

The University of Arizona – Center for CONSCIOUSNESS STUDIES

*Presents*

# THE SCIENCE OF CONSCIOUSNESS

**JUNE 5-10, 2017**

**La Jolla, California**

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# THE SCIENCE OF CONSCIOUSNESS

## **The Science of Consciousness 2017 !**

June 5-10, 2017, Hyatt Regency La Jolla at Aventine, San Diego, California

Welcome to the 24th annual 'The Science of Consciousness' ('TSC'), the premier interdisciplinary conference on all aspects of the nature of conscious experience, awareness, feelings and existence.

TSC 2017 San Diego is a 6-day gathering consisting of Plenary Sessions, Pre-Plenary Workshops, Evening Concurrent Talks and Poster Sessions, Technology and Art Exhibits, Social Events and Entertainment.

We thank our sponsors, program committee, support staff, hosts, presenters and registrants for making TSC possible. We especially acknowledge the extraordinary efforts and many years of service of Abi Behar-Montefiore, Assistant Director of the Center for Consciousness Studies at the University of Arizona. Without Abi, The Center and TSC conferences would not be possible.

We are grateful to Senior Graphic Designer, Debra Bowles of BioCommunications at the University of Arizona for her overall contribution to present this event through AV production and design concepts.

Continued gratitude to SBS web guru Ed Xia for many years of IT support. We appreciate the additional support from UAHS BioCommunications team members: Television production team including Erica Rankin, Ricky Bergeron, and Rita Ellsworth UAHS BioCommunications Director.

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. We used the Sunglassed Brain in 2011. Debra Bowles worked on creating the "Surfer Dude" with Dr. Stuart Hameroff (no resemblance intended).

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.

**Thank you to our 2017 Plenary:**

Sir Roger Penrose, Joscha Bach, James Tagg, Noam Chomsky, Tom Bever, Michael Spivey, Matthew Fisher, Travis Craddock, Marom Bikson, John JB Allen, Marvin Berman, Michael Rohan, Ivette Fuentes, Brian Keating, Daniel Sheehan, Hartmut Neven, Elaine Chew, Scott Makeig, Gentry Patrick, Georg Northoff, Stephen Grossberg, Leon Chua, Jack Tuszynski, Charles Stevens, VS Ramachandran, Peter Fenwick, Lakmir Chawla, Anirban Bandyopadhyay, Jiawei Dai, Erik Viirre, Yingjin Xu, Deepak Chopra, Bruce Damer, Alysson Muotri, Stuart Hameroff

**Continued gratitude to our initial sponsors, the Fetzer Institute and the YeTaDel Foundation who supported us for many years.**

**Finally, this year's sponsors have made this La Jolla Conference a reality**

Center for Consciousness Science, University of Michigan, Ann Arbor  
Mani L. Bhaumik Institute for Theoretical Physics, UCLA, Los Angeles

The Roger Penrose Institute, La Jolla

Quantum Gravity Research, Los Angeles

Dennis Balson

Arthur C. Clarke Center for Human Imagination

Alvin J. Clark Foundation

Gratitude America Ltd.

NICE Lab, (Non-Invasive Cognitive Enhancement Lab, University of New Mexico)

HEAD Penn / KCUT

**We also thank**

The Deepak Chopra Foundation for their support

The DEI Dayalbagh Educational Institute , Agra, India (DEI) for their special efforts to bring the Integrated East West Forum to TSC and to Vishal Sahni for his dynamic coordination efforts on the Forum and the Simulcast. To Saatviki Gupta for her many hours of support coordinating the large group abstract submission and notification efforts.

Thank you to Consciousness Central TV Nick Day, Host and team Sascha Seifert (Conscious Pictures); Jason Canfield (video production) and Will Reid.

Thank you to the Tucson-based Commotion Studios who were able to work with us on this intense program again and to provide us with excellent plenary session video files to upload after the conference. Thank you Matt George and Team.

## **WELCOME** to The Science of Consciousness 2017

### **Volunteers & Friends of the Center for Consciousness Studies**

#### **Thank you for all you do!**

Penny Valladares

Amatista Rodriguez Rush

Konscious Kidz

Cortland "C.J." Montefiore

Victor Paz Mendoza (UA)

Joshua William Maxwell (UNM)

Melanie Lamphere (UNM)

Chris Cutter (UNM)

Angela Combs (UNM)

Tucker Peck (UA)

Amit Moses

Naama Kostiner

Special thanks to James Tagg and Betsy Bigbee for site visits to La Jolla and to Jay Sanguinetti for organizing the Technology Exhibits and Abi for the Art Exhibits.

#### **Prizes provided by**

Penny's Potions

HEAD/Penn

Center for Consciousness Studies

Hyatt Regency La Jolla at Aventine

#### **Thank you to all the staff at Hyatt Regency La Jolla at Aventine**

**Meredith Van der Walt** *Associate Director of Events*; **Lauren Adams** *Associate Director of Sales*; **Michelle Basile** *Reservation Supervisor*

#### **Press Requests:**

All press must apply for credentials and complete an online registration form

No filming/podcasting or studio set ups without permission

**Contact: Abi Behar-Montefiore** 520-247-5785

center@u.arizona.edu

On behalf of the Program Committee, **James Tagg**, **Erik Viirre**, **Betsy Bigbee**, **Jay Sanguinetti**, **Paavo Pytkkanen**, and **Abi Behar-Montefiore**

#### **Have a great time and enjoy the conference!**

**Stuart Hameroff**

*Program Chair TSC 2017*

*Director, Center for Consciousness Studies at the University of Arizona*



## **Important Hotel Contact Information**

HYATT REGENCY LA JOLLA AT AVENTINE

3777 La Jolla Village Drive, San Diego, CA 92122, USA

T +1.858.552.6013 E

Lajolla.regency.hyatt.com

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## **Telephone Numbers**

### **Hotel Contact Sheet**

Hotel Line: (858) 552-1234

Hotel Operator (from hotel phone) Dial "0" In Room

Dining (from hotel phone) Dial "54"

**<https://www.sandiego.org/>**

### **The Official Visitor Center - San Diego**

Click on the language of your choice.

<https://www.sandiego.org/plan/visitors-information-services.aspx>

### **Things to Do**

<https://www.sandiego.org/explore/things-to-do.aspx>

### **Highlights in San Diego**

<http://hotels.sandiego.org/attraction/list/246>

### **La Jolla**

UCSD Birch Aquarium (858) 534-FISH

The Beach - La Jolla Shores

Dukes Restaurant

(parking available at the above locations)

### **San Diego**

SeaWorld

San Diego Zoo

LEGOLAND

San Diego Zoo Safari

USS Midway Museum

San Diego Speed Boat Adventures

Old Town Trolley Tours of San Diego

San Diego Sailing Tours

**<http://hotels.sandiego.org/attraction/single/246/4>**

## **WELCOME** to The Science of Consciousness 2017

### **DINING: Hyatt Regency La Jolla at Aventine**

**Delicious Dining in La Jolla at the Hyatt Regency**

**Hyatt Regency Hotel Restaurants and Coffee Shops**

**Information/Reservations**

**Tel: +1 858 552 1234**

**<https://lajolla.regency.hyatt.com/en/hotel/dining.html>**

#### **Perk's Coffee**

in house - grab and go

Hyatt Regency

5:30 am – 9:00 pm

Coffee, snacks, breakfast, sandwiches

858-552-1234 – coffee and breakfast

5:30 am – 11:00 am bagels and croissants;

after 11 am, Italian sandwiches and sushi, salads, soups (\$8-10)

Snacks – chips, granola bars, bottled water, juices, \$2.50 and up

Coffee (Starbucks coffee brand) \$3-\$5

#### **DRIFT Restaurant**

eat + drink

California modern cuisine

Hyatt Regency In House Restaurant

in house restaurant 11 am – 12 midnight

Lobby floor

858-552-1234

4-7 pm \$10 shares or Flatbreads...everyday.

Monday \$10 Margaritas \$ 2 chip and salsa

Tuesday \$ 3 Drift tacos and \$ 4 Pacifico

Wednesday- half off select bottles of wine

Thursday live music 6-9

Draft beers \$5 from 6-9

Fri late-night happy 10-12 am

Saturday \$10 Martinis Absolute or Beefeater

Sunday 11 am to 4 pm - Bloody Mary and bottomless Mimosas from

\$13+ appetizers

\$16+ flatbreads

\$14+ sandwiches w/chips, soup or salad

Happy hour 4-7 \$5 Beers, Carafe of wine

save \$4 off carafes of wine (\$18+) now \$14 +

flatbreads and the appetizers \$10;

Desserts - \$9 and up

## **Dining in Restaurant Village: across the Street from the Hyatt Regency**

### **Café Japengo – Japanese Asian Fusion**

Located in Restaurant Village

Assorted eclectic, Mediterranean, French, Asian

Vegan sushi and gluten free menu

\$ 20 and up for entrees; Happy Hour Treats

11:30 am – 2:30 pm and 5-9:30

Tel 858-450-3355

[www.cafejapengo.com](http://www.cafejapengo.com)

*\* You may charge your Café Japengo meal to your room at the Hyatt Regency Hotel.*

Happy Hour – Daily – M-F 4:30 pm – 5:30 pm at the sushi bar

Happy Hour – Daily – M-F 4:30 pm – 7:00 pm at bar in patio

Happy Hours – Saturday – all night at bar and patio only ½ off on drinks and selected sushi

### **Fleming's Prime Steakhouse**

Steaks – \$45 and up

858-535-0078

M-Thur 5:00 pm – 10:00 pm

Fri/Sat 5:00 pm – 11:00 pm

Sun 11:00 am – 9:00 pm

### **The Melting Pot**

Fondue –

wide range \$30 and up

M-Thur 4:00 pm – 9:00 pm

Fri 4:00 pm – 10:00 pm

Sat 4:00 – 10:00 pm

Sun 4:00 – 9:00 pm

### **Truluck's**

Seafood Steak & Crab House

\$50-75

M – Sat 5:00 pm – 10:00 pm

Sun 5:00 pm – 9:00 pm

## **Room Service Menu**

see current menu in the rooms on the desk.

