time delays in the intention to act and the top down versus bottom up attention system differences. The evolutionary development of the God concept and of spirituality in general will also be interpreted as evidence for these two separate conscious entities. The problems of daily living are mostly the result of the fact that the language consciousness thinks that it is who we are whereas our real “spiritual” identity comes from the primary consciousness. Spiritual awakening and enlightenment are the result of unifying these two conscious entities, or at least giving up the identification with the language consciousness. The source of the commonly accepted spiritual virtues of love, acceptance, forgiveness, humility and compassion are (mostly) from the primary consciousness. For theistic religions and spiritual paths, the concept of God can be mapped to the primary consciousness and the concept of the fallible “man” can be mapped to the language consciousness. The goal of “union with God” will correspond to the unification of the language consciousness with the primary consciousness – or at least giving up the false identification solely with the language consciousness. For non-theistic spiritual paths (Advaita, non-duality, enlightenment, and others) a similar mapping applies. For example, the dual state comes from identification with the language consciousness and the belief that it is separate from the primary consciousness. Whereas the non-dual state is the recognition that the language consciousness is really part of the primary consciousness and that the “world” that the language consciousness lives in is really the representation of the world inside the primary consciousness. Thus we can directly “see” how “we” are one with the “world” (since we are both part of the same world/self representational system of the primary consciousness). **P1**

**368 Information Theoretic Death and the Eastern Spiritual Tradition** Pratul Kant, Prem Sewak Sudhish <pratulkant@gmail.com> (DEI Dayalbagh Educational Institute, Agra, India)

The scriptures in the Eastern spiritual tradition describe death and its process in detail, along with the purpose and characteristics of life force, consciousness or spirit. They also prescribe practical methods of meditation where a yogi can withdraw the life force in a way to practically simulate death as defined in all current clinical or legal contexts. Various eastern schools of thought are unanimous on the spirit or consciousness being the fundamental and ultimate with different elements of coarse nature, viz the mind, body and the intellect are only envelopes on this finest and pure life source. As an example, a hymn from the renowned Vedic text Kathopnishad that throws some light on the interaction of all these distinct entities towards manifestation of the characteristics of life is translated as “Body and mind are short lived and changing. Atman (Spirit) alone is everlasting and imperishable. Giving the analogy of chariot- the Body is the chariot, Atman (Spirit) is Master, Intellect its driver, sense organs the horses and the mind the reins. Mind and horses go astray if not controlled by Buddhi, the Intellect. So intellect should discriminately listen to the Atman and work out its ultimate good”. In contrast, the western thought and understanding of death is focused primarily on the specific characteristics and measurements of certain vital physiological signs and their absence is described as death. This has led to new paradigms, such as Cryonics and the concept of Information Theoretical Death. While these rather modern concepts go beyond the conventional wisdom of clinical or legal death, they continue to focus on the manifestations and characteristics of certain physical aspects, such as brain structure and define life as a collection of thoughts, personalities, hopes, dreams that are believed to be preserved in brain structure and work on the assumption that preserving the brain structure and its stored information is sufficient to preserve life. These techniques are hopeful that with the use of yet to be invented technologies, it would be possible to bring back the dead to life by retrieving and repairing such structure and information. Using another analogy from elementary physics, a resistive conductor of electricity is known to produce heat when current flows through it, and various measurements may be taken to determine the flow of current. However, subjecting the same conductor to the same amount of heat through an external heat source may have the same effect but does not logically point to the same cause. Similarly, measuring and focusing on the manifestations and lagging indicators of life force (such as electrical impulses and wave patterns originating from brain, preserving or resurrecting physiological structures) does not guarantee or lead to the conclusion that the life force is functioning or that the entity is alive. In this paper, it is argued that body vitals, functioning of brain and its structure and stored information are the symptoms or lagging indicators of life and not the cause of root consciousness or primal life force or spirit. **P1**

**369 Can a System Based on Free Will and Agency Successfully Transform Into a Desired State?** Anhad Kashyap, Sumat Nanda <anhadkashyap@gmail.com> (Social Sciences, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The Radhasoami Faith refers creation as a purificatory process with an objective of emancipation. Revered Dr. P.S. Satsangi in his book “Expositions on Truth, Ultimate Reality and Supreme Being” has explained the genesis and purpose of creation. In the initial chapters, Dr. P.S. Satsangi presents two axioms which lead to an interesting idea of the need to transform and rectify the deficiencies/imperfections in the pre-creational system. This forms the Gracious Objective behind bringing about the creation. Inherent in the concept of such rectification, lies the need for positive change. This makes the concept of understanding change management a crucial and pivotal one. We wish to explore the following questions. If the objective of creation is emancipation and if creation is a purificatory process, how transformation of such a system is ensured? Why does our creation have such a probabilistic nature? Does the creation have a pre-determined model of change or does it have a model based on free will? What circumstances could have led to choosing a model based on freewill? Can a system based on free will successfully transform into a desired state? What could be the relevance of creating a principle such as Quantum Superposition? We attempt to understand the principle of Quantum Superposition and the observational mechanism from the perspective of change to understand “forced change” and “voluntary change” through

the exercise of “freewill”. We also wish to evaluate the possibility of the creation being partially pre-determined through a “Free Will Control Mechanism” model of change. We tried to understand the importance of safeguards and mechanisms which are intended to dynamically control the movement from the “existing state” to the “ideal or desired state”. Based on the assumption of creation and the objective of emancipation, we analogically conclude that the Creational System should have in place an effective real time change monitoring system, if it has to efficiently and effectively achieve the creational objectives. Could the principle of Quantum Superposition along with the Observational Mechanism be such a control and monitoring mechanism for Performance Management? **P1**

**370 Effect of Yoga on Spiritual Intelligence** Jyotika Kharbanda, Sarla Paul <sarla484@gmail.com> (Education, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

Human beings are made up of three components: body, mind and spirit. The spirit is the conscious part that reminds us to connect to our higher self. Sir Sahab Ji Maharaj the fifth Revered leader of Radhasoami faith stated that, “For developing our physical powers, we perform physical exercises, take nourishing food and we take recreation. For developing our mental powers we study in schools, colleges and universities”. But we leave the development of the third entity viz. the spirit severely alone. By acquiring higher experience of the spiritual world we can obtain peace. Yoga as a means of enlightenment is central to Hinduism, Buddhism, Sikhism, and Jainism, and has influenced other religious and spiritual practices throughout the world. Yoga in the present scenario has come as a rescue to mankind. Spiritual intelligence refers to the skills, abilities and behaviour required to develop and maintain a relationship to the ultimate source of all being and succeed in the search for meaning in life. The modern society is characterized by a lack of spiritual intelligence. As we already know yoga has a positive effect on general intelligence, physical, mental and spiritual health as proved by certain researches conducted in the field by Dubey. Shailendra (2000),Prakash. Lal (2008) Ganpat.T.S., Nagendra. H.R.(2011). Parag, J. and Manjunath N. K. (2012),Ganpat, T. S., Selvi. V and Nagendra. H. R. (2013). Statement of the problem The problem is stated as: “Effect of Yoga on Spiritual Intelligence” Spiritual intelligence-It consists of two words “spiritual” and “intelligence”. “Spiritual” as contrasted with “materialistic/physical” consists of the welfare related to spirit component of human being. Intelligence is the ability to carry on abstract thinking. Objectives of the Study: 1. To study the status of spiritual intelligence of the students of the two groups i.e. one practising Yoga and the other not practising it. 2. To compare the effect of Yoga on spiritual intelligence of the groups: one practising Yoga and the other not practicing it. 3. To compare the effect of Yoga on the various dimensions of spiritual intelligence scores of the group practising Yoga with the other not practising it. Variables of the study- Independent Variable (IV): Yoga. Dependent Variable (DV) “Spiritual intelligence”. Methodology of Research- Intact group comparison method was used. A Post- test was given to both the groups for assessing the effect of yoga on the spiritual Intelligence of students and then the results were compared Sample Selection- Sample was selected by purposive sampling method. The sample consisted of 25 women trainees who practice yoga regularly and 25 who do not practice it. Tools to be used in study- The two tools used were 1. A self-constructed Questionnaire 2. Raqon’s spiritual intelligence test. Statistical Techniques Mean, S.D. and Mann Whitney U test were used. Findings: Findings of the study indicate that there is significant difference in the level of spiritual intelligence between the groups practising yoga and not practising it. **P1**

**371 Spiritual Intelligence and Working Memory of University Students’ Involvement in Voluntary Agricultural Field-Work: A Comparative Study** Kavita Kumar, Swati Tripathi <kavita.kumars@gmail.com> (Psychology, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

Social service is a kind of professional and academic discipline that seeks to improve the quality of life and well-being of an individual, group or community. The concept of dignity of labor goes back to ancient times, and the practice of ‘Seva’ i.e. service with complete dedication has roots in many ancient civilizations and world religions. Any service that is done without the desire for reward or benefit is the work of the highest order. Hence working as a volunteer can be an

extremely satisfying and rewarding experience. In this context, student life is the most valuable, productive and memorable phase of life where mental, physical, social and spiritual development takes place. As a student, one can inculcate healthy life style, good moral character and develop physical, mental, social and spiritual faculties to the utmost. If the student follows a disciplined life and honor the significance of social service and dignity of labor, it will definitely make him/her a worthy person. Spiritual intelligence is concerned with mind and spirit, and its relationship to one's existence in the world. Spirituality involves a sense of wholeness, connectedness at work, and has deeper values. Working memory is necessary for staying focused on a task, blocking out distractions, and keeping one updated and aware of things that are going on in the environment. Researches show that learning the basic skills necessary to engage in physical activity at a young age is beneficial for future cognitive functioning. Physical activity can affect the physiology of the brain and may be associated with improved cognitive functions including attention, information processing, storage, and retrieval. The present paper has focused to compare the Spiritual Intelligence and Working Memory of University Students involved in Voluntary Agricultural Field-Work and those not involved in Voluntary Agricultural Field-Work. A sample of 100 students was selected, out of which 50 students were involved in Voluntary Agricultural Field-Work and 50 students were not involved in Voluntary Agricultural Field-Work. Individuals selected for the sample were only female students from different Faculties of Dayalbagh Educational Institute, Dayalbagh, Agra, India, age ranging from 18 to 26 years. Spiritual Intelligence was measured by 'Spiritual Intelligence Test' constructed by investigators. To measure the Working Memory, 3 sub-tests from WAIS-IIIUK, Third Edition were employed. The data was analysed on the basis of Mann-Whitney U Test. Results showed that students involved in Voluntary Agricultural Field-Work have better Spiritual Intelligence ( $Z_u = 4.938$ ,  $p < 0.01$ ) and Working Memory ( $Z_u = 2.730$ ,  $p < 0.01$ ) than those students not involved in Voluntary Agricultural Field-Work. The present investigation has implication with respect to improving the Spiritual Intelligence and Working Memory of students not involved in Voluntary Agricultural Field-Work. **P1**

**372 Well-Being, Religiosity and Consciousness among Adolescents** Preet Kumari, Shaktiyan-shi Raundele, Graduate Student, Dept. of Psychology, DEI, Agra <shakti.raundele12@gmail.com> (Psychology, DEI Dayalbagh Educational Institute, Agra, U.P. India)

The main aim of present study was to examine the relationship between well-being, religiosity and consciousness among adolescents. Well-being is a general term for the condition of an individual or group, for example, their social, economic, psychological state. High well-being means that, in some sense, the individual or groups' experience is positive while low well-being is associated with negative happenings. In this study contribution of consciousness would be remarkable as compared to religiosity towards well-being. Religiosity is the state of being religious and consciousness is the state of being awareness. A study was made on convenient sample of 50 adolescents (females) age range of 18 to 22 years selected from D.E.I. Agra and used three tools (i) well-being scale (Warwick Edinburgh, 2006) ii) Religiosity scale (Bhusan, 1970) iii) Consciousness scale (Brazdau, 2009). Co-relational design was used. Results indicate that well-being and religiosity scores are positively correlated ( $r=0.28$ ,  $p<0.05$ ). Thus increases in religiosity scores led to increase well-being scores. There is also high positive correlation between well-being and consciousness scores ( $r=0.44$ ,  $p<0.01$ ). Thus increases in consciousness scores led to increase in well-being scores among adolescents. Multiple regression analysis was also used ( $R=0.46$ ) and it showed that consciousness has highest contribution in determination of criterion variable i.e. well-being, the regression coefficient being 0.17. Religiosity has the least contribution in determining well-being, the regression coefficient being 0.04. **P1**

**373 Aquarian Theosophy** Eric Lundgaard <Maitreya@cox.net> (Aquarian Theosophy Foundation, Boulder City, NV)

This abstract is written from a Theosophical perspective in Aquarian Theosophical parlance. Aquarian Theosophy is written from a new understanding of reality. Since everything flows from consciousness, mankind will never receive a full understanding of the universe from science. It is the premise of this paper that reality flows from two sources, mankind's beliefs and reality engen-



dered from the scientific method. It is therefore not the experiment undertaken by the scientist's endeavor that creates a full picture of human reality. Consciousness is everything since It is the basis from which all things flow. Science will never measure or fully comprehend Consciousness since "etheric" Consciousness does not exist and will never exist from a measurable point of view unless and until it becomes physical. Therefore any Theory of Everything (TOE) will have to include a component of etheric reality. This paper is an outline of the remaining aspects of Consciousness that are not described accurately elsewhere. Science requires observation and an understanding that it can be repeated and measured. Science is both rudimentary and historic. Physics is talking about things that science has admitted violate the scientific method since they do not create a logical, repeatable understanding. Discovery must therefore be open to other understandings to advance beyond the current limits of science. This paper expands understanding beyond that scientific understanding. Each of us has our own point of view when it comes to beliefs and consciousness. This allows us to watch and make observations in a scientific or logical way. Aquarian Theosophy applies observed behaviors from people I have met. I intuitively know the rays of consciousness present in an individual. Knowing rays of consciousness, I am observing behavior and recording outcomes. From this information I posited personalities based on the five soul rays of consciousness. Other behavior can be explained generally as part of the three rays of consciousness that affect personality. These rays in descending order of influence are the soul, personality, and mind rays of Consciousness. That is my methodology. It is primarily available to understand human behavior. I observed and corrected my understanding, citing examples from my daily observations and contacts with people. With an exception of knowing the rays of consciousness in human beings, this method can be repeated by others to develop new understandings for humanity. From science the observer is, to some extent, causing the observed to change in some form or fashion. We are in a time period where scientists and philosophers are realizing that the universe will never be drawn into the scientist's lab again. It is the scientist that has to accept that universal consciousness is consistently creating and moving the universe in a divine direction. I have done this by offering understandings of our reality from better understanding the rays of Consciousness which are the genesis of communication and personality. When both an understanding of consciousness and science are blended, we are giving "reality" the best understanding available. **P1**

**374 A Continuum of Persistent Non-Symbolic Experience in Adults** Jeffrey A. Martin  
<jamartin@fas.harvard.edu> (Center for the Study of Non-Symbolic Consciousness, and Harvard University, Newport, KY)

Non-symbolic experiences have been reported for millennia and are generally attributed to spiritual and religious contexts, although atheists and agnostics also report them. Popular terms for them include: nondual awareness, enlightenment, mystical experiences, peak experiences, transcendental experience, the peace that passeth understanding, unity consciousness, union with God, and so forth. Most are temporary, but some individuals report a persistent form of them. Persistent non-symbolic experience involves a fundamental change in the experience of what it is like to perceive the world. Over the past 7 years our research project has sought to map this experience in over 1000 adults who report persistent non-symbolic experience (PNSE). Methods used included long semi-structured interviews, a wide variety of gold standard psychometric measures, physiological measurement, and experimentation. Five core, consistent categories of change were uncovered: sense-of-self, cognition, emotion, perception, and memory. Participants' reports formed clusters in which-of change in each of these categories were consistent. Multiple clusters were uncovered that formed a range (or continuum) of possible PNSE experiences. This continuum seems to begin with a tightly constructed individualized sense of self and end with an individual being unable to at all detect an individualized sense of self. When examined, the clusters, or locations on the continuum between these two points, form a logical series of stages in the deconstruction of the individualized sense of self. They also appear to correlate with specific brain regions and processes. The variety of these clusters and their underlying categories may inform the debate between constructivist, common core, and participatory theorists; and finally provide a generalizable conceptual map and psychological framework for these types of experiences. **C22**

**375 Intuition Demystified by the Integrated Approach of Spiritual Phenomenology and Scientific Methodology Based on the Philosophy of Radhasoami Faith** Ankita Mathur, Purnima Sethi <6.ankita@gmail.com> (Dayalbagh Educational Institute, Jaipur, India)

The quasi-magical, non-rational nature of intuition presents a colossal challenge to science. Intuitive knowledge apparently does not function like the methodical inferences associated with rational thought. It is known to arise 'in a flash', or 'out of the blue', sometimes with answers to tricky scientific problems, elegant solutions to complex mathematical theorems, and complete scores for intricate musical compositions. In recent studies, people have linked intuitive decision making to subliminal subconscious processing. But what is it that powers the unconscious/subconscious mind in absence of external stimuli to experience these flashes of information? The causal force behind the observed intuitive experiences still remains unknown to science. In this context, we would like to highlight that the philosophy of Radhasoami Faith-A Religion of Saints, provides plausible solutions to these fundamental queries pertaining to intuitive consciousness. The Radhasoami faith hypothesis is of spirit-mind-matter interactions. If the spirit force is developed by the method of spiritual practices, at planes higher than those at which it is kinetic in ordinary circumstances, the tanmatras of the various senses will no longer be dependent upon the physical frame for communication of impressions, and subtle actions of various degrees, which are always taking place, would all come within their cognizance. The Supreme Creator makes prompts giving each spirit force when He so desires, the necessary direction which is intelligible to that particular individual entity based on his background. So He gives the optimal solution as a prompt. Accordingly, that is the Ultimate Communication Technology. Drawing inspiration from the Hierarchical Order Theory of Consciousness proposed by Most Revered Prof. P.S. Satsangi, we would like to propose the relevance of the theory in context of acquisition of intuitive knowledge. The higher-order consciousness of spirit force acts on lower order consciousness of spirit force as well as the mental plane. In the mind when an ORCH-OR event occurs, decoherence takes place and consciousness is manifested in the physical plane as information which is perceived as intuitive knowledge. A scientific explanation to the same can be leveraged from the Omni Quantum Spiritual Force Field theory. We put forward Dayalbagh community as an exemplary example where people are strongly guided by their intuitive consciousness or take guidance from the mentor availing from His repository of intuitive consciousness to traverse an optimal life trajectory. The way of life here helps one cultivate their intuitive abilities. In the words of Most Revered Prof. P.S. Satsangi – I believe there is 'cumulative' consciousness, that is, consciousness of an entity is not just the present momentary level of consciousness attained by an entity but it is the highest 'characteristic' consciousness attained as of that moment, which you may tap for prompting or guiding you whether consciously or unconsciously. It is not all the time that you are in explicit communion with that highest consciousness attained by you, but that is the one which you have achieved and that is the one which potentially prompts you through intuition (whether conscious or unconscious). **P1**

**376 Forms of Consciousness in Materialistic World VS Spiritual World** Maanvi Mathur, Swami Pyari <maanvi.mathur@gmail.com> (Management Studies, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The empirical is the world common to all humans. This is the world operated by the senses, cognitively known, and driven by desires. The sensory awareness constitutes the objective aspect and the accompanying desires and cravings are the subjective aspect of a given thought in the empirical domain. Where as in spiritual world these forms of consciousness cannot work in the same manner. Our paper reveals how they are different to one another and what causes this difference to take place and which are the elements missing there in the spiritual world. **P1**

**377 From a Universal Consciousness to Social Consciousness – An Experiential Approach** Anjali Nigam, Dr. A K Nigam, Professor (HR& Amp; IR), Asia-Pacific Institute of Management, New Delhi, India <dr.anjalinigam@gmail.com> (Training and Consulting, WhiteSwan Consulting Group, WCG, Gurgaon, Haryana India)

The basic value-system of "Fatherhood of God and Brotherhood of Man" cascades from the eternal truth of "oneness with the universe" and the "spiritual Being". The "Visualization Tech-

nique” has been developed and experimented as a precursor to “Meditation and Dhyaan” by the main author. The experiential sessions were conducted with people from various backgrounds and diversities in different parts of the world and nationalities like India, China, Japan, UK, USA, Poland & Europe, Saudi Arabia, Dubai, Mauritius, Africa, and major SE Asian Countries and levels of the society as well as ages. The use of the technique has majorly resulted in facilitation of “striking an internal connect” in a mode faster, than normal meditation. Authors have done continuous experimentation with this technique, for a period of more than 8 years, more than 80% of the participants reported help in clearing the thoughts and internalization of all energies and a gradual escalation of the mind and spirit leading to feeling of oneness of the “microcosm” with the “macrocosm”. Based on the above results of experiential learning, the author is hypothesizing that once the individual is able to escalate his/her mental and spiritual energies to strike oneness with the universal energies, he/she is able to realize the truth of the basic value-system i.e. “Fatherhood of God & Brotherhood of Man”. The author further hypothesizes that “only when one is able to attain oneness with the macrocosm”, only then he/she will be able to realise the full truth of the value and belief of “Fatherhood of God and Brotherhood of Man”. Only after attaining this realisation he will be able to work towards it in the true sense, and work towards “better worldliness”. In the words of Professor P. S. Satsangi, the 8th Revered Sant Satguru of Radha-soami Satsang Dayalbagh, and Chairman Advisory Committee on Education, while His visit to the Vivekanand Shila Smaratha, on 31st May 2006, where He minuted about Swami Vivekanand and his achievement of enlightenment. “It is indeed a rare privilege and pleasure to re-visit the Vivekanand Shila Smarata this morning. It is truly a befitting memorial in honour of one of the greatest sons of Bharat Mata who attained enlightenment through sustained deep meditation and thereafter preached the science of consciousness all through the world over.” The above words drive the importance of deep and sustained meditation for attaining enlightenment. However, in this paper, the author through the researched use of “Visualization Technique” attempting to drive cleaning of the mental slate, shedding baggage and getting relief from thoughts, internalizing all energies and getting control on the “indriyas”, that is basically creating the mental platform and striking physical, mental, emotional, and spiritual readiness for attaining the state of “Dhyaan i.e Meditation”. This experience of oneness, would then lead one to work towards a state of “social consciousness,” i.e., internalizing a value system, which facilitates in building a value-based and gender sensitive society. The primary researched paper also evolves a model for the above experiment and its results. **P2**

**378 Devotional Music and Spiritual Consciousness** Vuppuluri Prem Kumari, Mrs.Binathi Gunty, M.A.,MPhil In Indian Music <prem.kumarivuppuluri@gmail.com> (Department of Music, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Spiritual consciousness: Consciousness is an awareness of one’s self and surroundings in the wakeful state and also in the dream and deep sleep states. Spiritual consciousness is awareness of ‘Turiya’l and beyond states. Spirituality is that state which is experienced when spirit entity is liberated from physical body and mind, beyond the limitations of human comprehension. It is experienced when the Jiva is elevated to transcendental spheres or spiritual sublimity. Sound and Music: Music has been central to the worshipping practices and beliefs from remote past in majority of religions and faiths. Music is being the most refined form of sound; man has developed in and applied it in his devotional practices with the unique quality of elevating oneself from sensual level to the transcendental or spiritual planes. It was cultivated by saints and seers throughout the history of mankind like saint Tyagaraja, Sant Kabir, Meerabai, Tulsi saheb, Bhakta Ramdas etc. who preached in their compositions that NADA the sound is ultimate reality Nada Brahma. Bhakti is devotional worship directed to one Supreme deity. Sage Narada defines Bhakti as ‘intense love for God’. Bhakti is a real, genuine search after the Supreme Being, a search beginning, continuing and ending in Love. It is a single moment of extreme love to God that brings us eternal freedom. To acquire such dedication and devotion, a devotee needs a medium for internalizing his attention to practice internal sound and come out of all the disturbances that every individual is facing in the present external world. This is possible only through regular, dedicated practice with pure mind and concentration. Music stands as one of the best media to attain such concentration and devotion. Among all the rasas, Bhakti rasa is more appealing and dear to the Supreme Being.