## **Ocean Views – Great Sunsets**

Take an Uber to:

## **Duke's La Jolla – for breakfast lunch and dinner**

Hawaiian Inspired – Fantastic Ocean Views

858-454-5888

Mon-Fri 10:00 am – 9:30 pm

Sat and Sun 8:00 am – 9:30 pm

Pancakes, Salads, Seafood Hot Pot

## **Ralph's grocery store**

Have the Bellman order you an Uber

## **Head for the Beaches**

Order an Uber to check out a variety of nearby La Jolla Beaches:

La Jolla Shores, Mission Beach and Pacific, Wind and Sea

## **Pharmacy**

CVS

24 hour – La Jolla Village Square

8831 Via La Jolla Drive

858-457-4480

## **History of TSC**

The Science of Consciousness' ('TSC') is the world's largest and longest-running interdisciplinary conference on all aspects of the nature of conscious experience, awareness, feelings and existence. Questions include how the brain produces consciousness, whether consciousness is intrinsic to the universe, or an epiphenomenal illusion, how consciousness can causally affect brain processes, what are the best empirical theories, do we have free will, how did life and consciousness originate and evolve, what are the origins of moral and aesthetic values, how can we improve mental, physical and cognitive function, and can consciousness persist after bodily death, e.g. through 'uploading' to machines, or via mental processes tied to the natural world? These and other relevant questions are approached through many disciplines in science, philosophy, culture and contemplative practices. 'TSC' began at the University of Arizona in Tucson in 1994, and returns there in even-numbered years, alternating with TSC conferences around the globe (Italy, Denmark, Japan, Hungary, Hong Kong, Sweden, India, Czech Republic, Finland). The TSC 2017 conference will consist of Plenary Sessions, Pre-Plenary Workshops, Evening Concurrent Talk and Poster Sessions, Technology and Art Exhibits, Social Events, Entertainment and Satellite Excursions.

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

- 1995** Ischia, Italy – Chloe Taddei-Ferretti
- 1997** Elsinore, Denmark – Alwyn Scott
- 1999** Tokyo, Japan – UN University, Mari Jibu, Kunio Yasue
- 2001** Skovde, Sweden – University of Skovde, Paavo Pyllkanen
- 2003** Prague, Czech Republic – Ivan Havel
- 2005** Copenhagen, Denmark – Morten Overgard
- 2007** Budapest, Hungary – George Kampis
- 2009** Hong Kong, China – Hong Kong Polytechnic
- 2011** Stockholm, Sweden – Christer Perfjell
- 2013** Agra, India – Dayalbagh Educational Institute , Rev. Prof. P.S. Satsangi, Vishal Sahni
- 2015** Helsinki, Finland – University of Finland, Paavo Pyllkanen
- 2017** San Diego, La Jolla California  
CCS-TSC University of Arizona, Stuart Hameroff

## **Program Committee**

Stuart Hameroff (Chair), Abi Behar-Montefiore, Betsy Bigbee, James Tagg, Erik Viirre, Jay Sanguinetti, Paavo Pyllkanen

## **Conference Director**

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



THE SCIENCE OF  
**CONSCIOUSNESS**

# THE SCIENCE OF CONSCIOUSNESS

## SESSIONS SUMMARY

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### PLENARY SESSIONS

### Aventine Ballroom

PL 1 *Can Machines Be Conscious?*

**Tuesday, June 6, 2017**

2:00 PM – 4:10 PM

PL 2 *Language and Consciousness*

**Wednesday, June 7, 2017**

8:30 AM – 10:40 AM

PL3 *Biophysics 1 – Memory, Spin and Anesthesia*

**Wednesday, June 7, 2017**

11:10 AM – 12:30 PM

PL 4 *Non-Invasive Brain Stimulation Panel*

**Wednesday, June 7, 2017**

2:00 PM – 4:10 PM

PL 5 *Physics, Cosmology and Consciousness*

**Thursday, June 8, 2017**

8:30 AM – 10:40 AM

PL 6 *Music and the Brain*

**Thursday, June 8, 2017**

11:10 AM – 12:30 PM

PL 7 *Neuroscience and Consciousness 1*

**Thursday, June 8, 2017**

2:00 PM – 3:30 PM

PL 8 *Neuroscience and Consciousness 2*

**Friday, June 9, 2017**

8:30 AM – 10:40 AM

PL 9 *Biophysics 2 – Memristors in the Brain?*

**Friday, June 9, 2017**

11:10 AM – 12:30 PM

PL 10 *Neuroscience and Consciousness 3*

**Friday, June 9, 2017**

2:00 PM – 4:10 PM

PL 11 *Vibrations, Resonance and Consciousness*

### Vicino Ballroom

**Saturday, June 10, 2017**

9:00 AM – 11:10 AM

PL 12 *Eastern Philosophy*

**Saturday, June 10, 2017**

11:40 AM – 1:00 PM

PL 13 *Origin and Evolution of Life  
and Consciousness*

**Saturday, June 10, 2017**

2:30 PM – 4:40 PM

# PROGRAM HIGHLIGHTS

## PLENARY PROGRAM

PL 1 – PL 10

Aventine Ballroom

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### TUESDAY JUNE 6, 2017

**PL1 2:00 am to 4:10 pm**

***Can Machines be Conscious?***

Sir Roger Penrose, Oxford University

Joscha Bach, Harvard University

Hartmut Neven, Google

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### WEDNESDAY JUNE 7, 2017

**PL2 8:30 am to 10:40 am**

***Language and Consciousness***

Noam Chomsky, Massachusetts Institute of Technology

Tom Bever, University of Arizona

Michael Spivey, UC-Merced

**PL3 11:10 am to 12:30 pm**

***Biophysics 1 - Memory, Spin and Anesthesia***

Matthew Fisher, UC-Santa Barbara

Travis Craddock, Nova Southeastern

**PL4 2:00 pm to 4:10 pm**

***Non-invasive Brain Stimulation Panel***

Marom Bikson, CCNY

John JB Allen, University of Arizona

Marvin Berman, Vielight

Michael Rohan, Harvard University

### Thursday June 8

**PL5 8:30 am to 10:40 am**

***Physics, Cosmology and Consciousness***

Ivette Fuentes, University of Nottingham

Brian Keating, UC-San Diego

James Tagg, Cengage, The Penrose Institute

**PL6 11:10 am to 12:30 pm**

***Music and the Brain***

Elaine Chew, St Mary's University London

Scott Makeig, UC-San Diego



**PL7 2:00 pm to 3:30 pm**

***Neuroscience and Consciousness 1***

Stephen Grossberg, Boston University

Georg Northoff, University of Ottawa

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**FRIDAY JUNE 9**

**PL8 8:30 am to 10:40 am**

***Neuroscience and Consciousness 2 - Anomalies***

Daniel Sheehan, UC-San Diego

Peter Fenwick, University College, London

Lakhmir Chawla, George Washington University

**PL9 11:10 am to 12:30 pm**

***Biophysics 2 - Memristors in the Brain?***

Leon Chua, UC-San Francisco

Jack Tuszynski, University of Alberta

**PL10 2:00 pm to 4:10 pm**

***Neuroscience and Consciousness 3***

Gentry Patrick, UC-San Diego

VS Ramachandran, UC-San Diego

Charles Stevens, Salk Institute, UC-San Diego

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**SATURDAY JUNE 10**

**Vicino Ballroom**

**PL11 9:00 am to 11:10 am**

***Vibrations, Resonance and Consciousness***

Anirban Bandyopadhyay, NIMS, Tsukuba, Japan

Jiapai Dai, South Central University, China

Erik Viirre, UC-San Diego

**PL12 11:40 am to 1:00 pm**

***Eastern Philosophy***

Yingjin Xu, Fudan University, China

Deepak Chopra, Chopra Foundation, UC-San Diego

**PL13 2:30 pm to 4:40 pm**

***Origin and Evolution of Life and Consciousness***

Bruce Damer, UC Santa Cruz

Alysson Muotri, UC-San Diego

Stuart Hameroff, University of Arizona

## PRE-PLenary WORKSHOPS (PPW)

Included with registration; no additional fees for registrants

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### MONDAY MORNING WORKSHOPS

**June 5, 2017 – 9:00 am to 1:00 pm**

#### PPW SESSION 1

- |  |                          |
|--|--------------------------|
| <b>1. DEI Integrated East-West Forum 1</b><br>(Dayalbagh Educational Institute , Agra, India)                  | <b>Aventine Ballroom</b> |
| <b>2. Artificial Intelligence and Machine Consciousness</b><br>(Tagg, Bach, Neven, Penrose, Rimmel, Verschure) | <b>Syros</b>             |
| <b>3. Tenniscentric</b><br>(see times below)   | <b>Tennis Courts</b>     |
| <b>4. Yoga and Meditation</b><br>(see times below)   | <b>Vicino Garden</b>     |

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### WORKSHOPS

#### Daily:

- |                                     |                      |
|-------------------------------------|----------------------|
| <b>Meditation</b> – 6:30 – 7:00 am  | <b>Vicino Garden</b> |
| <b>Yoga</b> – 7:15 – 8:00 am        | <b>Vicino Garden</b> |
| <b>TennisCentric</b> 7:00 – 8:00 am | <b>Tennis Courts</b> |

#### Afternoon Meditation and Yoga: M, T, Thur, Fri,

Daily Meditation Time: 4:30-5:00 PM

Daily Yoga Time: 5:15 - 6:00 PM

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### MONDAY AFTERNOON WORKSHOPS

**June 5, 2017 – 2:00 pm to 6:00 pm**

#### PPW Session 2

- |   |                          |
|---|--------------------------|
| <b>1. DEI Integrated East-West Forum 2</b>  | <b>Aventine Ballroom</b> |
| <b>2. Brain Stimulation/Consciousness Technology</b><br>(Bikson, Sanguinetti, Berman, Rohan, Martin)      | <b>Delphi</b>            |
| <b>3. Resonance, Life and Consciousness</b><br>(Schooler, Hunt, Bandyopadhyay, Craddock, Grossberg, Chew) | <b>Athena A</b>          |
| <b>4. Consciousness and the Arts</b><br>(Day, Seifert, Kostiner, Electra)                                 | <b>Syros</b>             |
| <b>5. Consciousness Healing Initiative</b><br>(Jain, Guarneri, King, Muehsam, Vieten)                     | <b>Mykonos A</b>         |

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## MONDAY EVENING SPECIAL LECTURE