Devotion is a sure path that paves way to spiritual development. Devotional music is a simplified, soft style without complexities that enables every devotee to make fervent prayers to the Supreme Being with the help of spiritually elevating lyrics. Devotional music awakens the person who is unconscious and unaware of eternal bliss of spirituality. It enhances the feeling of Love for Supreme Being. This state and moment is considered as the main characteristic of spiritual consciousness. In the present study we tried to bring out the impact of devotional music in enhancing spiritual consciousness on a devotee and a performer using interview and questionnaire method. For this we made literature study and visited historical Hindu temples and Satsang halls of Sant mat (where prayers are rendered to the accompaniment of music). Since from my childhood I happened to visit sat sang halls. Based on the opinions and experiences of devotees and performers in both Temples and Sat sang halls a statistical evaluation is made to delineate the impact of devotional music on the devotee and performers. – Prof. V. Prem Kumari (Emeritus, Former-Dean, Former-Head of Music Dept, DEI); – Mrs. Binathi.G (M.A.,M.Phil in Indian Music, DEI) 1. the state beyond the worldly plane **P1**

**379 Consciousness, Religiosity and Locus of Control Among Adolescents** Shaktiyanshi Raundeley, Dr. Preet Kumari (Assistant Professor, Department of Psychology, Faculty of Social Sciences, DEI <steffi.yadav0312@gmail.com> (Department of Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The objective of the study was to examine the effect of locus of control on consciousness and religiosity. Consciousness is the state of being awareness. Consciousness is defined as the amount of access we have simultaneously to information from multiple sources – from, in fact, the vast field of possibility that is consciousness. Religiosity is the state of being religious. Locus of control is the individual's belief of where the control of behavior originates- internally or externally. As the environment changes, adolescents can either attribute success and failure to things they have control over, or to forces outside their influence. This orientation is known as our 'locus of control'. A study was made on convenient sample and the total sample consisted of 100 adolescents (50 internal locus of control and 50 external locus of control). The age of the subject ranged from 16 year to 22 years. Two group design was used. The tools used in research were Consciousness Quotient Inventory (Brazdau, 2009), Religiosity Scale (Bhusan, 1970), and Locus of Control Scale (Rotter, 1966) to measure consciousness, religiosity and locus of control respectively. Mann-Whitney U test was computed for data analysis in the research. Result indicates that there is significant difference ( $Z_u = 2.09$ ,  $p < 0.05$ ) in consciousness of adolescents having external and internal locus of control. The results revealed that adolescents having external locus of control had significantly higher consciousness ( $M = 208.56$ ) and adolescents having internal locus of control exhibited low level of consciousness ( $M = 193.3$ ). There is no significant difference ( $Z_u = 0.66$ ,  $p > 0.05$ ) in the religiosity of adolescents having external and internal locus of control. **P1**

**380 Scientific Study of Environment at Holy Places Can Determine Field-Effects On Consciousness** Shabd Roop Satsangee, Sant Saran; Sukhdev Roy <rsatsangee007@gmail.com> (Commerce, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Millions of people go on pilgrimage to numerous holy places and shrines throughout the world either to raise their level of consciousness by experiencing inner peace, unity, bliss, healing, or for fulfilment of wishes. Followers of almost all religious traditions are encouraged to visit their respective sacred sites. Many of the world's religions, including Christianity, Islam, Hinduism, Buddhism, Judaism and Chinese folk religion have shrines that often contain idols, relics, or other such objects associated with the figure being venerated. Most of these places have a long history and their effects have been experienced by people in different ages. It is evident that there must be certain environmental factors that have such a tremendous effect on the spiritual, mental and physical state of different individuals and suggests a field-effect in these environments. The presence of a spiritual adept and mass meditational and prayer practices enhance the spiritual environment of a place. Experiments conducted at the Dayalbagh Prayer Hall revealed specific frequencies prevalent before, during and after the prayer services. Most of the sacred sites have also reported miracles especially related to healing that have been officially recognized as well. The most

notable Christian example is of the shrine of St Bernadette at Lourdes, France, visited by over 5 million pilgrims a year. As many as seven thousand medical cures have been attributed to this location's healing waters since 1873, with 69 of them getting official recognition as miracles by the Bishop of Pavia, Italy. The rapid and complete cures can only be explained through miraculous powers. Although the cause can be attributed to the sites, the faith of the individual can also be an important factor. In this paper, we present an overview of the major holy places in the world and their reported effect on individuals. We propose that a scientific study of the environment at these holy places can establish the factors that not only enhance the environment but also that affect consciousness. Correlating them at renowned holy places would help in determining fundamental factors affecting consciousness. The study would also establish whether only the environment affects the consciousness, the environment and faith together affect it, or it is only the faith of an individual that is the primary cause. **P1**

**381 Why Is There Something Instead of Nothing?** Swami Pyari Satsangi, Maanvi Mathur; Vineeta Manhar <swamipyari@gmail.com> (Psychology, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

This paper raises some extremely profound questions which have plagued and prodded the universe since the first emergence of auto-reflective within the self-labelled species called human. "Why is there something instead of nothing?" The purpose of this paper is to provide a rational context for the reader to open a non-rational connection to the possibilities that are implied through questioning the nature of the universe, mind, and reality. The questions themselves, almost certainly unanswerable to the rational mind, provide the insights and often self-destruct in paradox before an actual answer can even be attempted. Because of the fundamentalism of these mysteries, the entire history of shamanic, religious, spiritual, rational, philosophic, and scientific thought has attempted to contain and work with such questions in an effort to 'figure it out' or gain some significant insight into the essence of existence. The extent to which this quest has been accomplished within any of these fields is a question this paper will explore. **P1**

**382 Respecting Differences and Being Inclusive – A Way to Achieve High Level of Spiritual Consciousness** Sumiran Satsangi <sumiran.satsangi@gmail.com> (Gurgaon, Haryana India)

Each one of us is different. We are different in our thoughts, understanding, intelligence, habits, culture, attitudes etc. Talking ill about others is making our own consciousness filthy. One has to be inclusive i.e. including everyone at all times in our thought, actions and speech. It is not necessary that thinking of two persons matches; rather it is rarely the case. Ones caste, creed, social background, education background, different language should not come in way of our thoughts, actions or speech. When we are born, we are more closer either to our father or to our mother as we think our mother loves us more or father loves more than mother, but it is actually not the case. Then when we get married we have another companion in life with whom we keep on fighting to adjust to our own way of thinking. Then we have children and we want from day one to behave as we want them to. Thus in real life we react to situations and people instead of putting our feet in their shoes and responding to situations. When we are more inclusive in our approach, only then love the true form of consciousness can manifest. We should believe in ideal of Fatherhood of God and Brotherhood of man. This truth will alone take us to higher and higher level of consciousness. **P1**

**383 Communicating with Your Divine Self** Sunita Satsangi, Ms. Parul Verma <sunitasatsangi1234@gmail.com> (DEI Dayalbagh Educational Institute, Agra, UTTAR PRADESH India)

Communicating with your inner self is the beginning of transformation. Looking within, or self inquiry is the first step towards the path of spirituality. Jesus Christ said, "My father and I are one." All of us experience a subconscious connection to a much bigger dimension of existence while living our daily lives. Philosopher Ken Wilber in the Spectrum of Consciousness explains the play of limited ego with that of its infinite being, all in the span of our single identity of 'who' we are. By self inquiry, the 'limited stand-point' in the spectrum is constantly heightened for us to see other possibilities that lie beyond. Wilber has extensively quoted from Ramana Maharishi

to describe the experience of 'death' that led him to realization. There is no reaching the self—you are the self—you are already that. What most people don't realize is that there is also a very internal component to this higher part of us. Our inner self, which includes our life situations, is the outward reflection of what is going on at a higher level that is filtered through our egos. What this means is, that our 'Higher Self' will communicate with us in various ways: through intuition, hunches, sudden unexpected life changes, etc. We may or may not choose to listen or act on those communications. But in essence, it is our inner self that is the 'receiver' of these messages. If we choose to receive and follow that guidance, the potential is that we would become the physical manifestation of our 'Divine Self'. Richard Barrett also explains in personal level of consciousness that with transformation, we choose to live by the values and beliefs that resonate deeply with who we are and begin the process of self-actualization by focusing on our individuation. The upper three levels of consciousness focus our need to find meaning and purpose in our existence, actualizing that meaning by making a difference in the world, and leading a life of self-less service. To be able to actually 'live' one's own beliefs and thoughts is difficult. For this we have to reduce thought-process, and reduce thoughts to a form. Upnishads have encouraged us to experience (the soul must hear, see and recite). Adi Shankra expounded on 'neti, neti' – not this, not this – and also affirmed of being the infinite and blissful, as if to verbally express the transition from an idea to a state of experience. Eileen Caddy in her diary called *Opening Doors Within* says, "The more you become still, the more clearly can you reflect the qualities of your soul." P1

**384 Love: The Crux of Consciousness** Ranjeet Kaur Satsangi <ranjeetkaurdei@gmail.com> (Pedagogical Sciences, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Consciousness pervades in each and every particle of the universe either in latent or kinetic form. The major force of this universe is gravitational force of the earth and electromagnetic force in which negative and positive poles attract each other. Thus the physical universe is based on force of attraction. In the same manner the consciousness which is the prime reason of the manifestation of this universe also functions through the same force of attraction at a very subtle level which is in the form of love and bliss. Thus the crux of consciousness seems to be force of love. As said by Saint Kabir "Pothe padh padh jag mua, pandit bhaya na koi, dhai akhar prem ka, pade so pandit hoe." In Sant Mat consciousness is considered as sat, chit, anand, prem and prakash i.e., truth, consciousness, bliss, love and refulgence. The center of all these attributes seems to be love. Thus love can rightly be considered as the crux of consciousness. P1

**385 Developing Spiritual Consciousness: An Eastern Perspective** Sahab P. Sinha, Surat P. Sinha <spsinha.dei@gmail.com> (Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Consciousness is the awareness of the environmental stimuli as well as one's cognizance of mental events i.e., thoughts that result from memory. Maslow's theory of Need Hierarchy states that if the basic biological needs are met, the individual is free to develop meta-needs i.e., self-actualization. To reach this state of self-actualization one should try to raise one's own consciousness to the level of spiritual consciousness. Spiritual consciousness denotes the consciousness of a human being who has reached higher levels of evolutionary development and has gained knowledge of an "Ultimate reality". It is an abiding inner awareness of the interconnectedness of one's own spirit (Jeevatman) with the supreme spirit (Parmatman), of one's individual self with the universal self (God). Hence Fatherhood of God and Brotherhood of Man is a visible and an experiential aspect of a fully developed spiritual consciousness. The spiritual consciousness is not present in the new born, rather it develops across the life span as the individual is embedded in culture and social context. Thus it has bi-directional influences. The mutual influence between individual and context regulates the course of development. The development of "five Cs" among youth (i.e., competence, confidence, connection, character and caring or compassion) is essential for the development of spiritual consciousness. Bandura's social learning theory plays an important function in this development. It is believed that spiritual consciousness can be developed through different ways: 1) for some people it is "given"; 2) for some others, it comes through devotion to God and love to other fellow beings; 3) for others it develops through religious observance or meditational practices. Meditation can have calming influence on practitioners (i.e., ces-



sation of chitta vritis) as well as changing states of consciousness with different kinds of spiritual experiences: The experience of consciousness as vision of light (Jyoti) or illumination (Prakasha), sound (Nada), bliss (Ananda), and feeling of love (Prema). These are many kinds of meditational practices prevalent. The practice of Surat Shabda Yoga recommended by the spiritual leaders of Radha Soami faith describe spiritual consciousness as Param Sat- Chit Prem Anand Prakasha Shabda Anahada Nada Swarupam. The present paper discusses how Religion of Saints demonstrates the ascent of the spirit current from its focal point to the higher regions of consciousness till it reaches the Supreme being. **P1**

**386 The Mechanism and Resultant of Higher Consciousness** Neha Sinha Mehta Satsangi <nehadb01@gmail.com> (Distance Education Programme, Dayalbagh Educational Institute, Agra, UP India)

The mechanism : Receipt of Grace and Mercy or spiritual experiences result in unwavering Faith. This faith finds expression in Dedicated Service and conscious action (Bhakti), Repetition of the name which corresponds to existing phenomenon in higher regions or (Sumiran of a Dhunyatmak shabd) which eventually produces Unison (Yoga) or resonance which lifts the consciousness of the soul to the consciousness of the region with which resonance is achieved. The resultant: Glimpses of the big picture. Alignment of all these and the road beyond to optimal conscious living resulting in progress on the optimal trajectory and the eventual ultimate achievement of the object of creation which is salvation to the soul. The results in total appreciation and reliance on Systems Science. The learning process or E-L-P-S-E: Experience, Language: the process of being able to express the experience in Language, Picture: associative thinking, Symbolic association and reinforcement of consciousness. **P1**

**387 Apertures and Channels in Human Body for Flow of Consciousness Currents** Po-chamcharla Sriramamurti, Dr. N. Prem Kumari <ndsmurty@gmail.com> (Ctr for Consciousness Studies, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The substance of the Brain, the Grey Matter and White Matter, contains the Kamalas and Padmas, situated along the fissure between the two cerebral lobes. The same substance (the Grey Matter and White Matter) also constitutes the lower nerve centres that contain the Six Chakras along the Spinal Cord. The plane of sensory action and the focuses of spirit force in different spirit centres are not a part of this material constituent. They belong to the regions of Mind and Spirit into which they open. The nerves, nerve centres and spirit centres perform subjective functions like perception and volition as well. The powers of perception and volition apparently depend upon nerves and nerve centres like those of sense organs and motor organs. But these functions can also be performed without the help of nerves and nerve centres, as in the case of disembodied-spirits and in the case of Yogis, who dissociate themselves from nerve centres situated in the body, by performing spiritual practices. It is thus evident that the subjective economy of human body, especially of brain, is wider and deeper in scope than it appears to be. Ordinarily these nerve centres perform life-giving and life-sustaining functions. There are subtler planes peculiar to each one of them within the nervous system and the nerve centres. These subtler planes can be acted upon by performing spiritual practices, to establish communion with the macrocosmic spheres through these nerve centres corresponding to them belonging to Universal Mind and Pure Spirit. These innermost realms within the apertures associated with Brahmand and Nirmal Chetan Desh are of utmost importance in Consciousness Research. These apertures are the doorways to higher regions, called 'Chidras' (i.e. Tisra Til), Randhras (i.e. Brahma Randhra) and Dvaras (i.e., Da'am Dvar) variously. They are connected to the communication channels, called N'dis (Sushumn' N'di), N'ls (Banka Nal) and Dh'rs ('abda Dhar) that carry the spirit currents in their transformations from region to region. The spiritual traditions of the world, especially of Rishis, Prophets, Fakirs and Sants are replete with references to them. They have also taught the techniques, as to how the spirit force, which got diffused in human body, can be awakened, withdrawn, concentrated, elevated and made to reach its original abode, traversing respective channels by piercing the intermediary gateways. Those who have traversed the path and reached the Supreme Source of Spirituality, guide the aspirants in reaching their destination. **P1**

**388 Integrated EMG Activities of VMO and VL during Selected Rehabilitative Exercises With and Without Chanting of Holy Name** Sanjay Srivastava, Greesh Kumar Singh; Mukesh Kumar <ssrivastava@dei.ac.in> (Mechanical Engineering, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The aim of this study is to study the effects of chanting of holy name during selected rehabilitation exercises commonly used in physiotherapy clinics for activating the vastus medialis oblique (VMO) and vastus lateralis (VL) using surface integrated electromyography (iEMG). Ten subjects in the age range of 25-47 years without patellofemoral pain syndrome are recruited. Subjects perform eight exercises in Industrial Kinesiology Lab of DEI: straight leg raise with neutral hip position (SLRN), straight leg raise with externally rotated hip position (SLRER), short arc quad with neutral hip position (SAQN) and short arc quad with externally rotated hip positions (SAQER), open chain (OC), closed chain with internal rotation (CC), medial tibial rotation (MTR), hip adduction (HA). The integrated electromyography (iEMG) activities of the VMO and VL for each exercise are recorded using Biopac MP 150 system, Biopac Inc, USA, for two cases (i) chanting of a holy name as per religious beliefs of each individual subject and (ii) normal case i.e. no chanting. VMO, VL and VMO/VL are also compared across exercises. It is clear evident that chanting of holy name improves upon the activation levels. **P1**

**389 Peace and Consciousness: An Integrated Approach for a Sane and Harmonious World** Savita Srivastava, Nil <deisavitasrivastava@rediffmail.com> (Foundations of Education, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

In the 21st Century and beyond, man should address the basic quartering to him and would seek answer for himself. The day when the truth dawns on majority of people would be the happiest day for any peace-loving creature in the world. Peace means – Freedom from mental agitation or anxiety or the absence or cessation of war or a state or condition of order or harmony. What prevents us from acting on this understanding is the stock of mental pollutants, such as ignorance, cruelty or greed. Removing such pollutants will promote peace among human beings, as well as a balanced, healthy relationship between human society and its natural environment. This is how religion can foster environmental protection. The Hundredth Monkey Effect is based upon the principle that after one monkey on an island discovers how to wash a coconut in the water to remove sand and dirt, the rest follow suit until the last, or “hundredth” monkey, finally learns this improved method. At that point, monkeys on other islands become aware of this knowledge without “direct” communication. This same effect has happened repeatedly in human history, where inventors have simultaneously discovered inventions that others around the world were contemplating at the same time, or where mothers somehow know when one of their children is in pain hundreds of miles away. The thoughts become energy that is available to others that tune into this energy field, or universal consciousness. If we already tap into this energy field without being consciously aware think what we will be able to do if we exercise our minds and use this incredible resource to our best advantage! When we stop and think about it, we are adding to the energy field right now by merely reading this information on peace. We are investing our time, money, energy and dreams in this principle in order to help World Peace become a reality. The key to peace creation is the experience of Transcendental Consciousness – the direct experience of the unified field of natural law- a state of inner peace. Each peace-creating expert is experienced in the subjective technology of transcending – allowing the mind to settle down deep inside until it transcends thought altogether. Consciousness connects individual intelligence with the unified field of nature’s intelligence. The results are profound: Regular daily experience of Transcendental Consciousness leads to unprecedented individual growth and, experienced in groups, it produces an easily measurable influence of peace and harmony throughout society. **P1**

## 6.06 Sociology

**390 Religiosity and Religious Consciousness Among Jains and Radhasoamis of Agra** Poornima Jain <poornimajaindb@gmail.com> (Sociology and Political Science, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Religiosity as an independent variable in the study of religious consciousness among Jains and Radhasoamis has not been studied so far. Establishing a correlation between the two form an important area of study both in consciousness studies and Sociology of Religion. The present paper attempts an empirical analysis of religiosity and religious consciousness in a causal analytical framework. The objectives of study are: 1. To construct a scales on religiosity and religious consciousness. 2. To compare the degree of religiosity among Jains and radhasoamis. 3. To find out if there is any correlation between religiosity and religious consciousness. Hypotheses: 1. There is no difference in the degree of religiosity among Jains and radhasoamis. 2. There is a positive correlation between the degree of religiosity and religious consciousness Methodology: Universe; All jains and Radhasoamis living in Agra will constitute the Universe of study. A purposive sample of 50 adult males and 50 females (age between 35- 55 years) from both jains and Radhasoamis will be selected. Tool of data collection used will be Interview – Schedule. Sources of data collection will be both primary and secondary. **P1**

**391 The Effect of Drivers' Consciousness on Environment Protection and Car Safety in Context of Tire Pressure** Majer Singh, Charan Prasad; Dr. Meenu Singh <majersingh@gmail.com> (Technical College, DEI Dayalbagh Educational Institute, Agra India, Agra, Uttar Pradesh India)

The majority of drivers do not consistently monitor the tire pressures in their vehicles. The study demonstrates the relation of consciousness with Environment Protection, Energy Conservation and Car Safety through Proper Tire Pressure. It also helps to reduce tire wear, fuel consumption and greenhouse gas emissions. The fuel consumption of an automobile involves a large number of parameters such as type of engine, engine capacity, vehicle weight, use of fuel additives, fuel injection, tire pressure, tire condition, road condition, load with AC on/off, maintenance etc. The experiment was carried out on a particular vehicle for fuel economy at different tire pressure; the data such as highway and city road mileage for load and speed were recorded and determine the extra fuel consumed. A solution is provided here to address under-inflated tires on the particular vehicle and the concomitant wasted energy due to increased rolling resistance in the automobile fleet. The study indicates that substantial benefits would accrue if driver is so conscious about the car care facilities systematically offered complimentary tire pressure checks (i) increased safety by decreasing all crashes and saving more than 100 lives per year, (ii) reduced fuel consumption by over a billion gallons/year, which would (ii a) provide over several billion in economic savings for consumers that could in part be recouped in retail/auto-care facilities, (ii b) reduce greenhouse gas emissions by 13.5 million tons and automobile pollution and (ii c) enhance national security. In this study the drivers' consciousness is determined with survey method and measurement method using DEI-MEAD system. The consciousness of three categories of drivers – male, female and taxi driver determined by both these methods. It is found that taxi drivers are more consciousness then female and male drivers. **P1**

## 6.07 Anthropology

**392 The Beginning Was the End: Modeling Hybrid Reality In Javanese Culture** Allison Leigh Holt <allison.holt@gmail.com> (Oilly Oowen Laboratories, San Francisco, CA)

As a Fulbright Fellow in Indonesia, I interpreted the traditional Javanese way of knowing. I conducted original research on concepts of time, multi-dimensional reality, and how they intersect with my own philosophy, creating models in diagrams, video-sculptures, and a sound installation. I was interested in the structure of this sophisticated and endangered knowledge: in what people experienced in these other dimensions and in the tools Javanese culture developed to understand them. In extraordinary ways, it echoes my own ideas about reality, consciousness, and cognition, illuminating issues at the heart of my artistic inquiry. This exploration embodies my pursuit of a dialogue between divergent ways of encountering and describing reality.\_\_\_\_ At the center of my work lies a fascination with the templates humans place upon reality, and how systems of belief construct experiences of reality that can differ fundamentally, resulting in an extraordinary diversity in epistemologies. Through my research-based process, which includes experiencing altered

states and rituals directly, I create models that reveal the frameworks concealed within them. I construct objects and environments that draw attention to the continual interpenetration between perception, belief and cognition; between dreaming and waking consciousness; and between tangible and alternate realities. My work is a developing system of tools for viewing the tacit matrix that joins these worlds, and for imagining the apparatus that governs them. While investigating traditional Javanese knowledge, which is both spiritual and scientific, I started asking myself: In what ways might these ideas inform the development of Western art, thinking, and technology? How might an exchange between my practice and Java's art forms bring the relevance of this endangered way of knowing to new generations there?\_\_\_In 2008, I began dialogues in Java with professors of philosophy and dhukun (shamans), and personally undergoing rituals, drawing diagrams to clarify the relationships between man, nature, and the supernatural that form the core of the traditional Javanese way of life. Because this knowledge is no longer taught to children there, I produced my diagrams in the style of Indonesian educational posters, intending them as classroom tools for deeper conversation.\_\_\_To convey a visceral sense of multi-dimensional being, I collaborated with artisans, artists, and architects, casting a series of transparent resin cubes that house negative space forms taken from my diagrams, whose matte surfaces serve as screens onto which I project layers of video, mapped directly into their shapes, on an endless loop. They simulate chunks of space-time erased from the fabric of reality; delicate, powerful gauges designed to reveal the unseen energies present in the same time and space occupied by their viewers. I am currently collaborating with artists who use the psychophysics of sound to produce a distortion of reality that can be experienced physically, to make the interaction between different dimensions tangible.\_\_\_As indigenous knowledge bases are globally dying out, I am interested in incorporating new media with traditional knowledge, both toward the goal of reviving the latter and of using the structures I see within it to drive technological development. **P1**

**393 From Structural to Neuroanthropology: Anthropological Horizons and the Exploration of Consciousness** Szoke J. Zsofia <sophiehanna@unm.edu> (Anthropology, The University of New Mexico, Albuquerque, NM)