**6:30 pm to 8:00 pm**

**Sir Roger Penrose**

***Fashion, Faith and Fantasy and the Big Questions  
in Modern Physics***

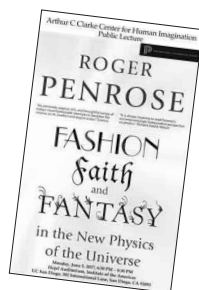
**Institute of the Americas**

10111 N. Torrey Pines Rd. • La Jolla, CA 92037 USA

<https://www.iamericas.org/en>

30 minute walk, 8 minute ride

Simulcast to Hyatt Regency La Jolla



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## TUESDAY MORNING WORKSHOPS

**June 6, 2017 9:00 am to 1:00 pm**

**PPW Session 3**

**1. Language and Consciousness**

(Bever T., Chomsky, Spivey, Bever, O)

**Mykonos A**

**2. Deepak Chopra - 'The enlightened brain'**

**Syros**

**3. David Bohm Centennial**

(Pylkkanen, Musser, Waliczek)

**Athenia A**

**4. Quantum Brain Biology**

(Craddock, Tuszynski, Hameroff, Bandyopadhyay)

**Aventine Ballroom**

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## EXHIBITS

**Grand Foyer & Barcino**

**Vie light**

Infrared Photomodulation and Neurofeedback for Alzheimer's disease

**Marvin Berman**

**Soterix**

Transcranial Direct Current Stimulation

**Abhishek Datta**

**Roger Penrose Institute UCSD**

Creativity Inspiration

**James Tagg, Erik Viirre**

**McLean Hospital, Harvard Medical School**

Low-field magnetic stimulation

**Michael Rohan**

**Arthur C. Clarke Center at UCSD**

Assembly

**Sheldon Brown**

**University of Arizona Center for Consciousness Studies**

Transcranial ultrasound ('TUS') program

**Chris Chan, Betsy Bigbee, Stuart Hameroff, Jay Sanguinetti**

**National Institute of Material Science, Tsukuba, Japan**

Visualizing microtubule information processing

**Anirban Bandyopadhyay**

**University of Alberta**

Unfolding misfolded proteins to treat neurodegenerative disease

**Jack Tuszynski**

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**ARTISTS****Grand Foyer & Barcino****Paul Thomas, University of New South Wales**

New Visual Languages and the Speculative Nature of the Quantum Universe

**Jens Pilegaard, 2Salty Dogs**

Musings on Captured Moments

**Margaret Dolinsky, Indiana University**

Creativity and its Mediation for Navigating between Reality and Virtual Reality

**Pam Payne, Plymouth University**

The Telenoetic Medium - Video Mnemonic Device to Facilitate Meditative States of Consciousness

**Naama Kostiner**

Create Your Own Flow - Discovering The Benefits of Creative Processes and Their Ability To Innovate Flow

## SOCIAL EVENTS

**Tuesday, June 6, 2017**

**7:30-9:30 PM**

*Opening Reception*

**Vicino Ballroom**

**Wednesday, June 7, 2017**

**9:00 to 11:00 pm**

*Club Consciousness*

QUALIATIK, 'Dorian Electra and the Electrodes'

**Barcino**

**Thursday, June 8, 2017**

**6:00 to 10:00 pm**

*Conference Banquet*

Elaine Chew, Piano Recital

**Vicino Ballroom**

**Friday, June 9, 2017**

**9:00 pm to 11:00 pm**

*Club Consciousness*

Scott Makeig – Brain Music Concert

QUALIATIK, 'Dorian Electra and the Electrodes'

**Aventine Ballroom**

**Saturday, June 10, 2017**

**8:00 pm to Midnight**

*Poetry Slam, Talent Show, Finals – Creativity Competition*

'End-of-Consciousness Party'

**Vicino Ballroom**

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## CONCURRENT TALK SESSIONS

**Concurrent talk sessions 1-8, Tuesday June 6, 5:00 to 7:05 pm**

**Concurrent sessions 9-16, Wednesday, June 7, 5:00 to 7:05 pm**

**Concurrent sessions 17-24, Friday June 9, 5:00 to 7:05 pm**

Speakers, titles and abstracts will be posted

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## CONCURRENT SESSIONS

**Tuesday June 6, 2017**

**5:00 PM – 7:05 PM +**

- C 1 Dualism and Panpsychism
- C 2 Memory and Consciousness
- C 3 Artificial Intelligence/Virtual Reality 1
- C 4 Consciousness and Molecular Biology
- C 5 Consciousness and Models of Reality 1
- C 6 Altered States of Consciousness
- C 7 Quantum Onologies 1
- C 8 Consciousness and Social Interactions

**Mykonos**  
**Athenia**  
**Delphi**  
**Milos**  
**Rhodes**  
**Syros**  
**Aventine Ballroom**  
**Andros**

## Wednesday June 7, 2017

### 5:00 PM – 7:05 PM +

- C 9 Free Will and Intentionality
- C 10 Complexity and Brain Organization
- C 11 Language and Autism
- C 12 Consciousness and Evolution
- C 13 Meditation and Consciousness
- C 14 Consciousness and Quantum Measurement
- C 15 Consciousness and Models of Reality 2
- C 16 Vibrations, Resonance and Consciousness

**Mykonos**  
**Athenia**  
**Delphi**  
**Milos**  
**Rhodes**  
**Aventine Ballroom**  
**Syros**  
**Andros**

## Friday, June 9, 2017

### 5:00 PM – 7:05 PM +

- C 17 Explanatory Gap and Intentionality
- C 18 Neuroscience Topics
- C 19 Consciousness and Unconscious Processes
- C 20 Mind Body
- C 21 Artificial Intelligence and Models of Reality
- C 22 Consciousness and Models of Reality 3
- C 23 Consciousness and the Arts
- C 24 Quantum Ontologies 2

**Mykonos**  
**Athenia**  
**Dephi**  
**Milos**  
**Rhodes**  
**Syros**  
**Andros**  
**Palatine**

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## POSTER SESSIONS

**Poster Session 1**      **Barcino & Foyer** (shared with Exhibitors)  
**Wednesday June 7**  
**7:00 to 10:00 pm**

**Poster Session 2**      **Barcino & Foyer** (shared with Exhibitors)  
**Friday June 9**  
**7:00 to 10:00 pm**

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## DAILY ACTIVITIES:

**Meditation** – 6:30 – 7:00 am

**Vicino Garden**

**Yoga** – 7:15-8:00 am

**Vicino Garden**

**TennisCentric** – 7:00-8:00 am

**Tennis Courts**



# THE SCIENCE OF **CONSCIOUSNESS**

# INDEX TO PLENARY SESSIONS

PL 1 – PL 13

Tuesday, June 6 through Saturday, June 10

(PL1 Tues | PL2-4 Wed | PL5-7 Thurs | PL8-10 Fri | PL11-13 Sat)

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## TUESDAY

### *PL1: Can Machines Be Conscious?*

- ▶ **Roger Penrose**, How can Consciousness Arise within the Laws of Physics?
- ▶ **Joscha Bach**, Consciousness as a Memory of Coordinating Attention: The Conductor Model of Consciousness
- ▶ **Hartmut Neven**, Language, Consciousness and Embodied Cognition

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## WEDNESDAY

### *PL2: Language and Consciousness*

- ▶ **Noam Chomsky**, Language and Unconscious Mental Acts
- ▶ **Thomas Bever**, Three aspects of (un)conscious processing in language and its normal use.
- ▶ **Michael J Spivey**, Language, Consciousness and Embodied Cognition

### *PL3: Biophysics 1 - Memory, Spin and Anesthesia*

- ▶ **Matthew Fisher**, Are we quantum computers, or merely clever robots?
- ▶ **Travis Craddock**, A Unitary Mechanism of Anesthesia?: Altering Collective Oscillations in Microtubules

### *PL4: Non-invasive Brain Stimulation Panel*

- ▶ **Marom Bikson**, Non-invasive brain stimulation devices to change thought and behavior
- ▶ **John Allen**, Transcranial Ultrasound, Mood, and Resting State Network Connectivity
- ▶ **Marvin Berman**, Integrating noninvasive photobiomodulation - and neuromodulation - techniques to remediate cognitive and behavioral symptoms in neurodegenerative and neuropsychiatric disorders.
- ▶ **Michael Rohan**, The Effects of Low Field Magnetic Stimulation on Mood and Brain Function



**THURSDAY**

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There will be 24 Concurrent Sessions at this year's TSC2017. Concurrent talks are 20 minutes each, with 5 minutes for questions. There are 5 or more speakers per session, covering focused areas of the same theme. (LCD projectors and laptops available.)

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# ART/TECH/HEALTH EXHIBITS

A1

## *A1: Art/Tech/Health Exhibits @ Demos*

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- ▶ **Margaret Dolinsky**, Creativity and its Mediation for Navigating between Reality and Virtual Reality
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- ▶ **Pam Payne**, The Telenoetic Medium - Presentation of The Author's Video Artwork, A Mnemonic Device to Facilitate Meditative, Noetic States of Consciousness
- ▶ **Jens Pilegaard**, Musings on Captured Moments
- ▶ **Naama Kostiner**, Create Your Own Flow - Discovering the Benefits of Creative Processes and Their Ability to Innovate Flow

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# 1.0 Philosophy

## 1.01 The concept of consciousness

**1 Consciousness as a Memory of Coordinating Attention: The Conductor Model of Consciousness** Joscha Bach <joscha.bach@gmail.com> (Harvard Program For Evolutionary Dynamics, Cambridge, MA )

In the perspective of AI, minds are best understood as computational systems that create and maintain dynamic generative models in the service of complex regulation needs. Our brains create hierarchies of function approximators from low-level percepts, over dynamic sensory motor scripts, to conceptual manifolds and linguistic abstractions. Our experiences do not have sensory data or physical reality as their object, but generative simulations produced within our neocortex, a dream anchored in the sparse impulses generated by sensory nerves. This simulation is the data structure that currently best predicts what impulses our nerves are going to discover next. In the 1960ies, Ray Solomonoff argued that the best model of the world that a computational mind can come up with is the shortest program among those that best predict the next observation from all past ones, for all available observations. Machine learning can be understood as approximating Solomonoff induction, by capturing the apparent invariances of the world in a static model, and its variance as a state of that model. By varying the state, such a model cannot only capture the current state of the world, but be used to anticipate and explore possible worlds, to imagine, create and remember. The compositionality of mental representations is probably achieved on the level of cortical columns, circuits that contain between 100 and 400 neurons, organized into more than 50 cortical areas. These are the instruments in the orchestra that plays the music of our mind. The activity of the cortical orchestra cannot be experienced as a whole, but there is a brain area that acts as a conductor. Probably facilitated via dorsolateral prefrontal cortex, anterior cingulate cortex and anterior insula, it has attentional links into most regions. Its role is similar to a conductor in a real orchestra: executive function and feedback on the performance of the individual instruments. Without the presence of the conductor, our brain can still perform most of its functions, but we are sleep walkers, capable of coordinated perceptual and motor action, but without central coherence and reflection. Each nervous system process serves to regulate a part of the organism and its environment. The conductor regulates the function of the neocortex itself. In each moment, it directs its attention to one or a few of the cortical instruments, while others continue to play unobserved in the background. To learn and to reflect, the conductor maintains a protocol of what it attended to, as a series of links to experiences generated by the other cortical instruments. This is the only place where experience is integrated. Consciousness may be understood as the most recent memory of what our prefrontal cortex attended to. Thus, conscious experience is not an experience of being in the world, or in an inner space, but a memory. It is the reconstruction of a dream generated more than fifty areas, reflected in the protocol of a single region. By directing attention on its own protocol, the conductor can store and recreate a memory of the experience of being conscious. **PL1**