Taking into consideration the progress of scientific knowledge in general, Kuhn called the core concepts of an ascendant scientific revolution its "paradigms". Kuhn's argument propagated the idea that scientific fields undergo periodic "paradigm shifts" rather than exclusively progressing in a linear and continued way, thereby opening up new approaches to various understandings that scientists would never have considered well-founded before. Kuhn also touches upon the idea that the notion of scientific truth cannot be established solely by objective criteria, but is also defined by a collective accord within a scientific community, since competing paradigms are frequently at variance and are often competing accounts of reality. According to this, our comprehension of science can never rely on full objectivity, but we must also account for subjective perspectives considering objective conclusions are often being founded upon subjective scientific conditioning. In this paper, beyond discussing current perspectives in Science and Technology Studies (STS) and the anthropology of science as connected to the inspection of consciousness, my presentations will discuss major anthropological attempts to frame the human mind from the 1920s onward in order to examine contemporary and future anthropological horizons, while arguing for the immanent need of a clear-cut shift towards the phenomenology of self-referential systems within the anthropological spectrum. I will discuss various anthropological subdisciplines including psychological and cognitive anthropology conjointly with their complex interdisciplinary potentialities, associations and paradoxes. Along, I will consider the newly emerging field of "neuroanthropology" placing the brain at the center of discussions, thereby posing challenging questions for neuroscientists and anthropologists alike at the intersection of brain, anthropology and culture. Neuroanthropological approaches will be discussed in relation to medicine, science and law by examining the focus on individual nervous systems and their relations to the outside world including the solar system and the cosmos. **P2**

## 6.08 Information technology

**394 Social Media Versus Gaming Associations with Typical and Recent Dreams** Jayne Gackenbach, Arielle Boyes <gackenbachj@macewan.ca> (Psychology, Grant MacEwan University, Edmonton, Alberta Canada)

As immersion in virtual reality type worlds has increased over the decade we have been investigating the effects of such immersion on dreams. Thus far we have focused upon video game players as their immersion far exceeded that of any other virtual experience. However, in recent years it has become clear that other forms of virtual experience are occurring with equal frequency and depth. In a recent series of studies we have extended our research to include non-gaming computer use and especially social media use. We began with a study examining non-gaming computer use and dreams and found that "There was some indication that the high end non-gaming computer use group had more lucid (females only) and control dreams but less bizarre dreams" (Gackenbach, 2012). However, we had no idea what types of activities constituted non-gaming computer use. Thus we embarked on the current inquiry where we compared high end video game players to high end social media users and examined if dreams were one of those comparable points. Specifically, university students who varied in the degree to which they use social media (SMU) and play video games (VGP) were compared in this inquiry on several dream indices and one personality inventory. While there were meaningful differences between the four groups (high VGP/high SMU; high VGP/low SMU; low VGP/high SMU; low VGP/low SMU), most analysis resulted in no differences in dreams. Differences seemed to support the nightmare protection thesis of video game play such that high end gaming, no matter the degree of social media use, suffered less from these negative types of dreams. Additionally, the high VGP/high SMU group had the thinnest psychological boundaries and thus were perhaps most susceptible to media effects. While at the same time this group of high end media users showed the least negative self-concepts in their recent dream content. This was reflected in their typical dream reports as well. Our third study in this line of inquiry is currently underway and will be reported along with the current study in this poster (Boyes, 2014). Here we are examining non-gaming computer use as social media use, along with gaming, in terms of nightmares and the nightmare protection thesis of video game play. We had found previously that female high end gamers did not evidence the nightmare protection effects of their male counterparts (Gackenbach & Flockhart, 2013). Thus here we are examining several thesis as to why this sex difference might occur. They include stereotype threat, women undermine their own performance in situations where they perceive it goes against sex role stereotypes; tend and befriend response to threat, women are less likely to fight in the face of threat but are more likely to tend/befriend; video game genre preference, women are more likely to play non-combative casual game genres, and social media use. **P1**

**395 Information and Energy** Mark Munro <markmunromail@gmail.com> (Seattle, WA)

This poster advocates that in cognition, information and energy are connected; in contrast to their separation in philosophy and computer science. Part one is about the origin of the separation of information and energy and how that separation is imported into consciousness studies, making those studies prisoner to the question of how information is ordered and valued according to other information (This is the central challenge faced by HOTS, Neural Network models, the Fame in the Brain hypothesis, Integrated Information Theory.). More broadly an unexamined separation of information and energy in the neocortex fosters a conflation of Machine Intelligence with cognition, and unhelpful mind-body dilemmas. Part two proposes that information and energy are mechanically connected within the neocortex, and offers an account of how information value can be achieved in organization driven by energy saving. This entails an inversion of the roles of information and energy; in computer science, information is the variable (Memory, logical structure, instructions, nested algorithms) and energy is neutral; in cognition's foundations, information is neutral (Memory only) and energy is the variable. This proposal and its consequences are, I believe, consistent with philosophy and a range of biological and evolutionary features. **P2**

**396 Second Language Social Networking for the Quantum Mind** Paul Renigar <renigar@email.arizona.edu> (Second Language Acquisition and Teaching, Tucson, AZ)

This presentation is based on findings from a pilot study I conducted in 2013 that incorporated second language (L2) pedagogical uses of Facebook (FB), a popular Social Networking Site (SNS) beyond the classroom as part of a larger ecological view of language learning and consciousness. This research will broadly take an adapted socio-cognitive-ecological approach (Larsen-Freeman, 2012) to shift the focus from differences in technology (a simplistic 'use or non-use' approach) to the L2 participants' perception of human possibilities through technology, also known as 'affordances' (Darhower, 2008; Berglund, 2009; Zheng, Young, Wagner, & Brewer, 2009). My aim is to do so by presenting the findings of a one-semester case study of an Intermediate Italian class that introduces participant-directed Technology Enhanced Language Development ('TELD': Renigar, 2014). Based on the pilot study, the research will promote second language development (SLD) as a journey to be experienced in community; utilize metaphors drawn from Quantum Physics (QP) to complement and enrich the views of language as product and process; utilize interdisciplinary QP approaches to inform research both within and among the disciplines; and transcend the current social-cognitive dichotomy and simplistic cause-and-effect views of language, consciousness and language learning by exploring the resulting self-organization and co-evolutionary symbiosis of emergent and complex social worlds. The question that needs to be answered is how to balance static and dynamic views of language and identity. Quantum physics (QP) seems to provide a clear solution to this dilemma since it proposes the 'coexistence' of the dynamic and the systematic; the wave and the particle; potentiality and the collapse of the wave function (Hameroff & Penrose, 2013). This dissertation proposes a post-postmodern metaphorical application of QP to TELD to challenge two deeply embedded ideas – on the one hand the assumption that the brain is a machine/computer with linear and chronological 'processing' (input, uptake, processing, output); and on the other hand, the assumption that the brain is merely part of an ecological system (ecology, interaction, complexity, dynamic system). Metaphors from QP bring back the power of agency to co-create authentic environments of being (ontology) and 'doing' (Hameroff & Penrose, 2013) through language, with agency being the 'socioculturally mediated capacity to act' (Ahearn, 2001, p. 112). This new scientific visualization for the language sciences (Onnis & Spivey, 2012) needs to be explored. The aim in my research is to contribute qualitative and quantitative data that informs this paradigm shift. **P2**

**397 Complexities of the Connected World – An Integrated Framework Approach for Consciousness and Information Systems Modeling for Businesses** S S Prasad Satyavolu, Sumati Prasad Satyavolu <prasads@ gmail.com> (MLEU, DEI DEC, Pune, India)

The latest buzz is about the interconnected world-not just a machine to machine connectivity but a whole new world of internet of things- where everything from your cars to your home to your refrigerator and maybe even your toothbrush is connected. Along with the social media data, the data from interconnected things is leading to a data explosion. Data Scientists-a term coined for the analytical skills- believe that the deep patterns in the data can be uncovered to predict the future events or at a more micro level the needs and requirements of consumers can be aptly targeted. Yet another wave of billions of dollars of investment is sweeping the business world in search of elusive "control and prediction" and in this so-called final frontier in bringing deep insights into everyday business processes. While these innovations are in the process of being proven right (or wrong), there are some advantages to connectivity of things. It will bring in some efficiency and eliminate waste in the overall social and business system. But this is mostly a transactional activity even though it is creating newer business models. Strategic management and leadership in business require decisions about capital allocation, new initiatives and growth for all three horizons viz. short, medium and long term. The role of individual and by extension a multitude of leaders, decision makers in the corporation comes to fore whence decision making cannot be an automated machine learning process. All scenarios cannot be perfectly modeled and programmed. Since newer and more complex events in unknown places impact the outcome of decisions in the fast developing interconnected world. In this context, this paper proposes an overall framework for business transformations in two parts. First part establishes the current



deficient models and provides a three dimensional framework to evaluate the aspects of real life decision scenarios- which require information systems modeling- across three dimensions viz. Information deficiency, Information latency and the role of individual (his or her value systems and its correlation to decision process). The second part of the framework is focused on exploring the question of raising the consciousness leveraging Eastern philosophies and practices and their likely impact on the efficacy and efficiency of decision process. Decisions require information, stimuli and a “processor” build on the training, coaching and value system of the individual. Information deficiency and latency in current practices both affect the process as well as the ultimate outcome. Therefore, there is a need to adopt an integrated “learning & development” model incorporating some key aspects of Eastern philosophies. In order to conduct experiments and collect data, the paper proposes a study framework for decision processes with a focus on business world. Advances and theories) in decision making (by eminent modern management theorists and their amalgamation with evolution in information systems modeling (mostly higher level analytics and computing paradigms) and the Eastern philosophies in building an individual’s value system; its practices form the foundation for this paper. **P1**

**398 Affecting States of Consciousness and Worldview Using Video Game Technologies** Gino Yu, Jeffery Martin <mcgino@polyu.edu.hk> (Hong Kong Polytechnic University, Tai Wo, Hong Kong)

Interactive video games have become one of the most engaging and widespread forms of media today. Although video games are predominantly used as entertainment, they are finding other application areas including education and training (serious games). The interactive and engaging nature of video games also makes them an ideal platform for creating experiences that facilitate personal transformation and psychological well-being (meaningful games). A nexus between new, inexpensive neurofeedback technologies and increasingly life-like gameplay is now possible that will dramatically enhance the level cognitive and affective impact these technologies can produce. Conditioned behaviors and beliefs have a physiological basis and are related to and accessible through emotional stimulation and awareness. Video gameplay engages the user’s awareness and mind. Their real-time response, including the decisions they make within the game as well as their physiological reaction to the situation, reveals their conditioned behaviors and beliefs (world-view). In short, games can illuminate the relationship between thoughts, feelings, sensations in the body, and behavior. The information elicited can be used in real time to feed information back to the player in a way that affects their worldview. In addition, as players become increasingly aware of the nature of their underlying beliefs, further changes occur. We present a conceptual overview and framework for developing meaningful games as well as several approaches for designers to use in creating positive psychological change and transformation, including: transformation through narrative, cultivating somatic awareness, medication through gameplay, directly inducing experiences through non-traditional video game technologies, and facilitating introspection. **A1**

## 6.09 Ethics and legal studies

**399 Holistic Corporate Management and Eastern Philosophy** Aashiq Bommireddipalli, Swanti Devguptapu, DEI; Prem Sewak Sudhish, DEI <aashiqb2291@gmail.com> (DEI Dayal-bagh Educational Institute, Agra, India)

The purpose of establishment of any enterprise in general, and a corporate business enterprise in particular, is to achieve its objectives that are predetermined, while sustaining the enterprise for a long period of time. However, it is well recognized that an effective and efficient management of resources at any level – whether at the top, middle or bottom level is a difficult problem with a diversity of solutions having achieved different levels of success in their own geographic and temporal domains. This includes various management functions such as planning, organizing, staffing, leading and directing resources. In this paper, it is argued that an adoption of the principles of eastern philosophy that encompass thousands of years of sagely wisdom would nurture an organization while presenting an optimal strategy to the management and leadership of the organization. This is illustrated through principles of Sikhism such as vand chako (sharing with

## 6.0 Culture and Humanities

others, especially with those in need), Kirat Karo (making an honest living), service before self, equality to all, separation from the five undesirable entanglements: kam (lust), krodh (rage), lobh (greed), moh (attachment) and ahankar (ego) and adoption of the five virtues: Sat (truth), daya (compassion), santosh (contentment), namrata (humility) and pyare (love). The paper further illustrates that leading a life that is guided by simple living and high thinking and working towards the establishment of a new world order with “Fatherhood of God and Brotherhood of Man” with the awakening of intuitive capabilities by following the timeless sacred teachings provide a foundation for leaders and managers to face any challenge and to emerge triumphant. This paper presents an experiential framework and case studies that demonstrate how optimal and holistic management may be achieved by integrating eastern philosophy in corporate management practice. **P1**

**400 Global Consciousness For Sustainable Development?** Preeti Srivastava, Dr. M. K. Gatum, Reader, Dept. of Pedagogical Sciences, Faculty of Education, Dayalbagh Educational Institute, Dayalbagh, Agra <deipreetisrivastava@rediffmail.com> (Pedagogical Sciences, Faculty, DEI Dayalbagh Educational Institute, Agra India, Agra, U P India)

The overall goal of Education for Sustainable Development (ESD) is to integrate the values inherent in sustainable development into all aspects of learning to encourage changes in behaviour that allow for a more sustainable and just society for all. The basic vision of the ESD is a world where everyone has the opportunity to benefit from education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation. This translates into four objectives, to: Facilitate networking, linkages, exchange and interaction among stakeholders in ESD; Foster an increased quality of teaching and learning in education for sustainable development; Help countries make progress towards and attain Millennium Development Goals through ESD efforts; Provide countries with new opportunities to incorporate ESD into education reform efforts. To obtain this goal Global Consciousness is strongly required for whole mankind of this universe; otherwise our next generation will never forget us. Consciousness is the state of being conscious; awareness of one's own existence, sensations, thoughts, surroundings, etc. And the thoughts and feelings, collectively, of an individual or of an aggregate of people is the moral consciousness of a nation. Awareness of something for what it is; internal knowledge: consciousness of wrongdoing. Most of us are concerned about sustainable development suggest that meeting the needs of the future depends on how well we balance social, economic, and environmental objectives—or needs—when making decisions today. **P1**

## 6.10 Education

**401 Incultation of Higher Consciousness Through Education and Discipline** Dhun Aadhar, Aashiq Bommireddipalli; Swanti Devguptapu; Prem Sewak Sudhish <dhun@alumni.stanford.edu> (Dayalbagh Educational Institute, Agra, India)

It is a well-accepted fact that higher states of consciousness may be attained by meditation and spiritual practices and ashrams and monasteries the world over attempt to create an environment conducive to such attainment. However, most such institutions require the subject to be a recluse, keeping the benefits of higher conscious states outside the reach of common man with everyday responsibilities. In this paper, we present a model for holistic education with a disciplined lifestyle that not only ensures a seamless integration of valuable qualities in an individual's personality towards a successful life, but also paves the path for spiritual upliftment without having to forego ordinary responsibilities. It is argued that an educational system that trains young individuals to inculcate self-discipline and exposes them to some core areas that include the culture and theology in both the eastern and western traditions besides the regular courses of study would evolve well-rounded individuals with an inclusive approach who are more sensitive towards the environment and towards fellow beings, safeguarding not only their own progress but also that of others. The paper takes the Dayalbagh Educational Institute as a case study whose unique, innovative and comprehensive system of education has the mission objective of evolving a “Complete Man” who has a rare combination of the qualities of intellect, bravery, worldly wisdom and dignity of labor. The institute's exemplary model in bringing about intellectual, emotional, ethical and

spiritual integration in individuals who also become ideal candidates for acquiring higher states of consciousness is being replicated nationwide, not being limited by the geography or the social structure of the surroundings. These establishments are located far and wide, from deep tribal hinterlands of Rajaborari in Madhya Pradesh and interior rural expanses of Murar in Bihar and Melathiruvengadanathapuram in Tamil Nadu to modern urban centres such as New Delhi and Bengaluru. Efforts are also underway to establish similar institutions overseas. **P1**

**402 Values and Consciousness Among Teachers** Prerana Bhatnagar <preranabhatnagar75@gmail.com> (Psychology, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The present research is to find out the values and consciousness among university teachers. A sample of 100 university teachers age range from 35 to 45 years was taken out of which 50 were the males and 50 were females. The sample was selected randomly from a population of 200 university teachers of different universities and colleges of Agra city. To measure the values of teachers, 'Multiple Values Scale', constructed by Mona and Bhatnagar (2013) and to measure the Consciousness, 'Consciousness Quotient Inventory' by Brazdau (2013) was used. The data was analysed on the basis of Multiple Regression Analysis. Results showed that there is a positive relationship between consciousness and moral values ( $r = 0.25$ ), consciousness and spiritual values ( $r = 0.33$ ), consciousness and economic values ( $r = 0.16$ ), consciousness and family-prestige values ( $r = 0.12$ ), and consciousness and professional values ( $r = 0.04$ ), but there is the negative relationship between consciousness and social values ( $r = -0.22$ ). The results also showed that relative contribution of spiritual values (.10) are found to be more remarkable towards consciousness, as compared to moral values, economic values, family prestige values, social values and professional values. **P1**

**403 Consciousness in Relation to Transformational and Conscious Leadership** Vaibhav Chauhan, Prof. Nandita Satsangee <vaibhav.vps.chauhan@gmail.com> (Foundations of Education, Faculty of Education, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Almost every kind of change, be it globalization, technological advancement, social, political or economic transformation, affects a nation's education system directly or indirectly. To engage and respond creatively to the challenges of our time, leaders need to be more emotionally intelligent, and they must have skills necessary for coping up with rapid change, uncertainty, complexity, to deal with paradox, ambiguity and conflicting polarities. They will need to combine discipline and empathy and trust the wisdom of their intuition. Consciousness is a very broad and comprehensive term. It has been studied and researched in various fields such as neuroscience, physics, medical science, and education. Focusing on the importance of individual and collective consciousness of leaders, Carter (2009) states that, "Consciousness begins with the self and self-awareness. Awareness flows into every part of work life and is fundamental to leadership effectiveness. Many challenges faced by the leaders in the 21st century demand profound levels of individual and collective awareness". Leadership until now has been studied in many styles and forms. But in recent times transformational leadership is evolving as a more humanistic and conscious form of leadership. According to Burns (1978), Transformational leadership is a process in which leaders try to raise the consciousness of followers by appealing to higher ideals and moral values. Riaz (2012) studied "Spirituality & Transformational Leadership in Education" and found that "If school leaders incorporate a spiritual dimension into their practice then they would become better leaders". The current paper take a step forward to seek the answers of some questions such as: What does "conscious leadership" mean? Does transformational leadership in a conscious leader gives rise to conscious leadership? And how can the component of conscious leadership be introduced in the curriculum of teacher education? **P1**

**404 Developing Behavioral Strategies to Improve Consciousness Using Fuzzy Cognitive Map (FCM) for Mental Tendencies** Sant Kumar Gaur, Prof. D. S. Mishra <santfoedei@gmail.com> (Mechanical Engineering, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Science shows that our planet has evolved through complex, mysterious and dynamic network of interdependencies. However, in spite of all complexities, harmonious living had been the

hallmark of the human existence. We have sustained all the earlier threats to our existence because of our awareness and understanding about the delicate flow of interactions that continuously tones up our emotions. We act because we communicate. It is all about communication whether silent, electronic, written, vocal or otherwise. Persons communicate, societies communicate, nations communicate. Communication drives the wheel of all sentient entities and gives rise to thoughtful process and consequent actions. A complete flawless communication in a controlled manner can save our earth from disaster. However this happens because of our mental tendencies and the degree of consciousness in us. To save humanity from disaster, to bring peace and happiness and a better world order it is necessary that strategies be evolved to improve identified mental tendencies so that consciousness among individuals in general is improved. It is only then that people and nations would take a wiser step towards achieving universal brotherhood. Authors have tried to identify several key mental tendencies and have developed their Fuzzy Cognitive Map (FCM) to achieve consciousness for peaceful coexistence. Various scenarios and their strategic transitions have been studied and analyzed. It has been proved that even in the presence of some negative tendencies at some lower degree, one can improve the level of consciousness to some extent by improving targeted positive tendencies. **P1**

### **405 Importance and Benefits of Value Based Education in the Today's World: Dayalbagh Gagandeep Nigam, Sudhagilroy <gagandeepnigam@yahoo.com> (DEI, Agra, India)**

Value based education helps in developing an individual who is really fit to live in the society at large. Value based education is applied at a place called "Dayalbagh Educational Institute" where students from school to the college level are aware about their total development which is to bring about physical, intellectual, emotional and ethical integration of an individual with a view to evolving a complete man who possesses the basic values of humanism, secularism and democracy and who is capable of giving a fuller response to social and environmental challenges. This paper will be flashing on why the students should focus on the role of service to mankind and to generate consciousness of democratic values and freedoms which a citizens of India should be prepared to defend; to promote respect for the rights of others and an awareness of one's duties and obligations to the society; to enable students to build a strong character and attain high ethical standards. Value based education is a part of D.E.I. education policy. The perfect education that is value based education leading to good moral values in an individual leads a person towards collective consciousness who becomes fit to gain intuitive consciousness. **P1**

### **406 Enhancing Consciousness of Library Going Children Through a Multi-Media Intervention Programme Sarla Paul, Prof. Nandita Satsangee, Ms Gagan Deep Nigam <pprof.sarlapaul@gmail.com> (Foundations of Education, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)**

Consciousness is the quality or state of being aware of an external object or something within oneself. It is generally regarded as a developed state of consciousness in which attention is improved and refined and aspects of mind i.e. thought and perception are enhanced. Revered Prof. Prem Saran Satsangi Sahab explained Consciousness as awareness at three levels- physical, mental and spiritual. ? At physical level- consciousness of information received through sense organs and the brain (measured by scientists) ? At mental Level ? in the form of cognition (which psychologists decipher) ? At spiritual Level -pure spiritual consciousness (which philosophers try to surmise). In recent years, consciousness has become a significant topic of research in psychology and neuroscience. The purpose of developing consciousness is to develop in every child his/her creativity, intelligence, logical and intuitive powers in short, his potentiality to the fullest aiming at both personal fulfilment and a positive change in the society. To explore the development of consciousness among children a purposive sample of children visiting a community library were taken up for a quasi- experimental study based on a single group pre-test post-test design. Objectives of the Study 1. To study the effect of a self-made intervention program (Intervention Program on Enhancing Consciousness-IPEC) on consciousness of library going children. 2. To study the effect of the Intervention Program (IPEC) on the six dimensions consciousness of library going children. Test used in the Study A self ?made test on consciousness was used in the present

study. It consisted of the following six dimensions ? Personal Health Awareness ? Environmental Awareness ? Social Values ? Emotional Sensibility ? Higher Values(Moral & Spiritual) ? Community Service Intervention Programme A comprehensive computer-based intervention programme was designed covering all the six dimensions of the test of consciousness. It was shown to library going children with necessary explanations and discussions. The whole programme was of ten days duration with one hour each day. Findings 1. Mean Values of scores on the test of consciousness before and after the Intervention Program showed a significant increase . It was found that the difference between the pre-test and post-test scores was statistically significant at 0.01 level. 2. The dimension- wise scores were also calculated. The differences between the pre-test and post-test scores in the six dimensions of consciousness revealed significant differences in almost all the dimensions. It was highest in Community Service. Conclusion of the Study 1. Technology-based interactive Intervention Programmes comprising of various dimensions of consciousness can contribute significantly in the raising the level of consciousness among children in their formative years. Further details of the findings will be discussed in the full paper. **P1**

**407 A Study of The Intuitive Abilities of Students in Holistic and Non- Holistic Systems of Learning** Nandita Satsangee, (1) Sapna, (2) Soami Piara Satsangee,(3) Sarla Paul and (4)Shabd Roop Satsangi <nanditasatsangee@gmail.com> (Foundations of Education, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Intuition becomes increasingly valuable in the new information society precisely because there is so much data. – John Naisbitt Intuition is being increasingly recognized by psychologists and philosophers as an important epistemological subject – a parallel system of knowing without the use of sensory inputs or rational thought processes. Neurologists call it right brain thinking; philosophers and transcendental psychologists call it the non-dual mode of knowing. Intuitive knowledge has been characterized as being more holistic, versatile and faster than the rational mode of knowing and also more suited to complex situations. A significant development in the field is the evidence that intuition is not simply an inborn ability but can be learnt and developed through conscious efforts. These realizations have resulted in the introduction of a number of courses on intuition in professional training of managers, doctors, nurses, etc. Based on these developments it was premised in the present study that intuitive abilities could also be developed in general educational settings provided the right kinds of input are made available. To test the hypothesis two contrasting systems of education being followed in two universities were identified – the holistic and the non-holistic. The holistic system was identified at the Dayalbagh Educational Institute and a relatively non-holistic system was identified at the B.R.Ambedkar University both being located in the same city, Agra. The former had a proclaimed mission of developing ‘the complete man’ by an integrated development of the cognitive, affective, social and spiritual domains. The curriculum was also correspondingly designed to incorporate core courses cutting across disciplines including cultural education, comparative study of religion, co-curricular activities, work experience, rural development, etc. The non- holistic system was largely focused on academics. The study was designed as an ex-post facto, causal-comparative research. A purposive sample of 160 students in the final year of the undergraduate course was selected from both the universities. To measure the intuitive abilities of students in both the groups a self-constructed Likert-type five- point rating scale (based on the current emphasis on first person subjective data in research) was used. Content validity of the tool was ascertained through expert opinion and the reliability was checked through the split-half method using product moment correlation. The mean scores on intuitive abilities of the holistic and non- holistic system respondents were found to be 102.56 and 95.16 respectively. The t-test was used to compute the significance of difference between the two means. A t-value of 2.84 evidenced a statistically significant difference at .01 level of significance. The study indicates a highly significant role of the educational system in developing intuitive abilities among the learners. In order to equip the learners with a powerful epistemological tool of acquiring judicious knowledge the holistic system of education of the type described in the paper needs to be provided. **P1**

**408 Invoking Higher Levels of Consciousness: A Survey on the Relevance of Total Quality Management Framework of Dayalbagh Educational Institute's Education Policy** Purnima Sethi, Ankur Gupta; Arsh Josan; Ankita Mathur <sethi.purnima@gmail.com> (Physics and Computer Science, DEI Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Over the years, the extraordinary and thought-provoking educational approach of Total Quality Management (TQM) has been a fundamental part of Dayalbagh Educational Institute (D.E.I). The D.E.I Education policy is an innovative, comprehensive and flexible higher and technical education policy with the mission objective of evolving a "Complete Man" (Total Quality Person), which conforms to the concept of Total Quality Management and is geared for transformation of India to a knowledge society. We were motivated to study and investigate the performance of students who have studied in D.E.I and its various distance education centers and gauge their performance in all dimensions of society. We conducted a survey on a set of 50 subjects half of which were D.E.I alumni while the rest had graduated from other reputed institutes of the country. We asked their colleagues to rate their performance on the basis of several parameters. All the participants were given customized questionnaires specially designed to measure the subject's participation in social, community and national issues exercised in different situations in life, their contribution to community engagement through research, teaching and outreach programs and their behavior towards them. We observed from the analysis of the survey conducted that D.E.I alumni strived to impart enhanced co-worker support, contribution to community partnership, enhancing civic awareness and sense of responsibility as compared to the other half of the group. We also conducted a survey on the students currently studying in various undergraduate and post graduate courses at the Institute to learn about their personal opinion and experiences pertaining to the different facets of TQM implemented as part of their curriculum at the Institute and also to study the first person report of their Intuitive consciousness. We observed that different educational activities lead to not only academic objectives but also inculcate moral and spiritual values and develop social sensibilities among the students. High performance standards, fundamentals and continuous assessment in the educational system lead to "Quality". The educational system enables the student to imbibe basic human values, sound ethical and moral principles and a spirit of tolerance and respect for the religious faiths and beliefs of others. It inculcates dignity of labour, discipline, hard work, selfless service, cooperation, humility and a spirit of brotherhood of man. Biggest attraction for anybody to study in Dayalbagh educational institution is the opportunity to inculcate higher level ability of intuitive consciousness which can guide one's judgment to transverse an optimal path in life. **P1**

**409 Integrated Science of Consciousness for the Treatment of Depression: Healing with Chakra Energy Level** Ashima Srivastava, Tanuja Shrivastava, M.Phil Psychology, DEI <ashima710@gmail.com> (Department of Psychology, DEI, Saran Ashram Hospital, Dayalbagh, Agra, Agra, Uttar Pradesh India)

Consciousness is the seed of all creation and is a multifaceted puzzle. Consciousness involves thought, sensation, perceptions, moods, emotions, dreams and an awareness of self. Self consciousness is associated with the mind and higher consciousness experience is beyond the realms of mind and can only be experienced by the spirit. The third eye (pineal gland) is a portal through which consciousness can be expanded through focused attention or meditation. Consciousness at every step involves increase of knowledge, intelligence, power, perception and wisdom. In everyday consciousness, the attention current is outwardly disposed, though meditation. Consciousness is beyond body, mind and experiences and is mystical. The normal constant flow of energy among the body mind and spirit is disrupted due to any genetic biochemical, environmental, psycho-social or economic factors which may result of symptoms of mood disorder. The present study is a model of bio psycho-social view for the treatment of depression patient research and practice that include the emotional pain of the patients. Healing technique was used as a therapy for six months of intervention. The modern research shows that the quality of consciousness depends on the quality of the brain. All mind power comes from the brain that is developed to its highest potential. The human body has seven chakras are dimensional portals within the subtle bodies which take in a process energy of a higher vibrational nature so that it may be properly



assimilated and use to transform the physical body. Each chakra has 'seed sound', these seed sounds are the symbolic representations of the energy pattern of each chakra and hold its essence. In the end of the study, psychological discussion of healing technique with pre and post design were used and found that high scored depression patient were relaxed and having peace or calm state of mind and after six month of intervention plan, patients lived normal life with positive result. Dr. Ashima Srivastava, Counselor and Psychologist at Saran Ashram, Faculty of Dayalbagh Educational Institute, Dayalbagh, Agra. Email id-ashima710@gmail.com Tanuja Shrivastava, student of M.A. Psychology, Dayalbagh Educational Institute, Dayalbagh, Agra. Email id-tanujashrivastava23@gmail.com **P1**

## 6.11 Miscellaneous

**410 Parallel Learning, Black-Body Radiation and the Helping Problem** Jeffrey Beck <vortex.beck@gmail.com> (Paradigm Research LLC, Gunnison, UT)

The Helping Problem seems to be the hard problem of consciousness in-between individuals and societies. How do you help another without interfering with their autonomous development? Parallel learning gives another way of looking at the Helping Problem and a personal optimization strategy that we can follow throughout our lives. It is presented here in the interest of enhancing the long-term survival prospects of human life and conscious intelligence on this planet. It is also an attempt to convey a framework within which to study consciousness in general. The idea of a meta-paradigm and hierarchical paradigms is introduced in an attempt to define a space capable of containing the known, the unknown, and the unknowable in a coherent manner. Parallel processes deal with unknowable information, at least relative to direct conscious access, and it will be important to understand these processes if we hope to understand how consciousness arises. My solution to the Helping Problem comes from personal experience with, and interpretation of, what is generally conveyed by the words parallel learning, imprinting, empathetic resonance, and transference. I have become increasingly aware over my own lifetime that there is more information available to me, consciously, than what I have taken in, consciously, apparently through parallel learning processes. These processes appear symmetrical with what is known as black-body radiation in the physical realm, except that they are playing out in the realm of information. This raises an interesting question as to how far that symmetry extends. Since black-body radiation requires quantum effects in order to understand it, will we need a quantum consciousness model in order to fully understand parallel information transfer? My experience with the Helping Problem also points to the need for further research into how the sympathetic and parasympathetic nervous systems regulate the development of consciousness within individuals. All of this is framed within a Controls Engineering view of the world, with conscious development driven by adaptation and survival to reproduction as the basis for its existence. **P2**

**411 Eco-villages and Sustainable Practices Lead to Higher Levels of Consciousness and a Better World Order** Prem Aarati Cohly, Kamini D. Cohly; Prem P. Cohly <ac4096@nyu.edu> (International Relations, Dayalbagh Educational Institute, NY Center, New York, New York)

Better world order leads to high levels of spiritual consciousness. In the Proceedings of the Joint International Conference on Applied Systems Research and XXXIII National Systems Conference (ASR-NSC 2009) better world order is defined as: "A world which consists of a system formed in spiritual light, aims at providing equal opportunities for highest development of all aspects (physical, mental, emotional, social and spiritual) of human race" (489). Ego, temptation, greed, and selfishness can create obstacles in obtaining a better world order, and as a result can negatively effect spiritual consciousness. These obstacles can be overcome by fostering environments that encourage this virtue through exemplary lifestyles. Sustainability is an important facet of better worldliness. According to the United States Environmental Protection Agency, "Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations." By definition, the concept of sustainability acknowledges that the human species is responsible for having negative effects on the environment. Climate change and poor agriculture

are examples of unsustainable practices. Negligence and carelessness has spiritual consequences such as a disconnection between the spirit and the Supreme Being, and the deprivation of spirituality; but through eco-villages, the spirit and environment can coexist in harmony. According to ASR-NSC 2009, "Eco-farming is a self-sustaining, low input economically viable small farming system managed to maximize production without causing large or long term changes to the environment and being ethically or aesthetically acceptable" (138). The Dayalbagh eco-village is two kilometers away from the city of Agra, in Northern India. In the past decades, the industrialization of farms has caused several issues, such as heavy use of fossil fuels, poor soil health, a large decrease in biodiversity, pollution of water and air, the consequences of heavy pesticide use on human health and the environment, and so on. Dayalbagh's eco-village addresses the problems of industrial farming by using natural and organic techniques like intercropping and crop rotations of cereal crops with legume crops, in order to ensure that the soil remains nutritious. Through crop variability, Dayalbagh is able to provide healthy and diverse food to the community, while also sustaining the environment and creating an environment where spirituality thrives. In addition, Dayalbagh addresses the issue of climate change through its conservation practices, as well as use of renewable energy. Climate change is responsible for the unprecedented amount the atmosphere and ocean have been warmed, the rising of the sea level, and the concentration of greenhouse gases in the atmosphere. In Dayalbagh, there are limits to the amount of electricity that can be used by individual households; air conditioners and TV are also prohibited, ensuring that the maximum amount of energy is conserved. Solar panels located on the roofs of the community's university and Prayer Hall feed electricity to the respective buildings and homes in the community. Through conservation practices and renewable energy, Dayalbagh has significantly decreased its carbon footprint on the world. **P1**

**412 Culture, Environment and its Impact on Development of Values and Consciousness**  
Gurpyari Prakash, Dr. Ranjeet Kaur Satsangi <gurupyari.prakash@gmail.com> (Agra, Uttar Pradesh India)

The study and understanding of human behaviour has posed a strong challenge to both scientific thinkers as well as behaviourists. Science has always been involved in the 'cause' and 'effect' phenomenon and the relationship between them as to how a 'cause' causes its 'effect'. Similarly, the behaviour scientists want to find out why people behave the way they do. While the behaviour is a reaction to situations and the type of reaction is based upon some inherited and some learned behavioural characteristics, the environment is an important catalyst in determining such type of reactions. If the environment is complementary, the values, personality and attributes will develop in a positive direction but if the environment is not rich then they may potentially take a different direction. Values generally identify a person's moral structure on which the concept of good or bad and right or wrong is based. Values indicate behaviour pattern and while they do not necessarily and accurately predict behaviour, when behaviour occurs, it is likely to be in line with the values one holds. Consciousness is defined as 'awareness' – awareness of everything that is happening around us. In a secular context higher consciousness is usually associated with exceptional control over one's mind and will, intellectual enlightenment and profound personal growth. In a spiritual context, it may also be associated with transcendence, spiritual enlightenment and union with divine. The value system as well as consciousness have a strong linkage to the cultural environment in which the individual is brought up. This study is an attempt to highlight the importance and significance of both culture and environment produced by that culture in the development of values and consciousness. The study was carried out on adolescents and youth belonging to different cultures and environments. It was observed that those living in modern and materialistically inclined Indian culture and environment were found high in power values, economical value, hedonistic value and rated low in religious value, family prestige value, social value etc. Their level of consciousness was average. Others belonging to a religious cultural group brought up in a warm, healthy, pure and ethnic environment possessed high religious, moral, aesthetic and social values. Their level of consciousness was found to be contrastingly high. Dignity of labour and hard work was very high in them, in comparison to the other group which showed helplessness in the absence of television, air-conditioner, cell phone and the internet etc. Interestingly, partici-

pants from the same religious culture but living in materialistically inclined environment showed consciousness which was somewhere in between the other two groups. The study concludes with highlighting the effect of both Culture as well as Environment on individuals, showing that they have a strong bearing on their Value system as well as Consciousness levels. **P1**

**413 Improvisation, Intersubjectivity, and The Hard Problem of Consciousness: A Nondual, Integral Perspective** Ed Sarath <sarahara@umich.edu> (Department of Jazz and Contemp, University of Michigan, Department of Jazz and Contemporary Improvisation, Ann Arbor, MI)

What might improvisation have to offer our understanding of consciousness, and particularly the resolution of the long-daunting “hard problem”? Informed by my new book, *Improvisation, Creativity, and Consciousness: Jazz as Integral Template for Music, Education, and Society* (SUNY, 2013), this talk responds to this question through the lens of an emergent worldview called Integral Theory (IT), which brings a uniquely broad perspective to the analysis. From a first-person vantage point, IT illuminates the inner mechanics that underlie the transcendent experience commonly associated with peak improvised performance, where performers experience heightened self-awareness, presence, mind-body integration, and interactive capabilities. From a second-person, intersubjective vantage point that straddles first-person terrain, the heightened experience of oneness between performers, listeners, and environment often reported comes into view. At which point a question essential to our understanding of consciousness, with direct ramifications on the question of the hard problem, assumes center stage: Is this manifestation of intersubjectivity epiphenomenal to the psychophysiological activity of each individual participant, or might it be more aptly understood as a primordial phenomenon out of which intersubjective consciousness is a localized manifestation? Integral Theory allows us to view intersubjectivity from both perspectives due to its grounding in a nondual account of consciousness and reality that is informed by a wide range of wisdom traditions. A central premise is that individual consciousness is inextricably linked to the cosmic wholeness, there is ultimately no divide between subjectivity and objectivity in the broader spectrum of reality. Intersubjectivity can thus be seen as both epiphenomenal to individual consciousness and also as a stratum of cosmic wholeness from which individuality stems. From this perspective, the hard problem, how does consciousness emerge from a physical substrate? – may be seen as rooted in a faulty premise, for the primacy of consciousness, not matter, is a cornerstone of the nondual vision. The talk closes with reflections on the importance of the arts, working in tandem with science and spiritual perspectives, as an essential facet in the quest to understand consciousness. **P1**

**414 The Nature of Consciousness as Illuminated by the Experience of Wealth** Peter White <p.white@att.net> (Choteau, MT)

The experience of having great wealth is distinct. The consciousness of wealthy individuals and families is deeply influenced by wealth as a phenomenon in all of the four basic existential perspectives: psycho-spiritual, cultural, societal-systemic, and physical. I have spent 30 years working with wealthy people on the qualitative aspects of wealth: i.e., not how much wealth one has or wants but how attitudes about wealth and choices made in the context of wealth influence psychological and spiritual development and quality of life. A common phenomenology of wealth can be depicted and understood, with prudent caveats about generalizing. The presentation will describe the experience of wealth and suggest ways it can inform our understanding of consciousness. The presentation will involve three stories about American families of great intergenerational wealth. It will begin with a brief description of my own background, in which I obtained conventional success as a lawyer but did not find meaning. I left the law in the early 1980s and found my way somewhat inadvertently into the arcane world of wealth. My personal and professional experience gave me an ability to understand and empathize with those who were struggling to find meaning in the context of great material abundance. The first of the three cases involves a family whose wealth was created by a man who grew up on a dirt farm during the dust bowl years of the Great Depression. He served in World War Two and returned home with a fierce commitment to keeping his family out of poverty. In the ensuing four decades he built a business empire worth billions. He retired, more or less, in the early 1980s, and his very capable adult children ran the businesses

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as successfully as their father had. He called me in the mid-1980s to say he wanted to find someone or something to take care of his young-adult grandchildren, who were, in his exact words, “all idiots.” The focal point of this story will be on the psycho-spiritual perspective of consciousness. This engagement didn’t end well, as I will relate. However, what came out of it was the creation of a successful program for young-adult members of wealthy families, whose theme was finding meaning in abundance through the formation of true community. I shall describe the program and talk about some its participants; the focal point will be the influence of culture on experience. The third story is a composite of several clients who have turned their concentration from hoarding and seeking more wealth to individual and family-wide programs of service to the poor and philanthropy. The focal point of the story will be the effect of “doing” on the consciousness of those in service. Last, there will be a discussion about what the experience of wealth teaches about the nature of consciousness. Does consciousness exist in the brain alone? How does consciousness limit the capacity to perceive? How do capacities such as love develop in consciousness? Does consciousness evolve as well as develop? Is free will possible? **P1**



# TSC 2014 East-West Forum Vision Talk Abstracts

## **Consciousness: An Integrative Systems Modelling Approach**

*Prem Saran Satsangi, Chairman, Advisory Committee on Education  
Dayalbagh Educational Institutions, Dayalbagh, Agra, India*

**“If you want to understand the really interesting things about what the mind does, ranging from perception to language to consciousness, you have to build models”**

*Paul Thagard, Professor of Philosophy and Director  
Cognitive Science Program at University of Waterloo.*

There is a growing trend toward interdisciplinary investigation, as evidenced by the emergence of cognitive science and neuro-science as coherent fields [The Cambridge Handbook of Consciousness, 2007]. Another prominent contribution is the development of neuro-imaging techniques - including, electro-magnetic, physiological methods such as Magneto-Encephalo-Graphy (MEG), and functional Magnetic Resonance Imaging (fMRI), which make it possible to treat consciousness in a rigorous and scientifically respectable fashion. With the currently considerable interest in exploring the neural-correlates of consciousness, there is also a growing realization that it will not be possible to make serious headway in understanding consciousness without confronting the issue of how to acquire more precise descriptive first person reports about subjective experience [The Cambridge Handbook of Consciousness, 2007]. Hence, the emerging Gestalt or systems approach for integrating Eastern and Western Perspectives of consciousness.

It is a truism that if we want to understand the hard and complex problem of consciousness, we need to build a model for it. Human brain is the most complicated machinery ever created by Nature. Seemingly unlikely sources such as fractals and internet communication have provided novel clues for understanding neuronal networks. However, externalized information is only as useful as its accessibility. Currently existing best-available search engines, such as Google and Yahoo, are very inefficient compared to the brain's search strategies to retrieve episodic information because neuronal networks utilize fundamentally different strategies for reconstruction of events and stories from fragments than do search-engines [Gyorgy Buzsaki : Rhythms of the Brain, Oxford, 2006]. Accordingly, [Chris Eliasmith : How to Build a Brain, A Neural Architecture for Biological Cognition, Oxford, 2013], one goal of researchers in neuro-science, psychology and artificial intelligence is to build theoretical models that are able to explain the flexibility and adaptiveness of biological systems. A special feature of the variety of wide-range of biologically constrained perceptual, cognitive and motor models illustrated in the foregoing book is that these models are not introduced as independent considerations of brain-functions by Eliasmith but instead integrated to give rise to what is currently perhaps the world's largest functional brain model consisting of 2.5 million neurons.

It is in somewhat similar strain that this vision talk purports to present consciousness from the twin integrative vantage points of Eastern phenomenological philosophy of Radhasoami faith (or Spiritual Philosophy of Eastern Saints) and Western Scientific Physical System Theory Modelling Framework.

## **A Science and Understanding of Consciousness: Bringing East and West Together**

*James J. Barrell, Department of Psychology  
University of West Georgia*

Eastern religious and philosophical systems and the scientific approaches and methodologies of the West can be integrated. To begin this integration, a subject matter that provides a common ground is needed. This common ground can be based on the exploration and understanding of direct human experience. Furthermore, the topic most relevant to our conscious evolution and survival on this planet is related to the questions of “Who am I?” and “What is my place in the universe?” Some pivotal dialectics that underpin systematic exploration of answers to these questions include 1) inner vs. outer viewpoints 2) alternative meanings of the self and 3) individuality vs. interconnectedness. East and West offer differing perspectives related to these areas. Through an *experiential approach and method* we can begin to see how these apparently different perspec-

tives can be integrated. From an Eastern perspective, the inner viewpoint is emphasized and self relates to a sense of *presence or higher self and interconnectedness*. Oneness forms the basis of reality. From a Western perspective, the outer viewpoint is emphasized and self is equated with a unique identity (as designated by one's name) as well as personal history and individuality. Within this Western perspective, separate identities are part of the nature and fabric of reality. However, from the perspective of *human experience*, both inner and outer viewpoints exist. An example would be the experience of being aware from an embodied inner viewpoint and the experience of being aware and observed by something Higher from an outer viewpoint. It is also clear that we can experience a concrete defined sense of ourselves in the world as well as a higher sense of self or presence. Finally, through being aware, we can experience ourselves as differentiated but not separate. Individuals then become interconnected and part of the whole. From a quantitative perspective one could measure how close or far one feels from oneness. Still another example could be a measure of the strength of clarity of one's self-boundaries in relation to others. Both qualitative and quantitative studies of the meaning of consciousness as well as specific aspects of consciousness such as those mentioned above can be effectively researched using both the qualitative and quantitative methods of an experiential approach that is outlined in our book *Inner Experience and Neuroscience* (Price and Barrell, 2012, MIT Press). Integration of the systems of the East and methodologies of the West are possible when we base our research on a common ground, that is, a science of human experience.

### **From Quantum Biology to Quantum Consciousness to Quantum Psychiatry**

*Jack A. Tuszynski, Department of Physics  
University of Alberta, Edmonton, Alberta, Canada*

In this talk I will provide a brief overview of the state-of-the art in quantum biology, an area that has been making great progress as a result of very precise measurements, especially regarding photosynthesis. This also includes properties of metabolic processes across biological species. Allometric scaling laws can be clearly explained in terms of quantum statistics. Since metabolism is a distinguishing feature of living systems, I believe it has major implications for cognition as consciousness and cognition are limited to living systems. A connection between quantum biology and quantum consciousness is in my opinion still lacking and I will elaborate on how it can be implemented making theories such as OrchOR more realistic and experimentally testable if metabolic (non-equilibrium) features are included as prerequisites. Finally, in parallel, there has been interesting development in a new area where quantum physics impacts life sciences, namely in psychiatry. I will conclude my talk with a discussion about a potential for revolutionizing psychiatry by adopting advanced concepts in quantum theory, such as second quantization, q-Bosons and q-deformed algebras.

### **The Metaphysics of Consciousness: Eastern and Western Perspectives**

*Rocco J. Gennaro, Professor and Chair, Philosophy Department  
University of Southern Indiana*

I explore some of the major background metaphysical issues involved in understanding the nature of consciousness, such as the traditional division between dualists and materialists, the debate between realists and idealists, and the prospects for solving the so-called "hard problem" of consciousness. Some of the differences in question often mirror the traditional differences between Western and Eastern perspectives on the nature of consciousness. Overall, I argue that some form of realism and physicalism is more plausible than the opposing views.

### **Descartes's Cogito, Ergo Sum in the light of Hintikka's Performatory Interpretation**

*Paavo Pylkkänen, University of Helsinki, Finland  
and University of Skövde, Sweden*

Descartes's dictum cogito, ergo sum ("I think, therefore I am") is perhaps the best known sentence in Western philosophy. Yet its validity and relevance has been subject to numerous discussions. One of the most interesting of these was originated by Jaakko Hintikka's 1962 article



“Cogito, Ergo Sum: Inference or Performance?” He suggested that there are several different arguments compressed into the formulation cogito, ergo sum which Descartes does not clearly distinguish from each other. The dictum can be seen as a logical inference. But it can also be seen as a performance, in the sense that when someone utters “I exist” this utterance has a self-verifying character. In this talk I will briefly present these different interpretations and the discussion they have given arise to. It is hoped that a better understanding of a central issue in the history of Western philosophy will suggest points of contact and comparisons with relevant counterparts Eastern philosophy.

### References

Apel, K.-O. (2006) “Speculative-Hermeneutic Remarks on Hintikka’s Performatory Interpretation of Descartes’ Cogito, Ergo Sum”, in R. Auxier and L.E. Hahn eds., *The Philosophy of Jaakko Hintikka The Library of Living Philosophers, Volume XXX. La Salle: Open Court.* Hintikka, J. (1962) “Cogito, ergo sum: Inference or Performance?” *The Philosophical Review* 71, no. 1, (1962): 3-32.