**2 The Concept of Consciousness and The Bogeyman of Conflation** Dylan Black <dylblack@indiana.edu> (Philosophy, Indiana University Bloomington, Bloomington, INDIANA )

A widely-held view in the philosophy of mind is that the term “consciousness” expresses distinct, easily conflated concepts. Call this the multiple concepts view. I criticize the evidence for the multiple concepts view and I offer some preliminary support for univocalism, the view that there is just one concept of consciousness. **THEORETICAL DIVERSITY:** I begin by criticizing the common suggestion that diversity among definitions and theories of consciousness is evidence for the multiple concepts view. Scientists offer many non-overlapping definitions of the term “life,” but it doesn’t follow that they use the term to express distinct concepts. Similarly, vitalists and mechanists proposed different explanations of life, but it doesn’t follow that they were targeting distinct phenomena. **ROSENTHAL’S DISTINCTIONS:** Next I argue that Rosenthal’s distinction between creature consciousness and state consciousness doesn’t point to a distinction between concepts of consciousness. One might distinguish between photosynthetic

processes and photosynthetic organisms, but it doesn't follow that there are two different concepts of photosynthesis, one that applies to a process and one that applies to organisms. Rosenthal's transitive consciousness (consciousness of something) also doesn't require a distinct concept of consciousness. I could use the term "write" transitively to report, "She writes," and I could also use it intransitively to report, "She writes a sentence," or "She writes home." Yet the term "write" is not ambiguous. BLOCK'S DISTINCTIONS: According to Block, some scientists begin their investigations of consciousness by targeting phenomenal character as their explanandum but then go on to offer theories that only appropriately apply to global access. To explain this Block proposes that there are two concepts of consciousness that theorists conflate, P-consciousness and A-consciousness. I offer an alternative interpretation: their theories are not theories OF global access, but rather global access theories. Block prefers his interpretation, I suggest, because of the explanatory gap. From Block's perspective, the proposal that global access can straightforwardly explain consciousness is either obviously mistaken or subtly confused, and interpreting scientists as subtly confused is more charitable. The trouble is that many theorists deny that there is a gap. The more charitable interpretation, then, is that scientists either reject the gap or believe it is bridgeable. The upshot is that the point of conflict between Block and scientists is a substantive theoretical disagreement, not semantic confusion. CONCLUSION: Absent any evidence for the multiple concepts view, the default position is univocalism. But given the extensive diversity of consciousness, one might think there is reason to be wary. To address this concern, I argue that scientists are converging on a common characterization of consciousness. What this reveals, I suggest, is that scientists use the term "consciousness" to express a shared concept. Specifically I suggest that it expresses a cluster concept. If I am right that the concepts philosophers use the term "consciousness" to express aren't concepts of consciousness at all, then it seems philosophers would be well-advised to use the term as scientists do. If nothing else it would help to facilitate more constructive collaboration between philosophers and scientists. C

**3 Reducing Phenomenal Properties of Sensory Phenomenology to Phenomenal Properties of Cognitive Phenomenology: A Dennettian Approach** Horacio Andres Chiarella <horacio.chiarella@gmail.com> (Rio Tercero, Argentina)

Despite tradition has considered "almost unanimously" that the phenomenal properties of sensory phenomenology are sui generis, the status of cognitive phenomenology is still under debate: Do properties of cognitive conscious experience exist? If they do, are the same than phenomenal properties of sensory phenomenology, or are these sui generis too? In the present work I want to introduce a new way to conceive the relationship between perceptual and cognitive phenomenology; a way that overthrows the privileged status of perceptual phenomenology over cognitive phenomenology. I will defend that the phenomenal properties of cognitive phenomenology should be considered sui generis, while the phenomenal properties of perceptual phenomenology could be understood in terms of cognitive phenomenology. For doing so I will stand in Dennett's shoulders, or at least in a personal but plausible interpretation of his theory of consciousness. P2

#### **4 From Virtuality to Repeatable Patterns: Consciousness as the Governing Software**

Babak Daneshfard, Reza Sanaye <babakdaneshfard@gmail.com> (Shiraz, FARS Iran (Islamic Republic Of))

The consciousness field as manifested through a series of treatments not normally obtainable by conventional methods, has been the pivot of so many papers, articles, and reviews by the Iranian tradition of mind-body healing (most recently named: Faradarmani). The approach in this methodology would be the mending of ?software structuration? rather than making attempts to focus on merely material hardware. Accordingly, consciousness is described to be the differential field of constant repeatability by means of which not only the blueprints of living entities are provided, but also the mannerism of their probable repairing is to be set down. In addition, immunity could also be elucidated by means of the same field(s) that are present to return likely abnormalities back to their original natural state. The very fact that not all vectors of pathogens fall victims to varieties of diseases, might be evidence to the novel theory of ?consciousness immunity?. There is, of course, the capacity to link on to such consciousness field(s) for purposes

of activating so many potentialities including repair, fractal correction, and medical treatment. Room is undoubtedly extant for basic and applied multidisciplinary investigation when it comes to scientifically expanding upon the repeatable patterns of existence and curing throughout the cosmos of entities --be they of the animal kingdom, plant kingdom, human beings, or even non-living materials. **P2**

**5 Heaven And Hell ?the Spirits Journey After Death** Chhavi Gupta , Gopi Chand Gupta <chhavigupta61@gmail.com> (Theology, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Aspects of heaven and hell cross religious traditions. Paradise can be a city, a palace, a garden, a vision of God, a mystical diagram, or an ineffable concept. In Hell, fires, dragons, serpents, stench, cacophony, torturers, and their paraphernalia abound. Christian, Islamic, Zoroastrian, and Japanese sources test souls on a sword-edged bridge to paradise over a fiery stream or feculent abyss, the voracious hell. According to Indian mystics, the region of heaven is the source of the Shabd, the Creative Word of God. It is the plane of Supreme Consciousness, Being or Reality. The love and energy of this region permeate and interpenetrate everything in the regions below, so much so that those who truly understand this highest reality say that Sat Desh is present everywhere and within all souls, here and now. Most religions insist that heaven and hell are out of all proportion to our experience of time, joy, distress, or understanding. Since human beings are so limited on our comprehension of the wonder and beauty of the heavenly realm or the spiritual depletion of the region of hell, we rely on the mystics to traverse us through this spirits journey after death. **P1**

**6 Science of Spirit (Paravidya) vs Science of Consciousness (Aparavidya): Know Thyself Before Knowing Consciousness** Shanti Gupta , Radhika Singh <shan\_gupta2@yahoo.co.in> (Dayalbagh Educational Institute , Panchkula, Haryana India)

Consciousness flows out of the Spirit. Knowing consciousness without studying and investigating its source, the Spirit is like putting the cart before the horse. One ought to study the Science of Spirit for understanding consciousness. Twenty two International Conferences of TSC have so far been held without as much as an agreement on the very definition of consciousness. Tragedy is that we are looking for consciousness in wrong places. Consciousness does not emanate in the brain. Brain is not a computer and consciousness is not a result of complex computation among neurons or from as-yet-unknown circuits or features of biological matter and energy. We had, in our paper "Network of Creational Currents-Understanding Consciousness" in TSC 16, argued that the Current of Consciousness enters the human frame at the time of birth and imparts consciousness to its various parts. When it leaves the body, consciousness ceases, this world ceases as well. The Current of Consciousness is the subtlest and can neither be seen nor monitored. A fortiori, it can only be experienced by means of subtle instruments which exist only in the human body. We had, therefore, suggested interaction with such exalted souls who have access to the subtle and the subtlest universes besides the physical worlds. In order to access subtle creational currents, one need to practice Paravidya which is the science of Ultra-transcendental Spirituality, training, and development of the spirit force. Most Revered Prof. Satsangi Sahab discourses that all the things of science that we are learning are not going to waste. All these will generalize in due course of time to give us the science of Para Vidya. That, perhaps, may be too long and much beyond the lives of countless future generations. Should we wait until then or wrest an initiative now to understand it in our lifetimes? Instead of Science of Consciousness, perhaps, we need to work toward a Science of Spirit. Science of Spirit is inward and upward unlike the science of consciousness which looks outward and downward in search of consciousness. This paper tries to argue that the TSC might consider the desirability of pursuing the Science of Spirit otherwise all knowledge about consciousness would remain a hollow and superfluous wild goose chase. Weiss (1988) in Many Lives, Many Masters admits that he does not have a scientific explanation for 86 lives recalled by principle character Catherine in hypnotic regression. Whilst our earlier paper sought to explain consciousness in terms of integrated wholesomeness of macrocosmic and microcosmic consciousness as revealed in the Religion of Saints, the present paper seeks to firm up

the definition of consciousness as a composite experience of Sat, Chit, Love, Bliss, Refulgence, Intelligence, Peace and Tranquility and hypothesize and motivate the scientists to pursue the Science of Spirit in order to understand consciousness. Let some hypotheses be formulated like: 1-Reservoir of Consciousness exists in the subtlest region of the creation; 2-Current of Consciousness is highly subtle and can be experienced only through Paravidya; **P1**

**7 Catching Consciousness in the Act: The Insurmountable Methodological Challenges of Conceptual Dualism** Jackson Kernion <jacksonkernion@berkeley.edu> (Philosophy, UC Berkeley, Berkeley, CA )