## TSC 2014 Oral Presentations

### F12 Impact of Yoga and Meditation on Jungian Personality Types with Respect to the Concerned Dimensions of Consciousness (Prem Pyari Dayal, Anoop Srivastava)

Relating personality with behaviour is quite common in psychology. Assessments of personality types using reliable tests are known to provide insights into behaviour patterns of the concerned individuals to quite an extent. Attempts have been made by researchers in the past to discern changes in personality types due to interventions like Yoga practice (Dayal and Agarwal, 2013). Effect of Yoga and meditation on different dimensions of consciousness has also been studied in the past (Ahuja, 2013). This paper attempts to carry forward research in the same context by relating the changes in the relevant personality types with respect to the changes in the concerned dimensions of consciousness as a result of yoga practice and meditation.

The researchers have relied on measurements of Jungian personality types of control and experimental subjects by administering Myers-Briggs Type Indicator (MBTI) Test. Consciousness Quotients as well as scores of the subjects on different dimensions of consciousness have been obtained by administering ‘Consciousness Quotient Inventory’ (CQI) developed by Brazdau (2012). The conclusions have been arrived at after applying suitable statistical techniques to analyze the results obtained.

### F16 The Five Koshas of Consciousness and their Karma Correlates (Vineeta Mathur)

According to yoga, individual consciousness is a partial expression of cosmic consciousness. Human consciousness is encased in five koshas (sheaths) namely the annamaya kosha, pranmaya kosha, manomaya kosha, vijñanamaya kosha, and anandmaya kosha around the central point containing the chitta or self. This study is an investigation of the hierarchical order in which the five Sheaths exist according to Eastern Traditions. The study also hypothesizes that karma of humans can be graded based on the fact that a mental state becomes conscious when a suitable Higher Order Thought is directed at the mental state.

A study was conducted with 110 participants to observe the five koshas (sheaths) and the karma of participants. Participants of the study were of two age groups : 46 to 65 years and 25 to 45 years old. The participants were given standardized questionnaires specially designed to measure thoughts (karmas) of religiosity, intuitiveness, empathy, duty and attachment and observe their association with the sheaths viz. material (annamaya), vital (pranmaya), emotional (manomaya), intellectual (vijñanamaya) and blissful (anandmaya) sheaths. The answered questionnaires were scored, tabulated and variation in choices of individuals across the two different age groups was studied. The data from the two questionnaires was correlated using Pearson’s correlation technique. The results of correlation studies of the participants above 45 years showed significant positive correlation (0.521) between intuitiveness and the vijñanamaya kosha of knowledge. So it could be said that intuition comes from the vijñanamaya kosha and becomes more powerful with

age. Significant positive correlation is seen between empathy and manomaya kosha for the higher age group(0.664) and lower age group (0.414), indicating that emotions arise from the manomaya kosha. Positive correlation is also seen (0.281) between attachment karma and the material annamaya kosha or the physical body for the participants under 45 years. Factor analysis was carried out using SPSS software for data collected for both age groups. The analysis identified four factors which were attributed to spiritual, cognitive, neural and environmental correlates of consciousness. On the basis of the results, a hierarchical order of the five sheaths constituting the human being was hypothesized.

### **F22 Mystical Experiences and Pure Consciousness Events (Sona Ahuja)**

Mind-wandering makes the human mind an enormously complex stew of thoughts, feelings, sensations, desires, pains, drives and daydreams. To understand consciousness, primary move is to clear away as much of the internal clutter and noise as possible. Mystics precisely do that through techniques like contemplation or meditation. Regular and long-term meditation leads to a stage when one can experience time of inner stillness—one becomes utterly silent inside, analogous to a gap between thoughts. Advanced meditators sequentially experience dualistic and unitive mystical state giving rise to shift in epistemological structure in the form of two quantum leaps. Gradually cathexis intensity decreases and consciousness increases leading to pure consciousness events. Researchers have debated over this stage of mystical experience. The present study discusses the issues addressed and the convergence of ideas in the light of Universal Consciousness Realization Postulate.

### **F25 A Study of Personality Type and Meditational Practice (Renu Sahni, Sudhir Sahni)**

This study explores whether a person's personality type determines his interest and inclination towards practicing meditation. The study was conducted on a group of initiates of a religious community in Agra, India. Their personality type was analyzed using a test based on Carl Jung's classification of personality types (Socionics). Interest in meditational practices was evaluated based on a person's frequency and duration of meditation, attendance in prayer meetings (Satsang) of the Guru (Adept), physical proximity with the Guru during such sessions, desire to perform community service in farms (Seva), etc.

Analysis of data showed that the members of the group were predominantly Sensing, Rational and Ethical types, and their predominant attitude was Introversion. As compared to Extroverts, Introverts had a higher frequency and duration of meditation, greater interest in attending morning and evening Satsang, and sat closer to the Guru. However, Extroverts showed a greater inclination towards working in farms. Thinking Types had a higher frequency of attending Satsang and performing Seva as compared to the Feeling Types.

The relationship between Personality and Meditation is bidirectional. While a certain type of personality will be more inclined towards performing meditational practices, the practice itself can modify the intuitive consciousness of the practitioner. It is the consciousness of spirit, which is the true self that propels any action of mind, brain and body. This study raises a lot of questions for which answers lie in the domain of inter-disciplinary research.

### **F27 Musical Consciousness Test based on Indian Classical Rāgas (Pritam Pyari, Saran Pyari Roy, Sukhdev Roy)**

There is a profound impact of music on our consciousness. In the Classical Indian Music tradition, music is the means to enlightenment. Eastern spiritual traditions that describe Shabda (internal sound currents) and Anhad Nada (unstruck music) as the very nature of the spirit and consciousness and which sustains the entire creation, have inspired Indian music in the form of Ragas (musical compositions) and the various percussion, string and wind instruments. The Sanskrit word Raga uses a series of five or more musical notes upon which a melody is constructed. It is defined as 'the act of colouring or dyeing' (the mind and mood / emotions in this context) and therefore metaphorically means 'any feeling or passion'. Renowned musicians and yoga practitioners have identified different Ragas that have an impact on different Chakras or energy

centres as each Chakra is associated with a seed syllable, color and number of petals or currents emanating from them. The healing effect of Ragas has also been well established.

In this paper, we report the results of a pilot study undertaken to design a musical test to ascertain the consciousness level of an individual. Four 5 minute instrumental flute compositions of Alap form of Ragas, namely, *Ahir Bhairav*, *Jajaiwanti*, *Bhupali* and *Darbari* that affect the *Anahata* (heart), *Vishuddha* (throat), *Agnya* (third eye) and *Sahasrara* chakras respectively, were carefully chosen. A group of 52 old male and female experienced devotees (50-80 years) were made to listen to three Raga compositions pertaining to the upper three Chakras after evening prayers, whereas, a group of 250 college/university students to the three Ragas pertaining to the lower three Chakras in the evening. The order of the Ragas was not in the progressive order of the chakras. The responses were recorded through a questionnaire by noting their order of preference and the qualitative effect in terms of feelings, imagination, color perception etc. Majority of the older group members preferred *Bhupali*, followed by *Darbari*, whereas, the students' preference was for *Jajaiwanti* followed by *Ahir Bhairav*, indicating that the older groups' consciousness level was at the third eye and above, while that of the students was at the throat and the heart level. The subjective experience pertaining to the perception of feelings and colors in most of the individuals also corresponded to that attributed to the different Chakras.

The study highlights the impact of Ragas on the consciousness of an individual and the usefulness of designing musical consciousness tests to ascertain consciousness levels. A musical test can be invaluable for consciousness measurement and can also be subjected to illiterate individuals. It also overcomes the difficulty of getting honest responses through written psychometric questionnaires. The Ragas can be invaluable not only to measure but also to tune consciousness to higher levels. To the best of our knowledge the test is a first of its kind. The results of further ongoing tests being applied on a wider range of individuals will also be presented.

## **F29 Panpsychism's Quantum Burden (Jason Ford)**

Many panpsychists claim, as an advantage of their positions, that they can explain the measurement problem in quantum mechanics (claiming that the reason that an observation can collapse a quantum superposition of states into a single determinate state is because the very small scale furniture of the universe is itself conscious in some way). In this paper, I will focus on those panpsychical positions that are also intended to be consistent with claims about the nature of consciousness and the self, which the authors derive from the Vedic traditions of India (e.g. Chopra, Katafos and Tanzi). I argue that this "cure" for the measurement problem is actually worse than the original disease: it creates a puzzle that is at least as vexing as the original measurement problem; and it also requires the panpsychist to take several determinate stands on controversial aspects of quantum theory (such that the commitment to panpsychism winds up driving the physics).

## **F30 Correlational Study of Triguna Test with Myers-Briggs Type Indicator (MBTI) Test on University Students : Comparison of East-West Approach towards Consciousness (Shobha Bhasin, Gurdev Roy, Shagun Dayal, Sukhdev Roy)**

The Myers-Briggs Type Indicator (MBTI) assessment is a well-known standardized psychometric questionnaire designed to measure psychological preferences in how people perceive the world and make decisions. These preferences have been based on the typological theories proposed by Carl Gustav Jung. Jung theorized that there are four principal psychological functions by which we experience the world: sensation, intuition, feeling, and thinking. One of these four functions is dominant most of the time.

However, eastern spiritual traditions reveal that all manifestation in creation, whether animate or inanimate and the constitution of mind, constitutes three Gunas (Trigunas) that are inseparable and simultaneously existing qualities, namely Sattva (pure, luminous and free from sorrow, binds us with happiness and wisdom), Rajas (passion arising from desire and attachment binding the self with compulsive action), and Tamas (born of ignorance, deludes all creatures through indolence and inertia).

In this paper, an attempt has been made to identify the degree of correlation between these two approaches on consciousness states of University students. We considered the Vedic Personality

Inventory (VPI) developed by Wolf that had Cronbach  $\alpha > 0.90$ . The tests were conducted on 280 University science students in India. We found evidence of construct validity as manifest in theoretically expected correlations with conceptually similar and dissimilar measures. ESTJ and ISTJ accounted for the majority of personality types with a greater contrast between Sattva and Rajas in ESTJ compared to ISTJ. Satogun has a relatively high correlation with ESTJ. Rajogun has relatively high negative correlation with ESTJ. In comparison to the earlier tests conducted on 57 yoga practitioners in America, and reported at TSC-13, we found lower Sattva component in students, revealing the efficacy of yoga meditation on personality development.

The study highlights the importance of multidimensional tests and/or multiple measures of a construct for consciousness studies. Since most concepts and phenomena in spiritual and transpersonal psychologies are complex, unidimensional instruments that assess these constructs as a global entity may not suffice for most research purposes. The above study would be useful for psychometric and transpersonal oriented studies. Results of ongoing testing of a wider group of subjects will also be presented.

### **F31 Spiritually-Inspired Quantum Vibrational Theory of Consciousness and Qualia Dynamics (Sukhdev Roy)**

Eastern spiritual traditions envision sound vibrations as the manifestation of consciousness. From the Vedic scriptures to the exhaustive descriptions of the Sant Mat and the Radhasoami Faith, the divine sounds have been explained to sustain different spheres of creation. Human form, a perfect microcosm of the macrocosm is endowed with ganglia or chakras and nerve centres that are portals for communion with different states of the macrocosm, through resonance with different sound currents through yoga meditation. All sensory perception is by means of vibrations and resonance with the five *tanmatras* – subtle elements that have functional integrity with the five sensory organs, which allows us to perceive the external environment.

*Yoga Shastra* (knowledge), *Tantra-Mantra Shastra*, *Spanda Karikas* in *Kashmir Shaivism* and Patanjali's *Yoga Sutras* also reflect on the vibrational aspects and teach conscious non-operation of the vibrational modes (*vrittis*) of the mento-emotional energy (*citta*) to experience higher consciousness. *Vrittis* are the outer valence vibrational modes of the conscious mind, i.e., the distortions created from the impact of the exterior mental subtler vibrations from the environment.

In this paper, we consider the vibrational quantum nature of consciousness and propose the human being as a composite wavepacket endowed with intrinsic vibrational frequencies. We posit consciousness as primary vibrational pattern that is qualitatively different from the mind that can be likened to sub-tones. The knowing person is a composite of consciousness, mind and body, functioning as a reflective ratiocinative cognitive being. Embodied consciousness gets conditioned and mind-based manifesting in a variety of vibrational mental states, forms and modes. The degree of attention leads to flowing out of sensory vibrational currents to the object and we perceive qualia through resonance. Thoughts, feelings and actions emanate from the sensory inputs, internally generated imagery, memory, conscious and unconscious impressions and dispositions. Considering consciousness and qualia to have a non-local field character, focused attention leads to attachment that generates harmonics in the form of desires causing action, volition and thoughts, leaving traces in the mind in the form of vibrational patterns (*samskaras*) that fuel more thoughts. This results in qualia dynamics, i.e., transformation and generation of qualia through complex feedback loops of energy and information with the environment.

We consider consciousness to have a dynamic aspect associated with it with higher levels becoming subtler, more refulgent, with greater energy and frequency. The vibrating power of consciousness increases when lesser vibrations of the mind that include thoughts, patterns and attachments to ideas have faded. Applying the principle of conditional forward causation, we consider propensities as vibrational dispositions, with the spirit generating intention (impulse) to give rise to mental propensities that make us perform actions. We consider mind to predispose physical / physiological potentialities in a quantum-like manner. We also propose a spirit-mind uncertainty relation based on the analogy with Fourier transform theory, i.e., reducing the spread in mental domain by concentrating on a frequency specific mantra, leads to an expansion of awareness in the spiritual domain. The theory opens up prospects of explaining yoga, meditation, non-local parapsychological phenomena and healing.

### **33 Harmonic Analysis of the Sounds of the Religion of Saints** (Prakash Sahni, Pooja Sahni)

The Religion of Saints or Sant Mat prescribes Sound Practice or Surat Shabd Yoga as the means to attain Salvation. The spirit entity during the sound practices hears the following musical sounds: Percussion (Metallic Bell), Wind (Conch), Percussion (Membranes), Strings, Woodwinds (Flutes), Woodwinds (Snake Charmer's Instrument). The ones which occur in lower order in the list are of lower spiritual order. If we do a harmonic analysis of the instruments, we observe the following. The percussion instruments like bell, membranes are instruments which produce inharmonic overtones or musically dissonant intervals. Their spectrum is dense with tones which are not integrally related to the fundamental tone. The conch being a natural instrument also has a large number of geometries associated with it and produces inharmonic overtones. Ideal strings and woodwinds produce perfect harmonics. In practice there are some inharmonics present since strings are not perfectly flexible and pipes have a finite diameter. Depending on whether one end of the pipe is closed or not even harmonics may be absent from the woodwinds. Hence, we conclude that the instruments which have harmonics associated with musically consonant intervals are associated with the spiritual regions of higher order.

### **F45 Personal Consciousness and Conscious Leadership – Implications from an empirical study of Corporate Leaders** (Purnima Bhatnagar, Shalini Nigam, Rahul Caprihan, Prem Prashant)

The global business landscape is undergoing a transformation and the factors leading to success are changing at a rapid pace. Corporate leaders today face a complex world – organizations with global footprints; varied country regulations; a need to deliver on shareholder expectations, driving value to the customers responsibly.

At the core of every organization functioning are Values – “the operating principles or philosophies that guide an organization's internal conduct as well as relationship with its customers, partners and shareholders.” Values “establish the forms of conduct that will be rewarded or not tolerated,” and hence impact behaviour, personality and other aspects in the individual, relationship, organizational and community spheres of functioning. Given the environment in which people function, different values may be deemed important over a period of time, as well as across cultures and contexts.

In the present digital age when information technology is transforming the way business is conducted, conscious leadership is the need of the hour. This requires leaders to understand what their roles demand and ability to deliver on expectations. The paper posits qualities of conscious leaders, on the basis of a survey of more than 65 Senior Management from 62 organizations in India.

The study also seeks to leverage Richard Barrett's “Seven Levels of Personal Consciousness”, developed by extending concepts in Vedic science to elaborate Maslow's needs hierarchy into levels of personal consciousness. According to Barrett, “our perceived needs are in reality a reflection of our consciousness, and what we value, consciously or sub-consciously, is reflected in the levels of consciousness from which we operate”. This study is exploratory and is unique in being able to empirically capture changing values and leadership qualities in response to evolving global environment.

### **F50 Eastern Philosophy as the Basis for Western Perception of Consciousness: Bridging the Gap** (Arun Kumar Gupta, Nandita Gupta, Saatviki Gupta)

In this paper we attempt to bridge the gap in western understanding of consciousness that is based on experimental and medical evidence published in peer reviewed international journals, using eastern philosophy.

Extensive data published in international journals clearly show the anatomical as well as physiological changes in the brain brought about by the long term practice of meditation. The anatomical changes have been documented on MRI and functional MRI and include changes in gray matter in regions implicated in emotional regulation and response control that is, hippocampus, Orbito medial Pre Frontal Cortex and other cortical midline structures (changes include neurogenesis, axon sprouting, dendritic branching and synaptogenesis, changes in glial number

and morphology, angiogenesis). Changes in white matter include alteration in fiber organization in the form of axon branching, sprouting, packing density, axon diameter, fibre crossing, number of axons, myelination of unmyelinated axons, changes in myelin thickness and morphology, changes in astrocyte morphology or number, angiogenesis. Physiological changes are also demonstrable on EEG and MEG.

So far, scientists do not have a satisfactory explanation for the mechanism by which these well documented changes accompanying long term meditation practice develop, although they are aware that any long term 'experience' (including non meditation experiences such as musical training) produces changes in areas of the brain used repeatedly for that particular 'experience'. Schore et. al. and Northoff and Bermpohl have even suggested that Orbito Medial Pre Frontal Cortex may be the 'entrance door' to consciousness but beyond that they do not have any explanation. Penrose-Hameroff and Bandyopadhyay et. al. have proposed possible mechanisms such as quantum effects in microtubules and more recently, generation of resonance in microtubules.

Science is able to reveal only up to a certain level as described above because it operates within the physical world and is governed by its rules. For the ultimate answer to this 'unknown' one has to go beyond the boundaries of this physical world and seek the explanations given by ancient eastern philosophy within its teachings of the practice of meditation. For that one has to go into the realm of spirituality which teaches the practice of meditation.

Meditation teaches the turning of 'attention' inwards by detaching it from the outside senses. This 'attention', in Eastern philosophy is the 'spirit current' operating in every human body and which is the source of energy and life to both the body and the mind. Attention is taught to be focused in the midline behind the eyes. In long term meditators, western science has clearly documented changes in Cortical midline structures on functional MRI and scientists associate these areas with higher cognitive functions and even consider these as the 'entrance door' to consciousness. In the Radhasoami faith too, it is described that there are 'apertures' in the gray matter as well as in the white matter in the midline of the brain which are like 'entrance doors' to commune with higher levels of consciousness, with Brahmanda (region of mind) and with Nirmal Chetan Desh (region of pure spirituality), respectively, by practicing long term meditation in a specific manner, as is taught in this faith.

Regular practice of meditation, done in the manner specified over a long period of time, may lead to repeated use of the 'same pathways' of white and gray matter for the flow of the attention/spiritual current and may thus produce the anatomical and functional changes observed in scientific studies listed above. This may provide the "answer" or "mechanism" scientists have been seeking to explain the changes observed in the anatomy and functioning of the brain in long term meditators.

Thus we suggest that eastern philosophy, which is often regarded by the scientific community and the western world as "abstract" or "subjective", may offer an explanation for the findings observed in persons practicing long term meditation reported widely in scientific and medical literature and thereby bridge the gap of the "unknown" – which in eastern philosophy is the spirit current force.

### **F64 Intuitive Abilities in Holistic and Non- Holistic Systems of Learning** (Nandita Satsangee, Sapna, Soami Piara Satsangee, Sarla Paul, Shabd Roop Satsangi)

Intuition has a long history in Hindu, Buddhist and other Eastern religious traditions as a subjective state of higher consciousness. More recently, in the West, intuition is being increasingly researched by psychologists and philosophers as an important epistemological subject – a parallel system of knowing without the use of sensory inputs or rational thought processes. Neurologists call it right brain thinking; philosophers and transcendental psychologists call it the non-dual mode of knowing. Intuitive knowledge has been characterised as being more holistic, versatile and faster than the rational mode of knowing and also more suited to complex situations. A significant development in the field is the evidence that it is not simply an inborn ability but can be learnt and developed through conscious efforts. These realisations have resulted in the introduction of a number of courses on intuition in professional training of managers, doctors, nurses, etc. in curricula of Western countries.



Based on these developments it was premised in the present study that intuitive abilities could also be developed in general educational settings provided the right kinds of input are made available. The paper begins by a comparison of the Eastern and Western notions of intuition. To test the hypothesis, two contrasting systems of education being followed in two universities were identified – the holistic and the non-holistic. The holistic system was identified in the Dayalbagh Educational Institute and a relatively non-holistic system was identified in the B.R.Ambedkar University, both being located in the same city, Agra. The former had a proclaimed mission of developing ‘the complete man’ by an integrated development of the cognitive, affective, social and spiritual domains. The curriculum was also correspondingly designed to incorporate core courses cutting across disciplines including cultural education, comparative study of religion, co-curricular activities, work experience, rural development, etc. The non- holistic system was largely focused on academics.

The study was designed as an ex-post facto causal comparative research. A purposive sample of 160 students in the final year of the undergraduate course was selected from both the universities. To measure the intuitive abilities of students in both the groups a self-constructed Likert-type five point rating scale (based on the current emphasis on first person subjective data in research) was used. Content validity of the tool was ascertained through expert opinion and the reliability was checked through the split-half method using product moment correlation. The mean scores on intuitive abilities of the holistic and non- holistic system respondents were found to be 102.56 and 95.16 respectively. The t-test was used to compute the significance of difference between the two means. A t-value of 2.84 evidenced a statistically significant difference at .01 level of significance. The study indicates a highly significant role of the educational system in developing intuitive abilities among the learners. In order to equip the learners with a powerful epistemological tool of acquiring judicious knowledge the holistic system of education of the type described in the paper needs to be provided.

This study has been conducted in an innovative Eastern system of education. However, similar results may be hypothesized when replicated in the Western systems as well. Further research may also be conducted on a comparative study of intuitive abilities in Eastern and Western systems of Holistic Education in order to identify a wider range of factors influencing the development of intuitive consciousness.

#### **F70 Formulating Generalized Metarationalistic Models of ‘States of Consciousness’ and Seasonal Rhythm: A Study with Reference to Oriental Radhasoami Spiritual Philosophy, Christianity and Cultural Anthropology** (Bani Dayal Dhir, V. Prem Lata)

Param Purush Puran Dhani Huzur Soamiji Maharaj, the August Founder of Oriental Radhasoami Faith in His Holy poetic composition “Barahmasa” (Hymns of Twelve Months) symbolically reveals the veiled spiritual implications of the twelve months of the year (The Hindu Lunar Calendar) and their correspondence to the different phases of the spirit’s descent right from the Pure Spiritual Region to this material region, its entanglement in the cycle of eighty four currents, enslavement to the five poisonous currents of kaam (desire), krodh (anger), lobh (greed), moh (attachment), ahamkar (ego), its helplessness before the forces of mind and Maya(materialism), finally its ascent to the Primal Abode through love and devotion to the Supreme Lord.

In Genesis 8.22 God gave this promise to Noah after the flood waters that covered the earth receded, “while the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter, and day and night shall not cease.” This command from the Creator initiated the pattern of seasons upon the earth for as long as it continues to exist. Sir James George Frazer, the Scottish anthropologist, observed “year by year in his own beautiful land the Greek beheld, with natural regret, the bright pomp of summer fading into the gloom and stagnation of winter, and year by year he hailed with natural delight the outburst of fresh life in spring. Accustomed to personify the forces of nature, to tinge her cold abstractions with the warm hues of imagination, to clothe her naked realities with the gorgeous drapery of a mythic fancy, he fashioned for himself a train of gods and goddesses, of spirits and elves, out of the shifting panorama of the seasons.”

The paper adopts a general metarationale and interweaves the three apparently diverse strands to investigate how the synchronization of human and natural energies manifests a spectrum of states of consciousness, which we are oblivious of.

The endeavor would be to construct “Psycho-Spiritual-Mythological Paradigms”, showcasing the nexus between ‘seasonal rhythm’ and various ‘States of Consciousness’, with special reference to Rev Prof. P. S. Satsangi’s model of “Triple Hierarchies of Consciousness in Cosmic Macrocosm and human Microcosm”(2012) and Andrzej Kokoszka’s model of “Altered States of Consciousness- Superficial and Profound States of Consciousness” (2007). Rev. Prof P. S. Satsangi explains “be it cosmic material plane or human body, at the lowest level of consciousness hierarchy, it is subject to second law of thermodynamics. At the middle level of consciousness hierarchy whether in the region of universal mind or microcosmic human mind, consciousness takes the form of cognitive knowledge, at the highest level of consciousness hierarchy stand the purely spiritual region of macrocosm (permeated by Supreme Being or God) and the spirit-essence of the human being as the microcosm which constitute the prime consciousness force.”

Kokoszka, a Polish psychologist, considers ‘Altered States of Consciousness’ significantly different from ordinary states of consciousness which are not symptoms of any mental disorders”. ‘Profound Altered States of Consciousness’ (PASC) are accompanied by a feeling of supernatural experiences, the communion with the Absolute, the Universe appearing as the “I”. ‘Superficially Altered States of Consciousness’ (SASC) resemble more to everyday experiences characterized by a change in view of reality, rationality of experiences, and emotional reactions.

“Barahmasa” of Oriental Religion of Saints- Radhasoami faith would serve as the central reference point for the elaboration of this thesis, with Christian and Primitive mythological perspectives supplementing, illustrating and elucidating how various seasons can be correlated with “Triple Hierarchies of Consciousness” and “Profound and Superficial Altered States of Consciousness”. The constructed paradigms would put together ‘Eastern and Western’ positions, draw parallels and contrasts to bring out some illuminating universals.

#### **F71 Phenomenon of Death and the True Nature of Consciousness (Vijai Kumar)**

The true nature of consciousness despite global scientific efforts still remains a mystery. The basic scientific principle is simple to describe (Parnia 2007) but what remains ill understood is the link between the psychological and phenomenal mind (Chalmers 1996). Very few people, including most scientists, realise that we have absolutely no proof that consciousness is actually produced by the brain and if so, how. Notwithstanding the lack of scientific understanding there are at least four sources of information which provide profound insight into the immaterial, transcendental, nature of consciousness.

Near death experience (NDE) and experience of those who have died but returned to life (Parnia 2007, van Lommel et al 2001, and Greyson 2000 and 2003) confirm that, as recalled later, the descriptions are a true reflection of the experiences undergone by the subjects. Recent studies have indicated that the study of human mind during cardiac arrest may hold the key to solving the mystery of consciousness (Parnia, S. 2007). These experiences clearly indicate that consciousness can exist independent of the human brain and body and survives death.

Experiences of death in the spiritual practices of Radhasoami Faith can provide a firm, prospective basis for testing the validity of NDE and natural death. The Faith addressees the scientists and says that: “To endow religions with practical and scientific interest, it is essential that religious research should be conducted on the same lines as those employed in scientific research (Maharaj Sahab, 2004)”. Such exploration of truth as revealed in the post-modern Radhasoami Faith can once and for all establish the truth of the nature of consciousness. Further its spiritual practices in which one can experience death can be a powerful tool for solving the “hard” problem of consciousness.

Surprisingly, there is identity of description of death in the ancient texts of unrelated cultures and of different periods as well as thanatology in general and NDEs / the findings of those who have died but returned to life subsequently. The book, Tibetan Bardo Thodol, describes the state of consciousness between lives (the Bardo). Thousands of years later the statements in the book are being verified by scientific studies.

Much information is now available of the findings of deep hypnosis and regression to previous life. Michael Newton’s (1998) pioneering work in this field confirms the findings of the NDE and the experience of those who have died and returned to life later. Many of his subjects describe

in detail the phenomenon of death and the descriptions match perfectly with those of the other sources of such information discussed above.

Taken together, the evidence arising from the four sources mentioned in this paper clearly brings out that consciousness and individuality survive death and can have an independent existence outside the body. The paper discusses in more detail the findings of these four sources which together can reveal the true nature of consciousness.

#### **F72 Value Education and Daily Spiritual Experiences: A Comparative Study of School Students** (Anoop Srivastava, Dayal Pyari Srivastava, Karan Narain, Mukti Srivastava)

According to Lynn Underwood, mundane or ordinary daily spiritual experiences are defined as the "...individual's perception of the transcendent (God, the divine) in daily life and the perception of interaction with, or involvement of, the transcendent in daily life" (Fetzer Institute 1999, p. 11). They are the experiential and emotional...feelings and sensations [of daily life]...rather than cognitive awareness of specific beliefs (Underwood 2006, p. 186).

The Daily Spiritual Experience Scale (DSES) is a 16-item self-report measure designed to assess ordinary experiences of connection with the transcendent in daily life. It includes constructs such as awe, gratitude, mercy, sense of connection with the transcendent and compassionate love. It also includes measures of awareness of discernment/inspiration and a sense of deep inner peace. Originally developed for use in health studies, it has been increasingly used more widely in the social sciences, for program evaluation, and for examining changes in spiritual experiences over time. Also it has been used in counseling, addiction treatment settings, and religious organizations. It has been included in longitudinal health studies and in the U.S. General Social Survey which established random-sample population norms. It has publications on its psychometric validity in English, Spanish, French, Portuguese, German and Mandarin Chinese. Translations have been made into twenty languages including Hindi, Hebrew and Arabic and the scale has been effectively used in a variety of cultures. The 16-item scale does not have a psychometrically representative shorter form although a 6-item adaptation has been used. The DSES was developed using extensive qualitative testing in a variety of groups, which has helped its capacity to be useful in a variety of settings. It was constructed to reflect an overlapping circle model of spirituality/religiousness and contains items that are more specifically theistic in nature, as well as items to tap the spiritual experience of those who are not comfortable with theistic language. The scale has been used in over 70 published studies.

Our motivation to conduct this study is based on the assumption that Educational Institutions play a vital role in shaping the attitude and behaviour of their students and Educational policies can affect the daily spiritual experiences. Students from educational institutions that emphasize value education have higher score on Daily Spiritual Experience Scale as compared to those from educational institutions having no special emphasis on value education. Students inclined towards Religion score higher on DSES as compared to those who do not follow any particular Religion/Faith. Students from educational institutions that emphasize value education have higher score on Daily Spiritual Experience Scale as compared to those from educational institutions having no special emphasis on value education. Students inclined towards Religion score higher on DSES as compared to those who do not follow any particular Religion/Faith. Teachers from educational institutions that emphasize value education have higher score on Daily Spiritual Experience Scale as compared to those from educational institutions having no special emphasis on value education. Students and teachers following Radhasoami Faith scored the highest in terms of considering their proximity to the Almighty.

## **TSC 2014 East-West Forum Poster Abstracts**

#### **F2 Human Performance and Consciousness: An Experimental Study** (D.K. Chaturvedi, Manish Arya, Rajeev Satsangi)

This experimental study is the extension of the work presented in TSC 2012 and 2013 in which the correlation between chakra (ganglia) energy and consciousness is described. This paper deals with the measurements of chakra energy at eye center and throat center with the sensor developed

in Department of Electrical Engineering, Dayalbagh Educational Institute. The measurements have been taken with 130 Diploma students of Technical College before and after appearing in 20 minutes examination of Quiz Test (QT). The correlation is determined between the difference chakras' energies and the students' performance (i.e. marks obtained in QT). It is found that the correlation between the difference in eye center, throat center energies and marks comes out to be 0.94 and 0.41 respectively.

Similar study has been conducted for determining the correlation between Industrial worker performance and their Consciousness. For this study, two industries has been selected in Agra, U.P. India namely BP oil mill and Bajaj Auto Workshop. Again the consciousness is measured with the help of chakras' energy and performance rating of industrial worker is collected from the supervisor. The correlation is determined between worker performance and consciousness. The results show that the workers with high consciousness level will perform better than the workers with low consciousness level. This study will help in maintaining job efficiency, determining the need of training of a particular worker, promoting worker's safety and also to serve as a partial basis for salary increases, promotions, terminations, etc.

### **F4 Music as a Spiritual Dimension: the East-West Common Identities** (Alexander J. Graur)

Together with Mathematics, Music is the most abstract language. As a product of human mind it is the expression of Logic, in all its aspects. That makes Music and Mathematics the universal language of mankind, though they have their dialects, as any language has. The music accompanied the spiritual activities of the human beings since the dawn of human civilization; it is an expression of consciousness. Used for worship, meditation, religious rallies, personal and common devotion, the Music expresses the human mind in all its aspects. The universal musical meme it is still strongly active in all the cultures and ideally unifies them. This presentation will show the musical structures common to various Eastern and Western cultures, the ways they disseminated around the world and their role in the spirituality of various cultures and religions; with commented audio examples.

### **F5 The Essence of Reality** (Thomas Nehrer)

The essence of the conscious Self transcends – yet fully connects to – the physical realm it encounters. Perceiving that interactive connection is necessary in order to fully comprehend the qualitative character of consciousness itself. However, recognizing the timeless, integrated Oneness of Consciousness/Reality is fundamentally deterred by any individual's belief system – his/her complex set of learned or deduced beliefs and definitions.

Thus, any paradigm – science included – creates a synthetic model that, upon acceptance as true, appears to be so: the mind is easily fooled by its own held tenets. Whatever one believes in appears to be true. (Many beliefs and definitions, along with underlying assumptions, were absorbed from parental/cultural authority during early childhood, emotionally woven into personal treatment during nurturing and imprinted by language itself.)

The track towards full, clear awareness of functional consciousness incorporates shedding beliefs and definitions, however hallowed, however popular, not conjuring new ones.

Religion generally severs the Self from some creative, imagined force out there. Ancient notions of luck and fate additionally project causality to external forces. Science, ignoring the independent validity of thought/feeling/expectation/hope/fear/etc. as attributes of an independently extant Consciousness, projects causality to diverse real-world forces and sources – consistent with its core notion of this being an objective reality (with the self a result of complex brain function). Reality's functionality is straightforward: Consciousness manifests qualitative imprints of its own complex nature as an ongoing flow of events and relationships that fully, inviolably reproduce its inner elements in the meaning of real-world encounters. Reality must be seen as a personally encountered fulfillment of the psyche's total content – in personal experience – not as the time-flow, unfeeling conjunction of particles and objects on a micro- to macro-scale.

This interaction can be perceived personally when one notes that patterns are inevitably engendered in life: we all create patterns in health issues, relationships and success, locked into distinct effects while situations and people come and go. Clearly aware of this connection, one sees that

outer patterns always have inner roots: find then dispel inner mechanisms underlying outer issues, and resultant patterns will change. The religious mind projects that metaphysical connection to a hypothetical external source (a god). The scientific mind, attuned to attributing causality to real-world sources, cannot easily grasp the inner-outer connection. It will, consistent with held beliefs, attribute causality to bacteria, conditions, spontaneous body malfunction or other illusory sources – oblivious to repeated patterns.

In my long inner journey toward clearly perceiving the inner-outer Oneness, I attained “Clear Awareness” of the connected nature of Self/Life. I did so by healing a wide range of physical maladies simply by eliminating their inner sources – and by shedding all synthetic particles of definition, scientific as well as religious, encountered during decades-long introspection of my psyche – ridding it of artificial tenets. I will explain how Consciousness and Reality relate in specific terms – what inner mechanisms correspond to explicit outer, i.e., real issues. But I can only do so for those open-minded enough to question their own favored paradigms.

#### **F6 Emotional Quotient (EQ) and Spiritual Quotient (SQ) (Anirudh Kumar Satsangi, Ankita Satsangi)**

Quotient is a ratio. Emotional quotient (EQ), is a measurement of a person’s ability to monitor his or her emotions. The ability to assess and affect situations and relationships with other people also plays a role in emotional intelligence. This measurement is intended to be a tool that is similar to intelligence quotient (IQ). There is no standard of measurement of EQ so far. There is also no standard of measurement of SQ.

We have attempted to derive mathematical formula each for EQ and SQ. Emotional quotient may be expressed as the product of wisdom (w) and intelligence quotient (IQ), and spiritual quotient may be expressed as the ratio of parasympathetic dominance (PSD) to sympathetic dominance (SD). Mathematical formula of spiritual quotient and of emotional quotient will certainly facilitate further research in the area of spiritual science.

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#### **F10 Belief System-A Perspective from Radhasoami Point of View (Shanti Gupta, Radhika Singh)**

Belief, degree of consciousness, faith and love for a deity are synonymous. Belief system is fundamental to human existence. One’s Religion is basically his belief system. Each individual belief system is unique and constitutes physical and subtle nervous system in the human body.

All arrangements in creation are carried through currents. Similarly, the entire economy of this physical body is regulated by currents, known collectively as the nervous system. Networks of currents spread out in individual systems / subsystems. Human nervous systems or more aptly their belief systems are wired in these networks and constitute its quanta in the quantum force-field.

The fountainhead of quantum spiritual force-field is the Supreme Being; field is compact in purely spiritual, lesser in spiritual-material, loose in material-spiritual region and void in nether pole. The basic flux is the attraction of spirit, mind and the matter respectively which bind the particles together. The God particle discovered by scientists is the physical particle of the material-spiritual region. The God-particle of spiritual-material region is subtler. The Supreme God-Particle of spiritual region is the subtlest.

Human existence is composed of spirit, mind, and the body each having its own reservoir. Man is de facto the microcosm while creation is macrocosm. Man represents all spheres of the creation. Devotion, love and faith for the Lord are embedded in the microcosm or individual belief system with sustained meditation over a period of time which help in establishing communication channels with the macrocosm. The prayers or intonations travel through such channels.

All impressions of acts, desires and thoughts are preserved in the highly elastic Manakasa. They are transmitted to destination by the elasticity and constitute centres of further acts. These impressions travel life through life and are known as Samskaras and determine the circumstances, qualities and attitudes of an individual. They form the founding belief system which is inherited at the time of new birth and firms up and matures with spiritual training, development and experience of an individual referred to as meditation in the small space allocated to free-will during his life time or deteriorates without it.

Network conductors in the creation are so programmed as to recognize only the Dhunyatmak sounds which reverberate on their own. The sensory conductors in the human body shall take the call only when the individual spirit tunes in with the Dhunyatmak sound characteristic of that Region. When that happens, one's spirit is transported to that region. The spiritual force-field is agitated by the meditation; the particles of that force-field coalesce to form conducting particles which constitute the path through the particular artery connecting the spirit entity with the presiding deity on virtual form.

God is conquered and He is willing to be conquered by his lovers. Lord is the sea of 'Grace and Mercy'. He accepts even the corrupt Bhakti and even when the belief systems are not firmly embedded in the nerve systems of the people who are driven to prayer meets by personal and selfish ends.

## **F11 Sound as a Manifestation of Creative Energy with reference to the Hymns of Guru Nanak Dev in the Sri Guru Granth Sahib: A Quantum-Mystic Approach (Avneet Kaur, Gurpyari Jandial)**

David Chalmers, in *The Conscious Mind* (1996), used the idea of the philosophical zombie to argue that a mechanical view of evolution cannot account for the phenomenon of awareness, while Daniel Dennett attempted to refute this argument by asserting that the mind is an emergent phenomenon of our bodies. "Quantum mystics" commonly propose the idea that an underlying consciousness or intelligence connects everyone, based on the fact that quantum fields can be interpreted as extending infinitely in space. In recent years quantum physicists have come up with the idea of super-strings that permeate and connect the entire universe. Like mystics, physicists are now dealing with a non-sensory experience of reality and like mystics, they had to face the paradoxical aspects of this experience. The models and images of modern physics have come close to those of Eastern philosophy.

Energy in its unmanifest state is without motion or sound. But when it becomes kinetic there is a flow which results in motion and sound. When the innate and dormant energy present in our bodies becomes active, the sounds reverberate. These sounds manifest themselves differently at different levels or spiritual planes. Therefore this 'soundless sound' or *anaahad naad* which pervades the entire universe and even our human bodies, is given tremendous importance in almost all systems of faith and can be rightly explained with the help of quantum mechanics. Where classical physics gave importance to the physical reality and what our sensory organs perceived, it is with the dawn of the quantum approach in modern physics that the gap between the physical and metaphysical world has almost disappeared.

The paper aims at analysing the role of sound and the repetition of the Divine Name through which one can experience the continuous flow of spiritual current. Quantum mechanics suggests that matter exhibits both the properties of a particle and a wave, Guru Nanak Dev in the 15th Century described the creation and the Lord as existing both in the wave and solid particle form. This universe was first created by the sound which was in wave form and later manifested in the solid form by creation of this universe. Thus He is prevalent in both the solid as well as the subtle form. As stated by an eminent Sikh philosopher, Dr. Grewal "He and His universe is a form of energy which keeps on changing forms..... from waves to particles; subtle to solid; unmanifest to manifest and vice versa. Singularity is in the origin; the energy but the duality is in the forms."



#### **F14 Awareness of Being and The Science of ‘Spanda’ (Dharampal Satsangi)**

Being aware of the universe of beings, not the beings themselves, is the starting point of all thinking. Therefore, first there has to be an awareness of beings before we experience the objective existence of beings. Awareness, call it Super Consciousness or Ultimate Reality, is therefore innately pure abstract; both thought-free and thing-free, for just as space is absolutely distinct from all the objects within it, so also is Awareness, absolutely distinct from all within it.

All beings are connected to one another, both outwardly and inwardly. They are connected outwardly because they all dwell within the Divine Awareness, and connected inwardly because the essential Self (Atman) of each being is its nature (Samskara), as a Self expression (Swabhava) of the same Divine Awareness that is The Ultimate Reality.

The formless awareness that we perceive as empty space is not in fact empty but is a fullness of formative potentials. Such potentials – all potentials – only exist in Awareness, and do so as potential shapes and forms of awareness. Formless Awareness undergoes contraction to give bodily shapes to these potentials. We all are the bodily shapes of formless Awareness. We are each a unified space or field of awareness, our bodies are a mere boundary between the Awareness we exist within and the awareness that exists within us. We are potential Awareness that has contracted to become actualized.

Awareness, contracting and stretching like a ‘string’ from pure potentiality to actualization (physical creation) exerts a ‘creative tension’ between these domains (potentiality and actuality) and vibration sets in the string. This vibration is called ‘Spanda’ that resonates within all beings and things as Consciousness. Spanda has a pulsating or quivering character of a primordial heart beat. Spanda is the trembling of actuality (consciousness) with potentiality (Awareness) that can be felt at any time, in any space and by any being on the threshold of outer movement, action or speech.

The virtual (potentiality i.e. Awareness) and actual (actuality i.e. consciousness) are, therefore, co-resonating systems. As the actual contracts (resonates at a higher intensity) the virtual dilates (relaxes). When the virtual contracts back, the actual dilates. Based on the teachings of Kashmiri Shaivism, this paper endeavors to elucidate the primordial sound and vibration as link between this world and the world beyond.

#### **F15 On Death and Beyond (Durga Prasad Rao Chilakamarthi, Dharampal Satsangi)**

The concept of death is a mysterious one, daunting humanity from time immemorial. Though man is aware of the unavailability of death, he is still afraid of facing it for he thinks that it is the end of every thing. Death, according to general understanding, is the permanent cessation of all biological functions that sustain a living organism. And if we define death in terms of consciousness, the living organism can be said to have died when consciousness ceases to exist. In the absence of consciousness, the body is simply a lump of dead matter. So it is very essential to understand the nature of death to overcome fear. According to Indian view, death is not the complete cessation of one’s existence. It is an intermediate stage to eternity. Moreover it is the original state while life is a transient one. An allegory explains it clearly. There is a cage-like body of which all the nine doors are open. Dwelling in it is an air like bird. It is of surprise that the bird still stays in it whereas flying out would be natural. Our tradition, combines philosophy with higher experience and teaches practical wisdom which paves the way for transformation of man to divinity. Lord Krishna explained the concept of death to Arjuna when the latter was reluctant to fight against Adharma, fearing that his kith and kin would be killed. O Arjuna ! It is not wise to grieve neither for the dead nor for living. Atman, the quintessence of our being is never born nor does it die. This is eternal, changeless and ever existent. It is not killed when the body is killed.

Our Sastras, by suggesting a philosophical way out warn us not to be afraid of death. Oh fool! Why are you afraid of death? Do you think that the God of death will spare you even if you are afraid? But it is certain that he will not catch hold of an unborn. Therefore, try not to be born again in this world.

Here the way out suggested, is birth-less-ness which constitutes proper understanding of the nature of death and belief in the permanent existence of soul. The human body is made up of five kosas annamaya, pranamaya, manomaya, vijñanamaya and anandamaya of which the three

bodies; gross, subtle and causal are constituted. Atman, being different from all these and beyond, has nothing to do with them. It never dies when the body dies. Moreover, the theory of transmigration of soul, gives a great solace to the departed soul as well as to those who are related to him. It is explained in the Upanishads, that the nature of soul is Sat, Chit and Ananda :- Ever existent, Consciousness and Bliss. All beings here are indeed, born from Bliss, having been born, they remain in Bliss, and on departing; they enter into Bliss (Chandogya Upanishad). It is also stated that the enlightened man is not afraid of any thing because he realizes his own nature as Bliss (Taittiriya Upanishad-2-9-1). By this, it is quite evident that the underlying principle is the immortality of soul, the realization of which gives supreme happiness. Coming to the practical aspect, it is stated that any person can get the experience of death while alive by becoming acquainted with it. SuratSabdaYoga, the technique of meditation, taught in the religion of saints, enables one to enter into that state willingly, stay free of it and enjoy the bliss of it. In this paper, some allegorical, logical, bio-logical, eschatological and philosophical interpretations of death and solutions to become free from fear of it are vividly sketched.

#### **F17 Consciousness studies for an integrated personality** (Arati Swaroop, Dharampal Satsangi)

Vedas are recognized as the treasure house of knowledge for the religions of the world and they tell us that life is axiologically oriented towards the quadripartite axiological framework built around the values of Virtue and Morality (Dharma), Wealth and Power (Artha), Aesthetics, and Liberation or Salvation (Moksha). The object of life is the pursuance of all these four goals of human endeavor, although the pride of place belongs to Liberation. Morality is central to the scheme, as it is the controlling value in relation to Wealth and Power, and Aesthetics, and is the enabling value in relation to salvation. To achieve this end it is essential to realize the centrality of the human Spirit (Atman) as the ultimate experiencer, which has been explained beautifully in the Katha Upanisad.

Human development has therefore to be oriented towards the development of all three of his faculties, side by side for a balanced and integrated personality. Personality development is generally taken to be the development of Physical and Mental faculties and the most important Spiritual faculty, which until recently, was completely ignored. This resulted in a lop-sided development of man, ill at ease with fellow man leading to social strife. Developments of science and technology having reduced the world to a global village only aggravated this imbalance. According to philosopher Bertrand Russell if enhancement in human consciousness does not keep pace with advancements in human knowledge, then it will only lead to increase in miseries.

An integrated personality is the simultaneous and uniform development of all the three faculties namely, physical, mental and spiritual. Spiritual development is the elevation of consciousness which is awareness in its fullness and increases progressively as the human spirit ascends to higher levels of spiritual consciousness. Consciousness determines our attitude and disposition towards life.

#### **F18 Creative Action leads to Cosmic Consciousness** (Madhuri Malhotra, Dharampal Satsangi)

Creative action (call it Right Action) is an Ordained Action that is in harmony with Ordained Duty and leads to eradication of past impressions (Samskara) stored in the Cosmic Mind (Manas). This steadies the mind and facilitates attention current to gain communion with the Primordial Sound Current to attain Cosmic Consciousness.

Scriptures of the Radhasoami faith and the Bhagvad Gita are two classic religious doctrines in the Eastern Devotional Tradition that set forth in precise and penetrating words the path of "devotion through creative action" (Karma Bhakti) that leads to Cosmic Consciousness.

The only way in which a great scripture can become a practical classic to guide mankind is when it teaches spirituality that can be lived, here and now. Radhasoami faith is a modern faith of the devotional school where the statements of eternal truth and Cosmic Consciousness are presented in the scientific accent of our times. Scientific, not because of some scientific data that can be perceived by our three dimensional senses but, because of its logical belief system. Based on the teachings of the Bhagvad Gita and Radhasoami faith, this paper endeavors to elucidate "creativity in action" (Right Action) leading to cosmic consciousness.