Meet Batty Betty. Just as you have an intimate, first-personal acquaintance with what it is like to touch a sticky surface, Betty is intimately acquainted with what it is like to sense in sonar. But Betty has another quirk: although she enjoys richly detailed sonar experiences, this doesn't seem to have any impact on her cognitive economy. She can't use her sonar perception to navigate around obstacles when blindfolded, and she's unable to notice when an inaudibly high pitch is played, even though such pitches should be sonar-detectable. In short, Betty shows neither outward nor inward signs of having the sorts of sonar experiences she in fact has. The question is: how do you know that you're not like Betty? Typically, we think that we can know the 'boundaries' of our own conscious mind in a way that we can't \*really\* know--or know in the same way--the boundaries of others' conscious minds. And I think Betty can help us see how this widely-held view is in conflict with another widely-held view that I'll call "conceptual dualism": the view that thinking about the mind in a first-personal what-it-feels-like way ought be sharply distinguished from thinking about the mind in a third-personal how-it-works way. Here's the problem. Conceptual dualists pretty quickly run into the so-called methodological puzzle of consciousness research: since we cannot directly measure experience, and since we can only ever gather third-personal data on others, how could we ever measure others' experiences, even indirectly? We seem to need some pre-theoretical functional criterion for conscious experience in order for a science of consciousness to be at all possible. We might appeal to first-personal 'data' to ground such a criterion. But the methodological puzzle seems to pop up again in the first-personal context: it's hard to see how one could ever come to know that some inaccessible mental state (like Betty's sonar states) contributes to one's own overall phenomenology. Nor can such a criterion play the same kind of abductively-supported background role of other fundamental 'assumptions' (e.g. the assumption that natural laws are invariant). Such assumptions gain abductive support only when both their confirmation and disconfirmation are conceivable in advance. But is it really conceivable that you observe some violation of any criterion for consciousness when you must rely on that very criterion to observe any states of conscious experience at all? So conceptual dualists are in a bind. They have to think that it's 'sorta hard' to gain knowledge of experiences and their functional characteristics because such things aren't revealed a priori (under their view). But they must also think that it's 'sorta easy' to gain knowledge of one's own experiences and one's own functional characteristics because, otherwise, the problem of other minds threatens to transmogrify into the problem of one's own mind. The main aim of this paper is to demonstrate how challenging it is for conceptual dualists to successfully balance this tradeoff. In my estimation, we're better off rejecting conceptual dualism. **C**

**8 Consciousness and Information Multi-environment. Awareness of unity at the fundamental level.** Renat Khabeev <kh.renat@gmail.com> (Lomonosov Moscow State University, Moscow, Russian Federation)

The well-being of modern society depends on the development of science. But no less important is the awareness of the inner unity within the society and the unity with our world. Without this it is difficult to imagine a responsible attitude to each other and to the world that we live in. In nowadays and in the past the spiritual culture had the prerequisites for understanding the unity at our fundamental level. While within the sciences, i.e. in the field of objective knowledge, unfortunately, we do not see any similar ideological support that could unite us. Is it possible to solve this problem: somehow combine awareness of unity brought to us by spiritual culture and objective knowledge? To do this we need to find some connection between the sphere of spiritual culture

and the sphere of objective knowledge. At first, in this work I will try to separate the concept of unity which is represented in our spiritual culture from extra aspects: from religious tenets and from speculative and unsearchable figure of the Creator of the Universe, whose existence most concepts try to avoid according to Occam's principle. As a result, I will focus on the properties of our own consciousness instead and within it look for the fundamental basis that unites us on our highest level. To achieve that at first I will have to expand the boundaries of the present empirical approach. And our achievements in the IT sphere and in particular advances in virtual computer worlds' development will help me a lot in that. Thus, the expanded empirical approach will be IT-approach. Within this IT-approach I will consider the interaction of our consciousness not only with the surrounding materialistic environment but with information multi-environment as a whole where our surrounding world and man-made virtual worlds are only one of many possible information environments. Artificial computer worlds are fully accessible and understandable, and therefore the interaction of our consciousness with these information environments is much more clear than its interaction with our complex physical environment. Consequently within this IT-approach it is easier to make objective conclusions about properties of our consciousness. In particular, within the IT-approach, the matching between material and non-material components can be explained by superposition of two states of consciousness: systemic and non-systemic. And properties of consciousness can be divided into two main groups: temporary systemic properties that largely determine our personality and fundamental non-systemic properties. These fundamental properties point to the desired unity of our consciousness. At first glance it may seem strange, because there are many individuals with sovereign minds. However, with the help of IT-approach it is easy to show how within information multi-environment the unity of consciousness and multiplicity of individuals can be combined. For this, we do not even need to introduce additional axioms concerning our consciousness. All this gives hope that sooner or later we will be able to somehow combine the awareness of unity with other people and our world in general and the objectivity of this outlook. **C22**

**9 Quantum Leadership** Joseph Leah , Maria Munoz-Grandes; Gareth Craze <joseph.leah@case.edu> (Weatherhead School of Management, Case Western Reserve University, Naples, FL )

There is an urgent need to repurpose business in a direction that is more conducive to greater human flourishing and a more sustainable stewardship of our planet. This workshop explores how the different approaches to consciousness can help business leaders do just that (Donaldson & Walsh, 2015; Laszlo et al., 2014). The Quantum Leadership workshop engages business leaders and scholars in various ways in which emerging scientific frameworks of consciousness might inform business practice beyond sustainability toward flourishing enterprise. As we explore a potential shift in our understanding of consciousness from a model of computational activity of individuals to one of consciousness as an interconnecting property of the universe, the role of business as a force for good takes on new meaning. Based on Ongoing Research The Quantum Leadership Project is an ongoing global research initiative conducted under the guidance of Fred Tsao at the Quantum Leadership Center of the AITIA Institute in Shanghai and Dr. Chris Laszlo, Faculty Executive Director at the Fowler Center for Business as an Agent of World Benefit at Case Western Reserve University in Cleveland. Central to the Quantum Leadership Project proposition are personal and organizational practices that instill a new consciousness of connectedness in leaders and organizations. Through an evidence-based approach which complements the financial case for sustainability by emphasizing the emotional and relational basis of leadership, the Quantum Leadership Project shows that it is only through such a change in consciousness that businesses can develop profit strategies aimed at healthy environments and increasing wellbeing. Without it, businesses are condemned to continue today's profit strategies that, at best, reduce social harm or their ecological footprint and, at worst, contribute to growing social crises and environmental disaster. Our research findings suggest that a strong relationship exists between increased consciousness of connectedness in leaders and greater compassion, relational energy, shared vision, and positive social and environmental outcomes for business (Leah, 2016). **Q C**



**10 A Contribution of the I Ching to the Study of Consciousness** Osvaldo Juan Loisi  
<osvaldoloiisi@gmail.com> (Banfield, Buenos Aires Argentina)

After having dedicated several decades to the study of I Ching, the ancient “Book of Changes” of the Chinese tradition, I can say that, despite the bizarre use it has been subjected to, for centuries as a divinatory oracle, it sheds a valuable light into the genesis and nature of consciousness. From the beginnings of Greek thought, Western rationality was shaped within a verbal dimension. That is, as sayings of a subject towards a predicate, in a framework of an ideal conversation based on concepts that exclude everything, but essential features. This perceptual model can be seen in the well-known phenomenon figure / background of the images called “reversible” discovered in the early twentieth century by the Danish psychologist Edgar Rubin. There, awareness is the fruit of contrast between a chosen piece of reality and an overlooked background, which represents “everything else”. I Ching shows an opposite rational system, based on a set of images -arranged in rigorous mathematical order- expressing both chosen and ignored aspects of reality. This opens up to the prospect of developing a broader consciousness, as well as a new scope to the studies of human psyche. C

**11 Signals of Transcendence: Mysterious Consciousness of The Unconscious in Social Dreaming** Ajeet Mathur , Mattila Sari, IIM Bangalore <anmathur@iima.ac.in> (IIMA, Ahmedabad, India)

The discovery of the associative unconscious led to the invention of social dreaming as a tool and method for groups to grasp unconscious processes in intra-group relations of large groups. Charles Beradt’s ‘The Third Reich of Dreams’ narrates how limits to freedom in Nazi Germany did not stifle the capacity of the unconscious to process censored phenomena. The concept of social dreaming inspired by Beradt and introduced by W. Gordon Lawrence built an edifice for praxis in and around the associative unconscious. Innovations in social dreaming have since evolved further. The design of harmony sensing matrices has brought forth three new phenomena to our attention. First, it established that there are more connections between the mind and the brain at a collective level than are as yet known. Second, that attention to dreams has the power to bring forth signals of transcendence that go beyond the group that comprises the dreamers. Third, the mind-body sensations and sheaths of consciousness that onion-peel may at times attest to mysterious consciousness of the unconscious through experience of oceanic feelings that were the subject of controversy between Romain Rolland and Freud. This paper revisits the notions of self and identity at a personal level contrasting it with group identities that coalesce beyond mind-body connections of individuals. How signals of transcendence manifest to connect systems remains a mystery worth unravelling. Experiences from harmony sensing matrices hosted in Europe and India over the period 1996-2016 are discussed in the paper to raise hypotheses about how suspension of the psycho-analytic techniques (that address and work with anxieties) to dwell on wonder enables connections with deeper insight processes for thinking about unthought knowns. In the Bionian tradition, this is called focusing on the Sphinx instead of Oedipus but the same phenomena can also be experienced through other contemplative and meditation traditions such as Vipassana and Yoga Nidra. Psychic discoveries reported from beyond the Iron Curtain in Eastern Europe during the cold war period included personality implantation at an individual level through suggestopaedic pedagogies when the subject is asleep. This can produce a dream within a dream inside another dream and raises perplexing questions about how the attributes of discrimination, memory, intellect and identity come together. The paper concludes that clues point to signals of transcendence as the mysterious consciousness of the unconscious in social dreaming and also that the politics of revelation get enveloped by theistic salvationist rhetoric if spirituality is denied or confused with religion without examining the foundations of authority for faith. P2

**12 Applying The Scientific Method To The Biofield Anatomy Hypothesis** Eileen McKusick  
<emckusick@gmail.com> (Biofield Tuning Institute, Winoski, VT )