**F20 Enhancing Risk Consciousness through self reflection: A case study of an Indian Entrepreneur** (Santi Swarup Kandikonda, Mukti Sri-Narain)

Entrepreneurs take risk and build organizations that fuel the growth of economies. Number of studies have shown that risk taking is a personality trait as well as a result of contextual forces. It is affected by the perceived risk and the risk bearing capacity of an entrepreneur. Many studies have also shown that entrepreneurs are over optimistic and do not analyze the risks associated with a start-up decision. So when the risk manifests they are severely affected. A previous study by the authors (TSC 2013) has also indicated that entrepreneurs do not attempt to do a feasibility study by developing a detailed project report to understand and mitigate risk.

In this study, we have used Risk flow charts and series of questions during the interactions with an entrepreneur and encouraged him to study and reflect on the start-up decision. This entire process of interaction was developed in to a case study. Management students and executives were asked to evaluate overconfidence and risk consciousness at the end of each stage. Their responses were evaluated using scatter plots. The analysis of these results indicated that with each interaction and guided reflective learning the over confidence of the entrepreneur has decreased and the risk consciousness has increased.

**F21 The Progress of Scientists can be “Multiplied Several Fold” by Recognizing the Science of Consciousness** (Krishnananda Sabaratnam)

The ‘Dayalbagh Vision’ of Spiritual Consciousness, while applauding the scientists for their achievements, urges them not to rest on the laurels of their present astounding progress, which can be multiplied several fold, if they would recognize the Science of Consciousness. It could be achieved easily for solving the problems for curing all the various ills and evils that affect the society.

There are great dangers of sorts lurking, as had been alerted worldwide, that would wreak far more detriment and do “more disservice both to humanity as well as to science”. In these grave situations, the one and only way to avert the formidable dangers is to pursue, even as a last desperate trial, seriously “to recognize the Science of Consciousness”, which had been a proven ultimate power that sustained, evolved and saved humanity, and other life forms.

The ultra-subtle Divine Science in the Supreme Master Plan for Creation has been continually unravelled by Nature, in definite and calibrated stages, through its process of originating, uplifting and evolving Creation and its wondrous life-forms, over the ages and eons, starting from the inert to the acme of ultra-sensitive and ultimately subtle Spiritual Consciousness. The Rishis and Munis of yore in India delved deep into the Supreme Divine Mysteries and sang the zenith-Glory of the Divine Creational Plan as “Satyam Sivam Sundaram” –The Eternal Truth is Eternal Auspiciousness and Eternal Beauty—as an efflorescence of the subtle-most Science of Spiritual Consciousness. This primeval and perennial Philosophy of India had its genesis in the glorious Upanishads of the Rishis, and were purified over the ages by the Sages, and now ultimately by the unbroken Holy Line of Incarnations of the Supreme Being, Param Sants, imparting directly as the ultimate “Radhasoami spiritual philosophy, a globally and scientifically accepted phenomenology”.

**F28 Rationality or Intuition – An Experimental Study of Live Traders and Their Decision Making** (Rupali Misra Nigam, Sumita Srivastava, Sanjay Misra)

Decision-making involves a combination of intuition and rationality, with both being contributing in a harmonious iterative manner. In the Eastern approach, the nature of reality is discovered by experiencing it directly, without thoughts. This is accomplished through a variety of meditative processes. However, the Western approach to a deeper understanding involves the application of symbolic thought (i.e. words and mathematics). In other words, science relies upon a specific thinking process (logic) while faith relies upon specific thoughts (dogma).

The study investigates the role of intuition, a manifestation of Eastern philosophy, and rationality, a manifestation of Western philosophy in predicting the price of seven listed stocks, currency and commodity over one-day, one-week and one-month investment time horizon. In an experimental design, a group of 34 live-traders undertake meditation protocol and predict the prices before and after the experiment.

Researches reveal that religion, religious beliefs and religiosity play a significant role in influencing judgment, emotional and motivational qualities, frame of reference based on a connection with a transcendent and ultimate reality. The study attempts to investigate the relationship between self-reported mindfulness, longitudinal meditation, religiosity and intuitive ability and cognitive capability of the stock-market investors.

### **F32 Vedantic Higher Consciousness - A Reflection In The Poems of the Great Mystics Sri Aurobindo and Walt Whitman** (Namita Bhatia, Soami Das Bhatia)

Veda means knowledge and anta means end, thus Vedanta means the end of knowledge. The quintessence of the teaching of Vedanta is that Brahman (God) is the only Reality and that the Universe is an illusory appearance; that the individual being (self) is essentially Brahman or God Himself. This oneness of the self (jiva) with Absolute Consciousness (Brahman or God) is the goal of Vedanta. For want of the right understanding of his real nature man remains deluded and considers himself miserable and beset with innumerable problems. Vedanta shows the way to eradicate these problems once and for all and enables man to attain the highest spiritual enlightenment, peace, happiness and freedom (moksha) from repeated births and deaths.

Men of religion call for spiritual discipline to live the great mystical and transcendental experiences and to cleanse and elevate human personality. It is made out clear that the sole purpose of all the spiritual exercises is the elevation of the human soul to those levels of consciousness.

This Eastern philosophy gets reflected in the works of Indian as well as Western Mystic poets. A mystic has apprehensions of a world of divine reality behind and within the ordinary world of sense-perception. He feels that the supreme soul or God is one and the same, but it assumes different forms. All Nature is alive and there is essential identity of Being among Man, Nature and God.

### **F38 Non-duality or Duality at Will?** (Sneha Idnani, Suresh Idnani, Swati Idnani)

Non-dual, simply put in English means – “Not two”. From the Lotus Sutra translated by Burton Watson, “The concept, often described as ‘nondualism’, is extremely hard for the mind to grasp or visualize, since the mind engages constantly in the making of distinctions and nondualism represents the rejection or transcendence of all distinctions.”

In western cultures, the term is used in modern spirituality and new age as – ‘A primordial natural awareness without subject or object’. The taste of non-duality is the sense or experience of unity, peace, something vaster than the everyday you. The philosophy of Non-Dualism is the point of view that there is one Absolute Reality without a second and that each of us is one with that Reality, just as a wave is one with the ocean.

Eastern philosophy and mysticism promotes a slightly different thought process on this concept. “Advaita” in Sanskrit means “Non-duality”. This is a difficult concept for most people as we look about us and see multiple objects. But what we see are only transformations not permanent forms, whether we are speaking of a chair, a tree or a human being. Each exists provisionally, but is certainly not lasting. One day the tree may become the chair and the human body will be eaten by worms. When we contemplate our own consciousness with intense awareness, leaving aside all thoughts of good and bad, we are automatically led to the experience of non-duality.

This abstract endeavors to explore the hard to define and slightly conflicting perspectives on the concept of Nonduality and how can it relate to the understanding of Ultimate Reality.

### **F40 Preliminary Investigations on Consciousness Correlations in Silver Coins through Kirlian Photography** (Ashish Mani, Sahab Dass, Rohit Shrivastav, Vijay Malhotra)

Consciousness pervades all dimensions of creation and beyond, but is a difficult term to define in precise intelligible terms. Further, the measurement of Consciousness through its physical correlates is a major technological challenge. Most of the efforts so far have been to measure correlates in animate objects, which run into the problem of repeatability and controllability as properties associated with animate objects change with time, which is natural. A novel approach has been proposed to solve the problem of repeatability and controllability by using inanimate objects like Silver Coins. The motivation for using the current methodology is guided by the Eastern Philosophy that same type of inanimate objects produces different results when exposed

to different environmental / energy conditions and account for difference in an object as Prasad (material seen or touched by Guru, Seer or Prophet) and ordinary objects. There is a re-surge of interest in the Kirlian photography more specifically in the domain of material testing and it is interesting that such images might also have connectivity with the consciousness-level of the object under study. Working on the above hypothesis, this paper investigates the possible correlation (if any?) between the pattern of images and the environmental conditions to which the silver coins are exposed. The procedure for exposing coins to varied environmental conditions, recording and processing of Kirlian images along with the observations will be discussed in the paper.

#### **F44 Influence of Spirituality on Well-Being and Stress** (Niti Soni, Vineeta Mathur)

Spirituality deals with the essence of spirit. It is the realization of a higher self beyond the physical realms and our connection to it. Spirituality is a personal concept. The relation with the higher self guides the spiritual life. The concept of well being relates to the factors necessary for human existence as a complete individual guided by moral values and ethics. It is a search for meaning in life. Stress refers to events or situations that cause nonspecific responses in the body, because of the demand that the event or situation makes on the body psychological/biological responses to uncomfortable stimuli. There are various coping mechanisms that help people to tolerate, manage and eventually minimize the impact of stress. The present study focuses on spirituality as a coping strategy to manage stress and influence well-being.

The research was conducted on a small scale wherein the sample comprised of 40 participants who were young adult professional working in various fields and living an urban lifestyle. The methodology used was the questionnaire method. The participants were asked to take the Spiritual Well Being questionnaire which had two parts, religious well-being and existential well-being, and Perceived Stress Scale questionnaires. Responses were rated on a 5 point Likert scale, with response options ranging from strongly agree (5) to strongly disagree (1).

The scores were then studied statistically using the Pearson's correlation method. Significant correlations were found between religious well-being and existential well-being scores. The scores of religious well being obtained were positively correlated with existential well being (.67). Spiritual well being scores showed a negative correlation with stress depicting that individuals with higher spiritual well being reported lower level of stress. The study undertaken to analyze the influence of Spirituality on well-being and handling stressful situations in life suggested that spirituality may serve as a protective factor in relation to the exposure to stressful life experiences and well being.

#### **F47 Spiritual Consciousness in Param Purush Puran Dhani Soamiji Maharaj's Barahmasa** (Prem Kali Sharma, Payal Sharma)

This research paper is based on analysis of Spiritual Consciousness in Barahmasa of Sar Bachan composed by Param Purush Puran Dhani Soami ji Maharaj. The practice of writing Barahmasa has come down from the ancient times. Jayasi's Padmavat is the representative epic of Prem Margi stream in the Bhakti Kaal. The Epic is written in the Sufi style wherein God is assumed to be the woman and the soul as the man and their union has been described. Baba Tulsi Sahab wrote Ghat Ramayan wherein he described Barahmasa as the union of the individual soul and the Divine Soul through the medium of nature imagery. Later on Param Purush Puran Dhani Soamiji Maharaj has rendered a beautiful description of Spiritual Awakening of the soul in twelve months of the year in Barahmasa. Barahmasa makes as one of the important forms of folk poetry. Consciousness is explained in a lucid manner by categorizing it in twelve parts, each part making for one of the twelve months of Indian Calendar.

#### **F49 Consciousness for success in leadership – East and West perspectives** (Mahesh Ohry, Deepak Ohry, Devangna Ohry)

The aim of this qualitative research was to explore, examine and gain an understanding of the awareness of consciousness by Leaders to influence leadership success in organizations.

Meditation practice is used to develop consciousness and is gradually becoming more recognised, however, its conceptual nature is often misunderstood since most people still regard

meditation as an aspect of religious belief. A Leaders use of meditation practices can play a vital role in ensuring organization success by enabling Leaders to appreciate and handle the emotional processes of themselves and others effectively.

The aim of the study was to investigate responses given by a sample of Leaders from a variety of businesses regarding their use of meditation practice and consciousness in order to enhance leadership success. Further, to examine the different views towards meditation from East and West perspectives.

A Leader's experience of meditation practice for conscious awareness is subjective and open to interpretation. Hence, a social constructivist approach was used to investigate Leaders experience. The participants consisted of leaders from various organizations in the east and the west. The primary method of collecting data was by interviews in person. Common themes were identified in the leader's accounts regarding the role to enhance consciousness and self-perception of leadership skills. Data collected was used to test hypotheses offered, testing the construct of the core of leader's consciousness.

The analysis showed that the Leaders understanding of the concepts of meditation practice and consciousness varied widely. In fact, only 30% of participants were aware of the term conscious leadership with a smaller percentage actively practicing meditation. Interestingly, there were variances between leaders from East and West based organisations in their views of meditation in relation to consciousness and how it could benefit their performance as Leaders. The west based leaders tended to see meditation as a stress relief and to achieve inner calmness, whereas east based leaders viewed meditation as a means of attaining higher levels of consciousness and detaching from one's ego e.g. followers of Buddhism and Radhasoami Faith.

A Leaders consciousness could have a positive and sustainable impact on individuals, organizations and society at large.

### **F51 Intuition Demystified by the Integrated Approach of Spiritual Phenomenology and Scientific Methodology based on the Philosophy of Radhasoami Faith** (Ankita Mathur, Purnima Sethi)

The quasi-magical, non-rational nature of intuition presents a colossal challenge to science. Intuitive knowledge apparently does not function like the methodical inferences associated with rational thought. It is known to arise "in a flash," or "out of the blue," sometimes with answers to tricky scientific problems, elegant solutions to complex mathematical theorems, and complete scores for intricate musical compositions. In recent studies, people have linked intuitive decision making to subliminal subconscious processing. But what is it that powers the unconscious/subconscious mind in absence of external stimuli to experience these flashes of information? The causal force behind the observed intuitive experiences still remains unknown to science. In this context, we would like to highlight that the philosophy of Radhasoami Faith- Religion of Saints, provides plausible solutions to these fundamental queries pertaining to intuitive consciousness. The Radhasoami faith hypothesis is of spirit-mind-matter interactions. If the spirit force is developed by the method of spiritual practices, at planes higher than those at which it is kinetic in ordinary circumstances, the tanmatras of the various senses will no longer be dependent upon the physical frame for communication of impressions, and subtle actions of various degrees, which are always taking place, would all come within their cognizance. The Supreme Creator makes prompts giving each spirit force when He so desires, the necessary direction which is intelligible to that particular individual entity based on his background. So He gives the optimal solution as a prompt. Accordingly, that is the Ultimate Communication Technology. Drawing inspiration from the Hierarchical Order Theory of Consciousness proposed by Most Revered Prof. P.S. Satsangi, we would like to propose the relevance of the theory in context of acquisition of intuitive knowledge. The higher-order consciousness of spirit force acts on lower order consciousness of spirit force as well as the mental plane. In the mind when an Orch-OR event occurs, decoherence takes place and consciousness is manifested in the physical plane as information which is perceived as intuitive knowledge. A scientific explanation to the same can be leveraged from the Omni Quantum Spiritual Force Field theory. We put forward Dayalbagh community as an exemplary example where people are strongly guided by their intuitive consciousness or take guidance from the mentor availing from



His repository of intuitive consciousness to traverse an optimal life trajectory. The way of life here helps one cultivate their intuitive abilities.

**F52 Scientific correlation of the Rudimentary Modeling Framework for Spiritual Domain** (Gaurav Mathur, Reena Mathur, Payal Sharma)

In consonance with the East meets West philosophy, this paper tries to give Experimental Scientific correlation to the “Rudimentary Modeling Framework for Spiritual Domain” presented by Revered Prof P.S. Satsangi Sahab. The paper also tries to correlate the different frequencies observed during experiments at Dayalbagh during mass congregational meditation-cum-prayer meetings in the Community Hall.

The authors accept the abode of Radhasoami Dayal to be the ultimate goal of spirituality and creatures with low level of consciousness are not able to understand or know this ultimate reality since the ‘Path of Information flow’ from the region of highest consciousness to us consists of resonance based switches which are open and can be closed only when they resound with the required ‘Anhad naad’ of the their respective regions. This postulate is correlated with the experimental work done by Dr. Anirban Bandyopadhyay together with other scientists, wherein a microtubule has been found to behave like a resonating vibrating string giving resonance peaks in its conductivity at different frequencies. We find that microtubules also present this same properties of change of conductivity (i.e. acting like a resonance based switch) at different frequencies. Thus in a state of complete resonance the information data flow rate from Highest level of Spiritualness to us would be such, that we, in our present lives, will be able to see/realize the ultimate reality.

Next, the presence of external manifestations in terms of electromagnetic radiations of ‘same’ frequencies gives a strong indicative proof to the various ‘Anhad naads’ and resonance frequencies being talked about in Revered Prof Satsangi’s Model. The paper also analyzes the mathematical correlates of the frequencies. Thus we aim to bring closer the Western scientific philosophy and the Eastern Experiential Cosmic and Spiritual modeling.

**F54 The Enigma of Consciousness: Humans vs. Robots** (Bhakti Kumar, Akshar Srivastava)

Science fiction assumes that someday the human race shall witness Human-like robots. These robotic machines would look and talk like humans, feel pain, ingest food, feel love and anger etc. According to Susan Greenfield, lack of consciousness is the key difference between people and machines. There have been numerous propositions which have indicated that robots would be able to emulate human behavior. Movies like ‘Bicentennial Man’ (1999) and Steven Spielberg’s ‘A.I. Artificial Intelligence’ (2001) project the human side of robots. ‘Bicentennial Man’ is a story of a robot who transforms into a human with a ‘positronic’ brain and a human heart in a span of 200 years. In these movies it is illustrated that the robotic personas like Andrew and David exhibit emotions, creativity, affection and love which are primarily human like characteristics but these properties are nothing but specified outputs to a certain set of inputs. It is the programming which indicates the robot to respond in a certain way to a certain given input. It is said that the Human Brain constitutes physical and psychological levels of consciousness and can achieve higher levels of consciousness with the body, mind and spirit interaction. Can machines have different levels of consciousness or can they illustrate consciousness only at the physical level, being devoid of the psychological mind consisting of emotions, behavior, feelings, intuition etc.? If we believe that human emotions and behavior can be emulated by robots via a learning algorithm or a kind of neural network, then how do we separate these human machines from human beings? The authors raise many such questions and attempt to answer some of them. The paper concludes by dwelling upon the fact that only Human Systems can reach the highest level of consciousness due to its constitution of the spirit, mind and brain.

**F55 God’s Grand Design: The Grand Unification Theory (GUT) hypothesis based on the philosophy of Radhasoami Faith** (Gurpreet Gill, Purnima Sethi)

The Grand Unification Theory (GUT) aims to unite the fundamental forces of the universe. GUT represents the ultimate restoration of the natural symmetry such that all the four forces combine into one entity at the Planck’s dimension. The success of spontaneous symmetry breaking

in explaining electroweak physics suggests that the three particle theories of the  $SU(3) \times SU(2) \times U(1)$  model could be the spontaneously broken version of a higher unified theory at some higher energy scale, a single theory with only one gauge group and one coupling constant. Though, gravity is not easily folded into a microscopic configuration, it is expected that it can be combined with the other forces at a smallest dimension of the order of Planck length i.e. 10-33 cm.

The gravity force field, weak nuclear force field, electromagnetic force field and the strong nuclear force field keep the energy confined in a force field and are pertaining to the physical universe. Scientists so far have not been able to unify these fundamental forces. In this paper we propose that the missing link in the grand unification is the quantum spiritual force field which truly pervades the entire macrocosm. This prime metaphysical force field of spirituality or consciousness is all-pervasive. Thus all the force fields are different forms of one common source of energy i.e. Supreme Being Radhasoami Dayal. He is the source of origin of the prime spirit force. The spirit forces are all elementary particles of the prime source of energy represented by the prime or original quantum spiritual force field i.e. we are tiny miniscule bundles of prime energy these electrons, quarks etc. each consist of an even subtler spirit force entity within them as the prime energy drivers. Thus, a subtler state exists for which one has to awaken his inner eye as no experiments in the outer world would yield the necessary insights. One would be successful in getting experience of reality only when one performs exploration into the inner realms. Until scientists attempt to study the universe through the science of consciousness their comprehension of reality will never be complete and the grand unification of theories would be impossible to attain.

#### **F56 Resolution of Cognitive Anomalies through Scientific Study of Yoga is the key to the Consciousness Puzzle (Sant Saran, Sukhdev Roy)**

The past quarter of a century has witnessed an explosive multidisciplinary interest in studying consciousness. The interest has ranged from artificial intelligence and computational and information processing in cognitive science to the philosophy of mind. Human beings as conscious subjects function at two levels, i.e., their awareness directed outward towards objects and events, and also focused inward to one's thoughts, feelings and being. Sharing experiences leads to the distinction between objective and subjective experiences. The primacy of the first or the second respectively, constitutes the distinction between the Western and the Eastern approaches. An important question that we confront is whether the scientific method that appears to adequately reveal the outward can be applied to the inward experience as well. Attempts to apply the logic of objectivity in the realm of inner awareness have led to reductive exercises designed to translate inner experiences into outwardly observable phenomena.

Although the favoured scientific approach is to determine the neurocognitive correlates of all conscious experiences, there are cognitive anomalies or parapsychological phenomena that resist all physical and neurobiological explanations. These phenomena have two attributes, the receptive that includes, extra-sensory perception, precognition, telepathy and clairvoyance, and the expressive that includes psychokinesis. Although tremendous effort has been made in the West to understand the wide variety of parapsychological phenomena, they have not met with appreciable success in science. This could perhaps be attributed to the lack of necessary conceptual and methodological tools required for understanding them. In this context, yoga acquires great relevance for psi and consciousness studies.

Yoga as a psychic discipline accepted by all Hindu systems has now acquired universal relevance by spreading to the west. According to yoga, psi is both real and natural rather than an anomaly and the acquisition of siddhis or psi phenomena are natural outcomes as a person progresses through different stages of psychophysical development. Systematic disciplined meditative practices lead to realization of higher states of consciousness. Mind itself is considered subtle material without being grossly physical. Yoga considers spirit, mind and matter as differentiated forms of consciousness. Scientific study of yoga meditators has already become important in neurophenomenological studies, as subjects with good concentration are required to establish neural correlates. Although, yogic norms forbid practitioners to reveal and use psi capabilities, experiments can be conducted on, for instance, Tibetans who generally accept precognition in the form of oracles and divination performed by lamas and also clairvoyance as a means to locate reincarnated monks.

Tremendous progress in our understanding of nature has taken place when anomalous phenomena have been resolved in science. Hence, scientific study of yoga meditational states that lead to development of extraordinary psychic abilities can be of great importance in resolving cognitive anomalies. In this paper, we review the various recent scientific studies undertaken on precognition, telepathy, psychokinesis on living and inanimate systems, clairvoyance, and psi and meditation that provide evidence for psi phenomena and also present a prospective work plan for future progress.

**F58 Correlation of Emotional Intelligence and Spiritual Consciousness** (Vineet Shrivastava, Kavita Kumar, Indu Shrivastava)

Is higher level of Emotional Intelligence mandatory for attaining higher levels of Spiritual Consciousness? Or a Spiritually Conscious person bound to have higher levels of Emotional Intelligence? Do these have a cause and effect relationship? Salovey and Mayer (2001) defined Emotional Intelligence as “The ability to perceive emotion, integrate emotion to facilitate thought, understand emotions and to regulate emotions to promote personal growth”. Spiritual Consciousness is an experiential quest as explained by Reverend Professor Prem Saran Satsangi in various forums and conferences (2003-2013). Data can support that a person having higher Emotional Intelligence is better equipped to attain higher level of Spiritual Consciousness. A cause and effect can thereby be inferred thus.

**F59 Invoking Higher Levels of Consciousness: A Survey on the Relevance of Total Quality Management Framework of Dayalbagh Educational Institute's Education Policy** (Purnima Sethi, Ankur Gupta, Arsh Josan, Ankita Mathur)

Over the years, the extraordinary and thought-provoking educational approach of Total Quality Management (TQM) has been a fundamental part of Dayalbagh Educational Institute (D.E.I). The D.E.I Education policy is an innovative, comprehensive and flexible higher and technical education policy with the mission objective of evolving a ‘Complete Man’ (Total Quality Person), which conforms to the concept of Total Quality Management and is geared for transformation of India to a knowledge society.

We were motivated to study and investigate the performance of students who have studied in D.E.I and its various distance education centers and gauge their performance in all dimensions of society. We conducted a survey on a set of 50 subjects half of which were D.E.I alumni while the rest had graduated from other reputed institutes of the country. We asked their colleagues to rate their performance on the basis of several parameters. All the participants were given customized questionnaires specially designed to measure the subject's participation in social, community and national issues exercised in different situations in life, their contribution to community engagement through research, teaching and outreach programs and their behavior towards them. We observed from the analysis of the survey conducted that D.E.I alumni strived to impart enhanced co-worker support, contribution to community partnership, enhancing civic awareness and sense of responsibility as compared to the other half of the group. We also conducted a survey on the students currently studying in various undergraduate and post graduate courses at the Institute to learn about their personal opinion and experiences pertaining to the different facets of TQM implemented as part of their curriculum at the Institute and also to study the first person report of their Intuitive consciousness. We observed that different educational activities lead to not only academic objectives but also inculcate moral and spiritual values and develop social sensibilities among the students. High performance standards, fundamentals and continuous assessment in the educational system lead to ‘Quality’.

The educational system enables the student to imbibe basic human values, sound ethical and moral principles and a spirit of tolerance and respect for the religious faiths and beliefs of others. It inculcates dignity of labour, discipline, hard work, selfless service, cooperation, humility and a spirit of brotherhood of man. Biggest attraction for anybody to study in D.E.I is the opportunity to inculcate higher level ability of intuitive consciousness which can guide one's judgment to transverse an optimal path in life.

**F60 Scientific Study of Environment at Holy Places Can Determine Field-effects on Consciousness** (Sant Saran, Shabd Roop Satsangee, Sukhdev Roy)

Millions of people go on pilgrimage to numerous holy places and shrines throughout the world, to raise their level of consciousness by experiencing inner peace, unity, bliss, healing, or for fulfilment of wishes. Followers of almost all religious traditions are encouraged to visit their respective sacred sites. Many of the world's religions, including Christianity, Islam, Hinduism, Buddhism, Judaism and Chinese folk religion have shrines that often contain idols, relics, or other such objects associated with the figure being venerated. Most of these places have a long history and their effects have been experienced by people in different ages.

It is evident that there must be certain environmental factors that have such a tremendous effect on the spiritual, mental and physical state of different individuals and suggests a field-effect in these environments. The presence of a spiritual adept and mass meditational and prayer practices enhance the spiritual environment of a place. Experiments conducted at the Dayalbagh Prayer Hall revealed specific frequencies prevalent before, during and after the prayer services. Most of the sacred sites have also reported miracles especially related to healing that have been officially recognized as well. The most notable Christian example is the shrine of St Bernadette at Lourdes, France, visited by over 5 million pilgrims a year. As many as seven thousand medical cures have been attributed to this location's healing waters since 1873, with 69 of them getting official recognition as miracles by the Bishop of Pavia, Italy. The rapid and complete cures can only be explained through miraculous powers. Although the cause can be attributed to the sites, the faith of the individual can also be an important factor.

In this paper, we present an overview of the major holy places in the world and their reported effect on individuals. We propose that a scientific study of the environment at these holy places can establish the factors that not only enhance the environment but also that affect consciousness. Correlating them at renowned holy places would help in determining fundamental factors affecting consciousness. The study would also establish whether only the environment affects the consciousness, the environment and faith together or it is only the faith of an individual that is the primary cause.

**F61 Spiritual Intelligence and Working Memory of University Students' Involvement In Voluntary Agricultural Field-work: A Comparative Study** (Kavita Kumar, Swati Tripathi)

Social service is a kind of professional and academic discipline that seeks to improve the quality of life and wellbeing of an individual, group or community. The concept of dignity of labor goes back to ancient times, and the practice of 'Seva' i.e. service with complete dedication has roots in many ancient civilizations and world religions. Any service that is done without the desire for reward or benefit is the work of the highest order. Hence working as a volunteer can be an extremely satisfying and rewarding experience. In this context, student life is the most valuable, productive and memorable phase of life where mental, physical, social and spiritual development takes place. As a student, one can inculcate healthy life style, good moral character and develop physical, mental, social and spiritual faculties to the utmost. If a student follows a disciplined life and honors the significance of social service and dignity of labor, it will definitely make him/her a worthy person. Spiritual intelligence is concerned with mind and spirit, and its relationship to one's existence in the world. Spirituality involves a sense of wholeness, connectedness at work, and has deeper values. Working memory is necessary for staying focused on a task, blocking out distractions, and keeping one updated and aware of things that are going on in the environment. Researches show that learning the basic skills necessary to engage in physical activity at a young age is beneficial for future cognitive functioning. Physical activity can affect the physiology of the brain and may be associated with improved cognitive functions including attention, information processing, storage, and retrieval.

The present paper has focused to compare the Spiritual Intelligence and Working Memory of University Students involved in Voluntary Agricultural Field-Work and those not involved in Voluntary Agricultural Field-Work. A sample of 100 students was selected, out of which 50 students were involved in Voluntary Agricultural Field-Work and 50 students were not involved in Voluntary Agricultural Field-Work. Individuals selected for the sample were only female students from

different Faculties of Dayalbagh Educational Institute, Dayalbagh, Agra, India, age ranging from 18 to 26 years. Spiritual Intelligence was measured by ?Spiritual Intelligence Test? constructed by investigators. To measure the Working Memory, 3 sub-tests from WAIS-IIIUK, Third Edition were employed. The data was analysed on the basis of Mann-Whitney U Test. Results showed that students involved in Voluntary Agricultural Field-Work have better Spiritual Intelligence ( $Z_u = 4.938$ ,  $p < 0.01$ ) and Working Memory ( $Z_u = 2.730$ ,  $p < 0.01$ ) than those students not involved in Voluntary Agricultural Field-Work. The present investigation has implication with respect to improving the Spiritual Intelligence and Working Memory of students not involved in Voluntary Agricultural Field-Work.

#### **F62 The Matrix of Consciousness: Guru, the Ocean of Spirituality, Communicates with Disciples through Spiritual Force Field** (Surat Kumar, Bhakti Kumar, Kavita Kumar)

As it was proposed earlier, every individual has inherent spiritual domains in it, just like a ferromagnetic material has magnetic domains. These spiritual domains are influenced by the Guru through spiritual force field in the process of spiritualization, just like a ferromagnetic material gets magnetized. Spiritualization, not only works in close proximity of Guru, but Guru can also effect spiritualization from a distance, through spiritual attribute of spiritual force field. This process of spiritualization can manifest its effects also through electrical, magnetic and gravitational forces of the physical world/existence. The spiritual force field is the prime force field existed in the Supreme Being/Reservoir of Spirituality, before the universe was created. It has its impression on the forces of physical world. Spiritual force field cannot be detected by tools of this physical world; however, its manifested effects can be measured or observed by physical tools.

Some effects like manifestation of  $\gamma$ -waves in the presence of the Guru creates resonance with the spirit currents/domains of the disciples present in the congregation/proximity. Such resonance can still be generated by the Guru, even when the disciples are situated at far-off places. These effects are manifested easily when the disciples are in perfect communion with the Guru. This process of spiritualization induces the consciousness of the Guru in the disciples. But this spiritualization is quantized or manifests in step-by-step manner through levels/grades.

#### **F63 Epigenetics and Consciousness: Does the Correlation exist?** (Indu Shrivastava, Vineet Shrivastava, Kavita Kumar)

Does a molecular “sculpturing” process exist during development and adult life that takes adaptive cues from the environment (i.e., epigenetic mechanisms), or is this molding process purely stochastic in nature with selection doing the rest (i.e., genetic mechanisms)? (Borerelli et al, 2008). Cancer and other life threatening diseases are known to be caused due to genetic mutations. The effect of nutrients, environment and stress is proven in altering the genetic constitution. A recent study proved an increase in the risk of cancer by consumption of meat and animal products. Scientists are still trying to decipher the relation between one’s genotype and its relationship on one’s behavior. Is there a direct correlation between the food we eat, the air we breathe and how we handle our stress to the genetic constitution, which in turn contributes to the up regulation or down regulation of our consciousness? Alternatively, the quest is extrapolated to understanding whether a higher level of consciousness can help people overcome their genetic limitations.

#### **F65 Spirituality - “The Eastern Way of Conscious Living”-The Secret to the Eternal Life** (Achint Satsangi)

The methodology of the eastern religious tradition, particularly the Radhasoami Faith emphasizes on surrendering oneself to the Sant SatGuru-The perfect Living Master, who have incarnated from the (highest) Region of Pure Spirituality -The Nirmal Chetan Desh.

The aim is to follow the teachings of the Sant Satguru and lead a spiritual life. This also involves the practise of the Surat-Shabd-Yoga. Leading life on the principles of the Radhasoami Faith is also profitable in some terms in the physical world. The disciple, due to the Grace of the Almighty, may be able to gain access to the Higher Levels of Consciousness, which leads to increased wisdom and “subtle perception ability” or the development of the sixth sense.

The individual gradually realizes the transient nature of the physical world; and develops an understanding of almost all phenomenon and thus the answers to the questions- Who am I? Why was I born? Why something is happening?...etc. He is able to find all the answers and finally discovers the Ultimate Reality-becoming ONE with The Supreme Being.

**F66 Radhasoami Faith: The Modern Religion of Consciousness A Panacea for the Modern Man** (Prem Prakash Srivastava, Prem Kumari Srivastava, Umang Srivastava, Akshar Srivastava, Alakh Bhatnagar)

This research attempts to problematize two evasive concepts that are most challenging and perplexing to man. One deals with a futuristic remedy to end strife and discord in religions in form of a global religion of the future; the second is to understand the spiritual consciousness of man that responds to such a proposition. Truly said, "The third millennium ... demands a reordering of priorities in terms of the spiritual, and an urgent need for a relevant faith.... that speaks to the current and future concerns of our time. (Caleb Rosado).

Making quiet but sure strides, the Radhasoami Faith is overcoming modernity's dismal legacy of alienation and individualism. It stands at the juxtaposition of progressiveness and tradition; which is its unique enabling element and force too. In this paper, we will argue two main points: Firstly, if Radhasoami Faith is a global religion of the future, then how and at what level does it intersect and blend with the consciousness of the common man? And, secondly, if spiritual consciousness is transcendence that enables the disciple to reach higher levels of consciousness - a mystical consciousness - under the guidance of a Self-Realized (Tattwadarshi) Sadh Purusha, and is a Jivan Mukta, who himself has attained Super Consciousness, and whose sole purpose of life is the emancipation of humankind by dispelling the darkness of ignorance (Agyana). And, if such a religion can provide a panacea to the common man? This paper is an attempt to examine and evaluate such questions and offer a few solutions!

**F69 Quantum modelling of thoughts and The Sixth Sense** (Achint Satsangi)

The thoughts in mind can be considered as a Wave Function. The mind processes many thoughts simultaneously, and hence can be looked as a Superposition of Thought. The collapse of wave function or decoherence can be due to internal and the external factors. The external factors correlates to the sixth sense. What is Sixth Sense? The Eastern spiritual Traditions and the Western Science have different outlooks regarding its cause and existence.

Sixth sense is the "subtle perception ability". The observations of the East suggest that there exists a "mental space" and we all are "connected" through it. One's thoughts can affect others. How this works- When a person has developed a composition of thought, thought waves or "ripples" are created in the mental space of the source which sort of "interferes" with the thought function of the other - leading to collapse of the wave function.

Hence one is able to sense when someone is staring at self, one recollects image of an friend or relative suddenly, which happens when one focuses his line of thought to the other. This ability is further enhanced by meditation, and the followers of the spiritual religion have had advanced experiences.





# Additional TSC Conference Abstracts

**501 Sculptor** Dr. Stuart Ross Snider retired from private practice in neurology three years ago to become a full-time wood sculptor. His wood source is the conifer forest floor near the 9000 ft. meadow of Treasure Park, on Mt. Graham. This area is unique in Southern Arizona because it rises above the desert more than 7500' like a great altar in the cathedral of the sky. It has a mystical aura, in fog and rain and especially at sunset that is archetypical if not spiritual and mindful, presented to our consciousness.

In my sculpture **"Inner Thought"** I try to convey the concept that consciousness is a product of that brain activity which results in awareness, thinking, directed as well as spontaneous, and feeling. Art, poetry, and a spiritual sense of nature are based in conscious feeling. Thus the inscription on the base of the sculpture: "Evergreen tree falls to the forest floor. It is transcendent. Numinous visual primitives streaming, saturate the air surround." **"Brain Waves"**, the title of my second sculpture, refers specifically to the spectrum of the EEG recorded energy. In this sculpture, also made of found wood, the waves are outside and above the brain, which itself is elevated on a pillar of petrified wood. The color code is darkness and light, the non-dominant hemisphere is represented in dark blue, the dominant hemisphere is light red. The question motivating this: Can these brain signals be the basis of wordless communication between humans and computers? In my sculpture **"Evolution of Man, an Allegory of God, Mind and Computer"** I postulate (in symbols) that the origin of consciousness came suddenly and from outside of the track of Darwinian evolution. The giver of consciousness as well as mind and soul is God, however you understand Him. He is represented by small pearl crosses on two of the figures. The story presented is that in the distant future computers develop an all-destroying dark side, as in the movie, "Space Odyssey 2001". Yet, all is not lost because another species of humans can be created by the God, who remains at the metaphorical charred tree of Armageddon. **A1**

## **502 Consciousness and The Singularity** (Wolens, Doug)

The Singularity is defined as the point in time when computer intelligence exceeds human intelligence. This notion of superhuman machines has long served as fodder for tales of science fiction. Yet many scientific leaders argue that these changes are inevitable, based on the great strides being made in fields such as nanotechnology, artificial intelligence, and molecular biology. However, singularity advocates generally overlook the role that consciousness would play in creating super-intelligent systems. Ray Kurzweil, pointing to Moore's law and various information technologies that are advancing at an exponential rate, tells us that if we extrapolate the number of calculations-per-second a computer would have to meet in order to be on par with a human brain then machines with greater-than-human intelligence are just the corner. This reductive logic fails to address the complexity and nuance of consciousness as it regards the mind. While it may be possible to create systems with the speed and accuracy of the brain, it begs the question as to whether or not it could be conscious, in the way that we are conscious (without which, by definition, such intelligence cannot be greater-than-human). For this reason, the exploration of consciousness is a focal issue in THE SINGULARITY documentary. To that end Wolens attended Toward a Science of Consciousness in 2008. His interviews with leading scholars help shape the film's narrative, providing a rich discussion of the role consciousness would play in creating intelligent systems. Through interwoven conversations with David Chalmers, Christof Koch, Wolf Singer, Andy Clark, and Alison Gopnik (each on location in Tucson), juxtaposed with Kurzweil and others in the Artificial Intelligence field, THE SINGULARITY addresses the complexity of the questions the film seeks to answer, including the distinction between intelligence and consciousness as it regards creating a mind. Singer laughs at the idea and argues that building human consciousness would be impossible noting that there are too many possible states of the brain to recreate. Chalmers discusses the hard problem and measuring consciousness, conceding that were a robot to opine about feeling what it is to be a robot, then that may be enough for him. Koch explains that although we really know very little about consciousness we can now point to correlates of consciousness in the brain and that such efforts help us solve the problem in favor of a theory of the mind. Clark reminds us that we may not need to actually create consciousness for the singularity to occur but instead that the singularity can result from augmenting our minds or

working closely with machines. Finally Gopnik talks about the quality of machine consciousness, suggesting while that we may be able to create another conscious machine (reminding the viewer that we are conscious machines ourselves) but because they would not be “us” their consciousness would be different. Wolens’ *THE SINGULARITY* further addresses the moral and social implications were the singularity to occur, inviting the viewer to participate and come to his or her own conclusions regarding the future of science and humanity. Ultimately, if we become more machine-like, and machines more like us, will we sacrifice our humanity to gain something greater? Or will we engineer our own demise? Even if the answers are impossible to know, *THE SINGULARITY* makes clear that we cannot postpone addressing the questions. All Content © 2014 Doug Wolens.

### **503 Consciousness and Signification – Contemporary Human Sign – and (Digital) Toolmaking (Palucki, Patrick)**

Line of work of the artist and communication designer Patrick Palucki that deals with consciousness and signification processes. Palucki observes contemporary human sign- and (digital) toolmaking. He has gathered various artefacts from that field and has created works about such. A central idea is that any communication-technology, such as language, must reflect the conceptual systems of its maker(s). Therefor the semiotics of our artefacts will contain information about the status and the transformation of 21st century human views of the world and of the human position within it. As we are (successfully) striving to ever extend and transcend our physical reach and as we are continuously transferring communication and activities into the virtual realm and processing agency through it, we may look at what kind of signifiers are in use. While our digital tools often suggest a functional horizon of endless possibility their semantic suchness, i.e. design, displays anthropo-morph and -centric perspectivity as well. On the other hand we find an amount of symbols and signs that refer to holistic, philosophic or spiritual concepts or to extended inter-relatedness (being used to f.i. promote technology and commerce, propagate lifestyles or illustrate creativity and possibility). The semantic effect of signs and tools represents the potential to recursively shape our concept of reality. So, it is of interest how ideas are created and perpetrated through the semiotic suchness of the things we create - aside to a readiness or inevitability of progress or evolution. Therefor the question of reality and belief systems is central to this cyber-anthropological work. The work specifically aims to raise questions about primordial content, changes and novel items within consciousness. Some instances offer the occurrence of emergence or quantum properties able to be witnessed in the realm of signification.

### **504 “Press Pause: Reset Your life” - An experiential 10 minute docudrama taking the viewer on a brief journey into how one’s perceptions can shape one’s day, and how to shift this perception. (Cherry, Linda)**

Have you ever wondered if there was some magic spell, some grand recipe that could reshape your life or in some way allow you to just start over? “Press Pause: Reset Your Life,” offers a glimpse into how this is possible. The gift of a strange city and challenging circumstances forced the filmmaker to retreat into stillness and find her way back to herself. This film is a brief journey into how she and others have been able to shift out of the stress and chaos of life by simply taking time to pause, feel and be. Science, as well as personal accounts, demonstrates that one’s state of mind affects the state of one’s day. Highlighting certain tools, such as Western-Floatation/Sensory Deprivation Tanks and Eastern-Mindfulness-Based Meditation, results show that these, like other practices that allow one to pause, can help center and calm the mind and body, allowing for a shift in focus and consciousness. “Press Pause: Reset Your Life” takes the viewer on a brief journey into how the filmmaker, and others, have reset their lives, and how it continues to be a work in progress. As we move further and further into a digital world and a digital way of communicating, students of today and of the future need more experiential forms of instruction. Although I feel very strongly that face-to-face teaching is invaluable, it seems to be going the way of the horse and buggy, less and less effective for the fast-paced, multi-tasking generations. I have chosen to use documentary filmmaking as an important tool in my teaching; I feel a well-done piece of digital media is an effective form that can reach many people, as it is engaging, experiential,

visual and portable. Experiential learning is key, as it helps one to learn kinesthetically, interactively experiencing what is being taught. Along with kinesthetic learning, film engages the viewer visually and auditorily, increasing one's level of absorption. Since the viewer will be engrossed on multiple levels, particularly visually, there is also a possibility of stimulating the 'mirror neuron,' sensory neurons within the brain that fire to help one experience what it sees another experience, thereby allowing for the stimulation of the neural pathways for empathy. As the world changes, it is vital for academia to change with it. I believe integrating my research findings into a documentary format, that is engaging and informative, will allow it to reach more people and be more accessible to a broader scope of people.

**505 From the Campfire to the Movies... and Beyond! Consciousness and Storytelling** Nick Day & Sascha Seifert, filmmakers.

So, what's the story? Or to be more precise, what's the story of the story? How might telling stories be connected to consciousness? The emergence of language and the capacity for oral storytelling can be considered fundamental to becoming human. Our brains cannot help but seek the "story" of everything we see, hear or sense. Story favors survival by activating a powerful inner world of association and meaning. Storytelling itself is adaptive, having evolved over time, rewarding good stories, good story structure, and good storytellers. Humans also tell stories visually, from the earliest cave paintings to Michelangelo to Instagram. Cinema was the first form to truly integrate these modes, making a really good movie one of the richest experiences we can have. When we watch a movie, we readily enter an altered state akin to hypnosis, a waking dream. While neuroscience is discovering more about how what goes on in the brain when we watch a movie, it is our appetite to be engaged by story that keeps us coming back for more. In part one of this presentation, award-winning filmmaker Nick Day discusses the evolution of storytelling and how it might relate to consciousness. He also looks at the formal language of cinema and the transformational nature of film, with reference to selected movies, including his latest film on consciousness, *Mindville*. In part two, producer Sascha Seifert explores the evolution of storytelling in the digital age. *Mindville* is a motion picture in development, but while once it might have been only a film project, in 2014 it's also considered a transmedia project. Today's filmmakers post, tweet, share, pin, integrate and connect, as well as making their movie. With secondary content, line extensions, crossmedia and intermedial formats ranging from mobile to tablets, from flat rates to 3D event films, from social media to the internet, the ways audiences consume, perceive and interpret content multiply every year -- yet sometimes it seems as if we're simply discovering more ways to consume. Will the premiere screening of *Mindville* be simulcast in theatres, on pay-per-view TV and Google Glass? Is Facebook now the primary launch pad to build a global audience? Could the diversity of delivery channels influence how we produce the film? Or do we affect and influence our audience by the way we present consciousness on film? Online we perceive the world through the eyes of the media. And we mirror this by our reactions. Sophisticated algorithms monitor and influence our behavior and emotions in ways we may not even recognize. Has story itself become lost in the plethora of channels? Using examples from his daily work, Sascha provides an overview of the changing landscape for storytelling through media and how this might affect consciousness.



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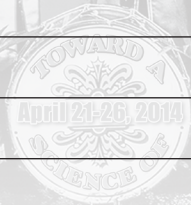
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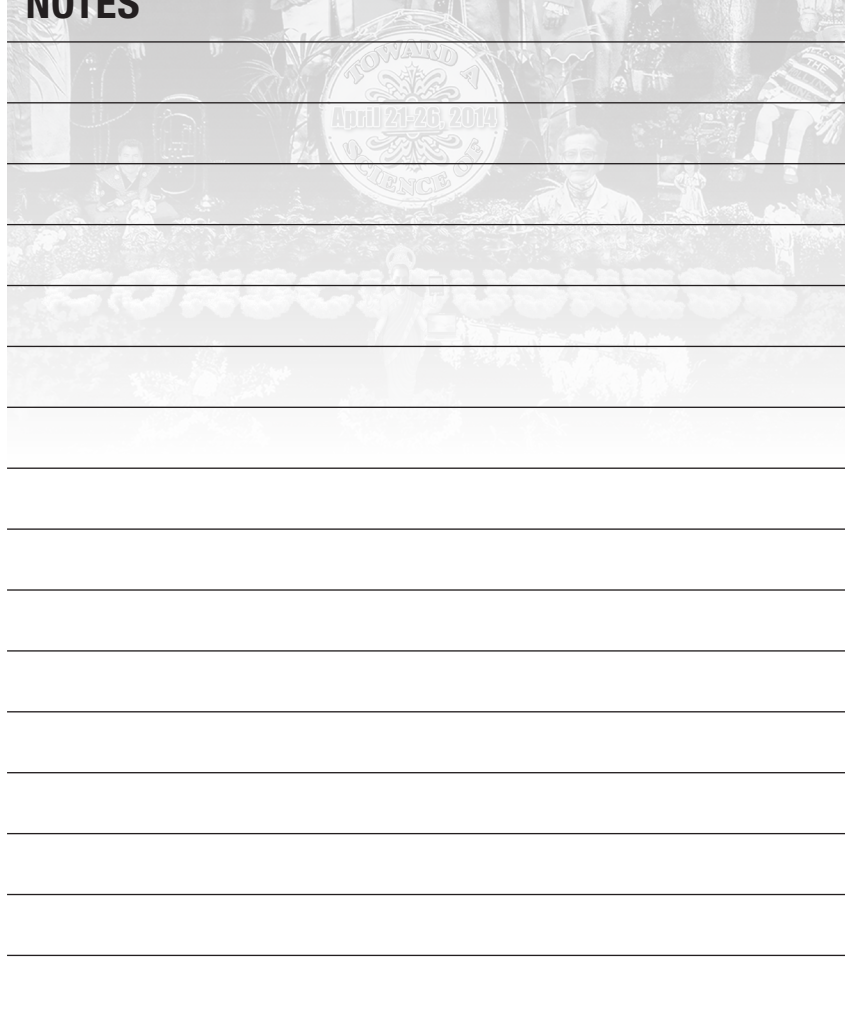
“It was twenty years ago today!”

## NOTES



“It was twenty years ago today!”

## NOTES



TOWARD A SCIENCE

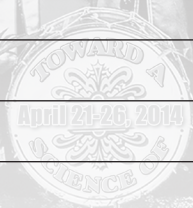
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“It was twenty years ago today!”

## NOTES

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