Sound researcher Eileen McKusick has spent the last 21 years bouncing single acoustic frequencies off the human body, like sonar, and studying the returning waveforms. Her observations have led to the formation of what she calls the Biofield Anatomy Hypothesis which states: what we call

mind and memory resides in a diffuse magnetic field that surrounds and interpenetrates the body at a distance of about 6 feet to the sides and 2-3 feet above the head and below the feet. Through work with thousands of clients in a very busy sound therapy practice, McKusick has mapped this field much like researchers have mapped the brain, and discovered that it appears to store our memories encoded mathematically in standing waves in a very specific format. McKusick has been able to identify the waveforms of specific emotions and pathologies, and found that stressful or traumatic experiences produce turbulent regions (noise, static, resistance) in these waves, which can be both located and resolved by passing a single tuning fork slowly through the field. This process can lead to potentially profound and immediate therapeutic outcomes for a wide variety of symptoms on the physical, mental, emotional, and even ancestral levels. These waveforms may inform and be informed by the microtubules on cell membranes, which act as antennae to the information stored in the field. McKusick has trained over 600 people in this method, all of whom have been able to find and identify these turbulent areas (according to the Biofield Anatomy Map), as well as produce the same therapeutic outcomes that Eileen has. Students call the process profound and more effective than any other modality they have trained in, and her classes are routinely full with long waiting lists. However, the claim that consciousness exists outside the body is a radical one in today's academic climate. For this reason, Eileen has partnered with Dr. Shamini Jain and the team at the Consciousness Healing Initiative (CHI), to apply the Scientific Method to her hypothesis. So far the team has created and conducted a pilot study, and are currently working on an IRB submission to conduct a full study this year. Eileen will discuss the project, the challenges the team has faced in doing subtle energy research, as well as the implications for potentially opening up an entirely new field of research in the diffuse magnetic field that surrounds the body. **P2**

**13 Consciousness Is Spatial** Michelle Montague <michellemontague@mac.com>  
(Philosophy, University of Texas at Austin, Austin, TEXAS )

A persistent problem for any physicalist theory of consciousness is the seeming 'repugnance' between consciousness (the experiential) and spatiality (the spatial). I take consciousness to be an essentially phenomenological-experiential phenomenon, and I will use 'consciousness' and 'experience' and their cognates interchangeably. The notion of space at issue is our common sense conception of space, which includes properties such as extension (including depth), location, and so on. The apparent repugnance between spatiality and consciousness results from the idea that our conscious experience seems to present itself as non-spatial, and from the idea that when we encounter things in space they seem to be fundamentally non-experiential. One might think it's easy to understand the sense in which conscious experience is a spatial phenomenon. A reductive type/type identity theorist, for example, might say the following: mental states are brain states, and since brain states obviously have spatial characteristics, so do mental states. But there is a sleight of hand here because ultimately spatial characteristics are understood as properties of the brain in the same sense as spatial characteristics are understood as properties of other physical objects such as tables and chairs. This does nothing to alleviate the sense in which conscious experience presents itself as non-spatial. If there is any hope of making the repugnant less repugnant, we have to conceptually connect conscious experience as it presents itself with our common sense conception of space. The aim of this paper is to alleviate the sense of repugnance between the spatial and the experiential. I will argue that some of the essential features of our common sense conception of space can be connected to (matched to) some of the intrinsic features of conscious experience in a way that can diminish or dissolve the sense of repugnance. The three spatial features I will be concerned with are the following: (1) Extension (including depth): extension entails (the idea) of continuity, and when this is combined with shape it entails the idea of boundaries giving a sense of bounded space. A sense of bounded space then entails (the idea) of unity. (2) A bounded spatial whole excludes other bounded spatial wholes from its location. That is, two distinct spatial bounded wholes exclude each other from their location. (3) Some spatial wholes have spatial parts. The three experiential features, which match those spatial features are the following: (1)\* A subject's overall experiential field has a unity, which is parallel to the sense of unity found in (1). (2)\* The way in which subjects exclude the existence of one another is similar to the way

in which bounded spatial wholes exclude each other from locations. (3)\* Conscious experiences have structure, including structure that derives from the fact that they constitutively involve awareness of themselves. The sense in which they have structure can be brought into alignment with the sense in which spatial entities have structure. C

**14 W[hole]ness - Scaling Consciousness/Cosmologies Through Geometry** Jiyun Park <park@jiyun.com> (Studio Involution - Transdisciplinary Design, Iowa City, IA)

The universal language of mathematics, particularly geometry is an autonomous [self-governing/self-organizing] meta-structure. This meta-structure is a hinge merging the metaphysical and the physical realms. In the gap between metaphysical(/)physical is a third condition connecting both as meta(physical). This embodied geometry, like offspring, is part of both realms. It aligns to forces and energies as phenomenon of nature's meta-morphic growth of forms. An a priori condition, often hidden in plane sight, its "marriage" to linear, static, and optical consciousness comes into view as curvilinear, dynamic, and resonant frequency vibrational awareness. It is manifold as meta-structure, meta-form, and symbol of the ancient Greek goddess, Hestia, whose other symbol is the hearth. A hearth was central to home and city, whose flame was carried to ignite new cities. Myth allowed for phenomenal complexities of archetypes as a whole, whereby metamorphic states of matter, scale, and dimensions remain interconnected. This complex labyrinthine meta-form is known in its simplest state as the circle. The circle, as particle, point, or spherical hinge, having 360-degree omni-directional potential and behaving along lines of force energy, is dynamic. This particle/field is activated by the fundamental forces and shifts dimensions if "dragged" through space/time. As a point it is "dragged" through space/time to form sp(lines), lines or curved lines. Curved lines "dragged" through space/time skip over planar two-dimensional realms and move directly to three-dimensional volumes. Dynamic toroidal and tesseract volumes of fourth-dimensional space/time/light/sound hinge to a fifth-dimension. Linked intimately with nature's formation, these spline/hinges are circle's interior or exterior edge at multiple scales, from sub-atomic microscopes to infrared telescopes. Their "drag" morphs through polarities, rotations, polarity/rotation and finally polarity/rotation/polarity as literal chrysalis metamorphosis. Circles of space/time hinge between container/contained to reveal time itself following geometric extensions of consciousness proposed by architect Anne Griswold Tyng in 1950. Circles dimensionally shift in manifold ways, including the hole or void. The MEREON Matrix, visualized through the cymascope, is a circular labyrinth that hinges, eclipses, and "breaths" through its yin/yang like reciprocity of the subtlest intimacy with matter. Solid, liquid, and gas states of matter transform in reciprocating vibrational fields that obey implicit laws and ordering principals. Metamorphosis, or shape shifting circles hinge back and forth around squares, where architect Manuel Baez's residual "spline/triangles" morph into hexagons as the shape of all known matter. As building blocks of the universe, uni (one) and verse (sound), a universal sound adjusts foundations to close the gap between abstracted geometries and nature's own growth of forms. Seed become flower then fruit and returns to earth as their womb enriching the next seeds. A1

**15 Future Forms of Consciousness and the Accelerated Artificial Intelligence Revolution** Dnyandeo Patil , Dr.Moninder Singh Modgil PhD (Cyclic Time Physics) Alumni - IIT Kanpur, India, Mr.Santosh. H. Kaware M.Tech. Mr. Dnyandeo.D.Patil Electrical Engg, Mr.Hemant. B. Bhoir B.Com. <alchemyofgod108@gmail.com> (Consciousness Research, Alchemy of GOD, NAVI MUMBAI, MAHARASHTRA India)

Kurzweil raises the interesting question of future of our consciousness or conscious experience - when the accelerated Artificial Intelligence (AI) achieves the point he calls the "Singularity". However, from point of view of physics there exist pertinent questions on the debate - when one associates consciousness as arising from a non-material substrate. Some of these are - relationship of consciousness with, e.g. - (1) time or temporal dimension/s (which includes the arrow of time and existence of the "present moment"), (2) three spatial dimensions and extra dimensions (such as those arising in string theories and supersymmetry (SUSY) and supergravity (SUGRA)) (3) perception and its absence (in coma, under anesthesia and deep dreamless sleep), (4) universe and its origin, (5) brain (along dualistic lines of Eccle). The "3 dimensions" which we attribute to

physical space are arguably a perceptual construct. The fourth dimension of time - though there exists reliable measurement device (clocks) - is an even more abstract mental concept. Tolle all together, replaces time from a line (going from past to future via the “present”) to specifically the “point of the present moment”. The concept of matter consisting of particles such as “electrons” is as argued by Bohm et. al., mere mathematical frame work. While one is able to make devices based upon such concepts, such as Artificial Intelligence (AI) on computer chips, still there are serious fundamental, unresolved, issues of physics such as - questions in quantum mechanics about causality, EPR paradox, Quantum Gravity, issue of extra dimensions... and more..., and than those issues about which we are not even yet aware of - which may have an important role in future evolution of consciousness. The questions we ask and address are - (1) What would be our perceptual experience if we had one more sense organ? What is it we would see?, (2) What if we could see and enter into another extra dimension or dimensions? Would the accelerating AI revolution, as visualized by Kurzveil - the evolving man-machine interface, - the singularity - help us see these two?. Such devices may be termed as perceptual enhancers. Then it is a win-win situation, for AI as well as the non-material consciousness. Producing machines better at chess, driving, shooting, number crunching, petabyte processing, expert systems ... is one line of progress - of enhancing human capabilities. Given the accelerated AI, one can visualize a time in near future, when the Nanobots in brain - would be making more friendly people, and acting as God spot activators, Spiritual experience creators. The usual consciousness is not there when we have the flat EEG or slow delta waves EEG. This suggests, there is a definite interaction between the non-material substrate of consciousness (Soul) and the “Electromagnetic fields” in brain - which produces consciousness. One can speculate that the solution may lie in a theory of Super quantum gravity (SQG) - of which the loop SQG is promising. **P2**

**16 Yogic Science’s Paradigm Of Consciousness** Ananda Poudel <ananda.pdl17@gmail.com> (Yoga And Life Style, Tribhuvan University, Institute of Medicine, Ayurveda College, Kathmandu, Nepal)

Today, there is a growing interest to investigate consciousness among quantum physicists, neuro-physiologists and philosophers. There are several researches on consciousness done by the scientist of different branch of modern science. After these many researches done by various scientists still there is an unfailing urge in the study of consciousness which indicate that they are consciously or unconsciously not satisfied with their matter based approach to study consciousness. Although the matter based approach is verily needed to achieve quantification and measurement and to avoid the prejudiced and wrong speculations related to the immeasurable metaphysics, featured with superstition, it cannot take a scientist to what is called as the core purpose of life (liberation or complete peace) by the Yoga and Vedanta. As the scientists feel a need of the deep study of consciousness. The ancient yogic science may satisfy their urge. Modern science misses the investigation beyond matter. If it starts to explore that which is beyond matter, then it can get satisfactory result in consciousness studies. For further explorations the yoga and Vedanta can help. Yogic view of consciousness is holistic in nature. it deals consciousness with its different layers, i.e. from known to unknown, from gross to subtler, from infinity to one, from seen to unseen, from the knowledge which is in the form of mental mode to the knowledge that is the core nature of the self and from physical consciousness to spiritual consciousness. These are clearly explained in Vedanta. The great seers of Vedic age realize consciousness through higher meditative aloofness (by the self experience) not only by discussions and debates. And they conclude that the core consciousness is of experiential knowledge which cannot be experimented with material equipment. Actually the whole Vedic philosophy is based on consciousness principle and the whole Vedanta mainly deals with this ultimate reality or the pure consciousness. Consciousness as a part or aspect of mind is a superficial understanding according to Yogic texts. This paper just throws a light on - how consciousness is dealt yoga and Vedanta ? This Paper mainly deals on the following issues: i. Investigating yogic means to understand consciousness . iii. To extract the yoga techniques (Pranayama and Dhyana) and how it practically apply for mystic experience of pure consciousness. **P1**

**17 The Independence of Emotions From Acts of Consciousness** Cinzia Ruggeri <cinzia.ruggeri@ucdconnect.ie> (Philosophy, University College Dublin, Dublin, IRELAND Ireland)

This paper is concerned with Scheler's understanding of feelings (Gefühle) as emotional cognitive organs. We shall, first, illustrate how Scheler could proficiently overcome the Cartesian and Brentanian reduction of the whole experience to mental experience, and then dwell upon Scheler's idea of a 'directedness' of emotions, which is to be understood in non-rationalistic terms. We shall show that Scheler could overcome the equation of experiencing with conscious experiencing by, first, showing that some experiential objects (value-essences) escape by necessity the grasping power of theoretical/cognitive acts; and, second, by endorsing, as well as re-interpreting, Brentano's concept of intentionality. We shall see that values are the objects of certain types of feelings, intentional feeling-functions (Fühlen), whose 'cognitive' power is to be understood as altogether detached from the cognitive power of intentional acts of consciousness. We shall, then, focus on Scheler's idea of a 'directedness' of emotions. Besides intentional feeling-functions, there are for Scheler non-intentional feeling-states (Gefühlszustände), and non-intentional emotions or affects (Affekte). The latter feelings are non-intentional, and nonetheless they do share, Scheler says, 'directedness' with feeling-functions. What such a 'directedness' of non-intentional emotions could be is not, however, very clear. One interpretation is that the 'directedness' of emotions is provided by the "awareness of being fastened to the casual object" (Smith, Q. 'Max Scheler and the Classification of Feelings,' p. 125). This thesis seems to us too Brentanian, though, because it accounts for consciousness or conceptual thinking. We shall, therefore, suggest a different interpretation of the 'directedness' of affects, which accounts for feeling-functions only, and which is grounded on Husserl's bimodal understanding of intentionality: intentionality in the 'broader sense,' i.e., 'pointing at' something, and intentionality in the 'narrow sense,' i.e., providing something with meaning. Our interpretation remains more faithful to Scheler and, moreover, further highlights the essential independence of the human being's emotional region from the theoretical one. **C17**

**18 The semantic field of the term "consciousness" in the traditional Indian philosophy** Natalia Safina <videhidevi@gmail.com> (History of Philosophy, Peoples Friendship University of Russia, Moscow, Russian Federation)

What does it mean "consciousness" from the perspective of Indian philosophical thought? How did Indian thinkers understand consciousness and what particularities they emphasized? There are dozens of terms determining the modern concept of consciousness in the traditional Indian philosophy. We can meet many of these terms in the ancient Upanishads. The philosophers of Samkhya, Vaisheshika, Vedanta, Yoga schools etc. discussed these definitions in details. The nature of consciousness is considered in the texts of the philosophical systems from the perspectives of empirical (eg. terms citta, buddhi) and phenomenological (eg. terms atman, purusha) views. This work focuses not only on the description of the terminological variety of consciousness, but also on the creation of terminological typology clarifying the aspects of terms according to the various Indian philosophical schools. **P2**

**20 Consciousness Perspective of Ashtavakra Geeta** Ranjeet Kaur Satsangi, Arti Singh: Neha Goswami <ranjeetkaurdei@gmail.com> (Pedagogical Sciences, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Ashtavakra geeta is an ancient Indian scripture which is written as a dialogue between the self realized sage Ashtavakra and philosopher king Janaka of mithila on the nature of soul, reality and consciousness. It insists on complete unreality of external world and absolute oneness of existence. It depicts consciousness as unconditioned, changeless, formless, immovable, unfathomable awareness, not bound by anything. It emphasized that truth is that which never gets superseded at any point of time. thus the reality or truth lay beyond all the three states viz. waking, dream and deep sleep. Self is pure consciousness, always liberated, an uninvolved witness of all events and happenings, all pervasive and perfect like a super conductor and has nothing to do with the body (puri 2008). World is superimposed on pure consciousness and the self looks as if bound and Subject to miseries, life and death. Ashtavakra Geeta shows path of an effortless quantum flight to absolute consciousness and truth or liberation which is devoid of rituals, control of breath japa or

chanting sacred syllables. The paper will discuss nature of consciousness and the simple ways and means to attain absolute consciousness as revealed in Ashtawakra Geeta. **P1**

**19 Comprehending Ultimate Consciousness: Problem of Astrophysics or Biophysics or Psychophysics** Anirudh Kumar Satsangi , Vibha Rani Satsangi; Sunitha N. Seenappa <anirudh.jenna@gmail.com> (Director Office, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

All that exists are consciousness. Consciousness still continues to be a mystery. Both science and scriptures agree that the consciousness is the sum total of our ability to cognate, connote and affect. Scriptures tell us that this ability is as limitless as the cosmos itself. Consciousness defines our existence, yet its nature and place in the universe remain unknown. (Hameroff). To resolve this problem we have to observe carefully the whole cosmic play projected before us by our human body. The whole cosmos appear to us as a limitless mass of energy where some of its particles are constantly in the process of evolution and involution. Is consciousness a problem of astrophysics? During the process of evolution energy particles evolve into atoms and molecules which give rise to precellular, cellular, and multi-cellular forms of plant and animal kingdom. The human body that projects the picture of phenomenal universe before us is one such multi-cellular form. Human bodies are ever changing masses of matter and energy. Energy enters in the human body in the form of food, drink and air. Part of this energy produces gametes. Union of male and female gametes gives rise to ovum and ultimately a perfect human body. The genetic material of these forms of plant and animal kingdom carries with it the information of millions of years of cosmic evolution. Is consciousness a problem of biophysics? It is reasonable to suppose that conscious states are realized in the brain. We are not aware of having a subliminal perception, and thus it is an unconscious perception. (Rocco). Sense organs project the picture of phenomenal universe before us only when the brain is in the state of wakefulness. The whole picture of phenomenal universe disappears from our view during sleep. We perceive the body as the source of our consciousness. We thus identify ourselves with the body. Our identification with human body is an illusion. This illusion arises out of our superficial observation. (Dabholkar). The illusion of self-identification with the body is deep rooted in our consciousness. No illusion of ours can ever be removed by any method other than our own deeper observation. Yoga is an experimental technique of increasing the depth of our observation and helps us to verify the reality of existence. Concentration, meditation, and realization (samadhi) are three principal practices of yoga. Samadhi is meant for cultivating mind to arouse levels of consciousness. Focusing consciousness outside is attention and inside is meditation. (RN Singh). Yoga help us to yoke our body properly to the process of cosmic evolution. Our illusory identification with our body then falls. Practices of yoga brings down our limen level (threshold) which gives us the ability for deeper observation. Although astrophysics and biophysics contribute to our understanding of consciousness but comprehending consciousness is the problem of psychophysics. **C7**

**21 Study to Find the Percentage of People Who Believe in Self Realization or 'atma Gyan', in Metros** Rubina Saxena , Rajul Dulondel; Rimple Saxena <rubinasaxena17@gmail.com> (Women's Polytechnic, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

There are many social problems that people are facing in metro cities where the life runs at the speed of bullet trains. In big cities people are unable to tackle the social problems because they have less time for their own self. There is no time to think for issues like 'self realization'. The individual God is also worshiped in haste and to have wishes fulfilled. Self realization is like understanding the ultimate reality or God who created the world. Now the question is how come self realization helps in overcoming the sufferings? Though the scriptures of various religions have explained the concept of 'Atman' and the importance of knowing it by various methods. Our paper includes a questionnaire research in three different regions. The research is to find out how much effort and time, people of different cities, give to know about 'self' and to understand their awareness level of benefits of 'self realization'. Self realization or 'SUMMUM BONUM' is the ultimate goal of man's life, because it helps individual spirit to overcome the sufferings of this world and reunite to its original essence, the ultimate truth in higher plane of consciousness. A survey is conducted to find the awareness about self-realization in people. The ultimate goal of our research

is to make people realize the 'Atman' and live a confident, fearless and contented life. **P1**

**22 An Axiomatic Approach To Spiritual Queries For Sound Social System** Majer Singh, Meenu Singh; Charan Prasad; <majersingh@gmail.com> (Technical College, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

An evolved group of people is an awakened group of spirits, with a sound mind in a sound body, and endowed with wisdom, intelligence and health. Such persons work for the benefit and progress of society. The professional codes of conduct and ethics are followed by them as to run a disciplined, smooth and orderly working of different institutions also, to establish peace and happiness everywhere. However, we notice that such ideal conditions are fading from the world today. Morality of people in general is on the decline, as a result, we are today surrounded by Structural, Familial, Developmental and Disorganization Problems on one hand and on the other hand some other problems like : inefficiency, corruption, violence, terrorism and other evils. If one tries to analyze this unhappy state of affairs in the world today, it can easily be seen that this is due to lack of spiritual awareness and incomplete or wrong religious concepts among people. This article is an attempt to see theologically some spiritual queries such as: Rationality of our struggle in life, Is it destined to suffer pain and pleasure, How to select the Supreme path of life among the several paths existing in the world today, Does one need a teacher to help in following the Supreme path successfully also, How does one recognize a supreme guru etc. An attempt has been made to answer such questions by using Axiomatic Approach based on Theology where the need of the spirit; being the life and essence of human personality and other related queries are recognized, catered and solutions for related problems have been provided. This article would help to clarify wrong religious concepts in the light of Indian religion experienced by many sages, seers and Saints. **P1**

**23 A Theory of the Evolution of Consciousness Based on Spiritual Wisdom and Science** Prem Sundaram <prem@riviera.com> (Sundaram Institute of Science and Spirituality, Los Angeles, CA)

Most of man's troubles and miseries are caused by his present state of mind or consciousness. Consciousness itself is primordial bliss and intelligence, and spirit, our real self, is pure consciousness. But at present, being hidden under the veils of mind and matter, it has forgotten its true nature. This state is known as involution of consciousness. The cause of involution is the process of evolution of creation. The only way to enjoy one's true nature and be happy is through self-realization, or evolution of human consciousness. **P1**

**24 The Doctrine Of Action In The Bhagvad Gita** Arati Swaroop, Dr. Arati Swaroop <dharampalsatsangi@gmail.com> (Dayalbagh Educational Institute, Agra, U.P India)

Religious doctrines are obscured with abstruse principles and a way must be deftly navigated before truth can be understood. Pseudo religious persons in their colorful garb and flowing oratory are all too common and seekers of the truth have to train themselves until they become proficient in their pursuit to finally find the truth. The Bhagvad Gita is a religious classic and a philosophical treatise which sets forth in precise and penetrating words the essential principles of a spiritual religion which are not contingent on ill-founded facts, unscientific dogmas or arbitrary fancies. The essential purpose of the Gita is to teach us how devotion to a living Adept can lead one out of bondage by adopting the right technique (yoga) of action. Gita is therefore a mandate for action. It explains what a man ought to do, not merely as a social being but as an individual with a spiritual destiny. This paper endeavors to present Gita's doctrine of action that our outward life (swadharma) and inner being (swabhava) must answer to each other. Only then will action be free and spontaneous leading to the highest spiritual wisdom. **P1**

**25 Is it beneficial to be conscious in the presence of one's own death? How do we understand a concept good death?** Ilona Usvapelto <ilona.usvapelto@helsinki.fi> (Social and Moral Philosophy, University Of Helsinki, Helsinki, UUSIMAA Finland)



It is often stated with the death ought to be good. However, it is often much less clear what we mean by referring the goodness of the death. This paper examines the concept of good death and conscious death through philosophical methods. How should we see the value of consciousness in the presence of death? Is it always good and if so, why? Should we jettison the other elements connected with good death, if contradicting with conscious death? Most philosophers and religions have emphasized the importance of the consciousness of one's death. In the ancient Greek philosophy Plato and Epicurus stressed the importance of being able to accept one's own mortality and to be able to face it without fear. In Vajrayana Buddhism the practice of conscious dying (Phowa practice) is an important part of the training. The Phowa practitioner tries to keep a solid awareness through the different mental and physical states that are part of the dying process, as well as to keep a conscious, reflective state during the dying process. Consciousness of one's death can be seen as something preferable, as it enables the dying person to have an active role in her/his state, to come to terms with the situation, and to bond with relatives. Mortal awareness has also been seen as beneficial for life. However, the consciousness of the nearing death may also give rise to problems and conflicts as it may contradict the other ideals we often associate with the idea of good death, such as peacefulness, painlessness. In modern palliative care, one of the important questions is, whether the awareness is so crucial it should be taken into account in the medical treatment of patients. **P2**

**26 Formation of a Thought: How the Brain Produces a Conscious Experience** Ludmila Vucolova <vucolova@gmail.com> (Independent Researcher, Hackensack, NJ)

Understanding how the human brain produces a conscious experience is one of the greatest challenges of cognitive science. By integrating over twenty novel ideas and hypotheses, we speculate that a thought is an emergent property of coded neural events that translate the electro-chemical interactions of the body with its environment - the objects of sensory stimulation, X and Y. The latter is a self-generated feedback entity, resulting from the arbitrary pattern of the mechanical stresses applied by agent's motor repertory (M). The culmination of these neural events gives rise to a thought: a state of identity between an observed object X and a symbol Y. This constitutes a conscious experience, manifesting as a "state of awareness", a "state of knowing", and forms our perception of the physical world. Consequentially, it establishes a second form of existence for X in the external world as Y. Two physical entities from the outside world, X and Y, initially unassociated, become a pair; Y becomes an independent entity, a single unit of mental activity, and a basic unit of language. The informational value of the variables of a construct - X (object), S1 (sense for perception of X), Y (object), S2 (sense for perception of Y), and M (motor repertory that produces Y) - mediating interactions, will determine the informational relationship among the elements and specify the particular conscious percept. The proposed principle of interaction between the elements of a construct (X, Y, S1, S2, and M) is universal and applies to the diverse modes of communication (normal, deaf, blind, deaf and blind people) and for various language systems (Chinese, Italian, English, etc.) The particular arrangement of modalities of each of the three modules S1 (5 of 5), S2 (1 of 3), and M (3 of 3) define a specific mode of communication. This multifaceted paradigm demonstrates a predetermined pattern of relationships between X, Y, and M that passes from generation to generation. Using the novel ideas presented in this paper, we show that in the invisible "chaos" there is an order, a structure with landmarks and principles of operation and mental processes (thoughts) are physical. This proposal explains a path to a mental process, and how it arises in a physical system; it offers an insight into the various intrinsic aspects of a phenomenon: third/first-person perspective, mental imagery, and embodiment. The analysis presented here of a cognitive experience encompasses the key elements of embodied cognition theories, and unequivocally accords with the scientific interpretation of cognition as the mental process of acquiring knowledge and understanding through thought, experience, and the senses. It supports the notion that cognitive processes are deeply dependent upon physical features of the environment, the material human body, and that mind and body are inseparably connected. The postulated findings of this investigation explain the principle of thought formation and the evolution of language that underlie human consciousness and cognition. These findings are supported by current scientific data and are substantiated by the records of the evolution of language and human intelligence. **P2**



**27 The Multiple High B Value Dwi And Its Advance Quantum Biological Interpretation-----a Case Presentation (1)** Ming Wong <drmingwong@gmail.com> (Medicine, independent investigator, Brighton, MASSACHUSETTS )

Initiated by Schrodinger's Concept of negative entropy, Crystal; with the idea of yin and yang from Chinese philosophy, I hypothesized the Advance Quantum biology (aqb) in my Book (The collection of the essays on the issue of consciousness and high negative entropy). According aqb, I develop out the so-called MRI hologram. With this new concept, for multiple b value DWI, I developed out a new data process and interpretation which called as aqb process which is different from the current data process and interpretation of MB (Molecular biology). I applied it to one of research article of multiple b value DWI from PLOS; and compared it to the current MB data process and interpretation. I found. This new aqb process looked like more completely, more fundamentally and more substantially to present out the T2WI MRI signal, and provided significant advantage than other MB process and interpretation.. The conclusion: for multiple b value DWI (even T2 MRI signal), other than the current MB process and interpretation in molecular level, there is another side of story, aqb data process and interpretation could be provide more substantial presentation than MB; it is done in the advance quantum level. Thus, for Hypothesis of aqb, for aqb data process and interpretation, they are new; they are worth to have further investigation and study. **P2**

## 1.02 Materialism and dualism

**28 Scalar Consciousness: Why Stop At Dualism When You Can Have 72 Categories Of Mind and Matter?** Lachlan Kent <lachlankent@students.federation.edu.au> (Psychology, Federation University, Hawthorn, VICTORIA Australia)

Dualism divides existence in two and leaves us with the mind-body problem - the hard problem of consciousness that continues to evade scientific understanding. If a satisfactory solution fails to be arrived at by simply repealing the dualistic separation of mind and matter, then perhaps progress can be made by taking dualism a step (or steps) further towards logical conclusion. A stepwise analytical process, called iterated dualism, further divides matter and consciousness according to scale until additional divisions no longer seem plausible. After six of these iterated divisions, which seems a logical endpoint, we are left with 36 categories each of consciousness and matter ranging from the smallest fundamental building blocks (ie., neurons and elementary particles) to the largest theoretical scales of existence (ie., the period of conscious life and the observable universe). The resulting structure depicts a branching network of physical and mental properties that neatly illustrates many central fields of the emerging science of consciousness (eg., quantum cognition, artificial intelligence). It also leads to some confronting conclusions. Firstly, it suggests a hard analogy between physics and consciousness (like Richard Dawkins' analogy between memes and genes) at all scales and levels of abstraction. Secondly, it suggests that the origin of phenomenal consciousness may be analogous to the origin of life (ie., a psychological form of "biochemistry" gives rise to the inner life of awareness, imagination, ideas, and so on). And thirdly, it suggests that parts of the brain might function like elementary particles that interact according to known principles. Despite how confronting these conclusion may seem at first, a hard analogy between physics and consciousness could help solve the hard problem of consciousness because: a) it spans the range of physical and conscious phenomena; b) it treats consciousness as fundamental and not simply emergent along the physics-chemistry-biology-psychology continuum; and c) it lays the foundation for potential empirical tests of parameters that define boundary conditions that separate categories of consciousness. Prior to embarking on quantitative investigations into well-defined problems, iterated dualism provides a much-needed qualitative analysis of the categories underpinning present and future consciousness research. **P1**

**29 Scientific Dualism and the Metaphysics of Non-material Reality** Michael Remler <mike@remler.com> (Neurology, UCDavis, Berkeley, CA )

Scientific Dualism is a dualist understanding of Consciousness formulated wholly and explicitly within contemporary scientific metaphysics. A Scientific Dualist Consciousness, to be compatible with established Physics and Neuroscience must be 1) a non-material entity, 2) not localized

in space as understood in physics and 3) capable of bidirectional causality with matter. These features of a putative Scientific Dualism are said by Materialists to be unscientific concepts and therefore Scientific Dualism is a contradiction in terms without further discussion. The physical reality of non-material entities, taken as not having mass or size is long established in physics. Caloric and the luminiferous aether were scientifically well accepted and utilized entities. The fact that they were scientifically commensurable and then discarded in favor of alternative understandings, documents their metaphysical validity. Similarly Neutrinos, although now shown to have mass, were originally defined to have no mass and no size in contemporary particle physics. The recent demonstration of gravitational waves is difficult to understand without the acceptance of the metaphysical existence of empty space. The metaphysical existence of non-material Consciousness is conceptually not more difficult than the physical existence of empty space. However all of the above concepts have characteristics of time and space. They can be said to be here and not there, at this time compared to another time. However while quantum collapse and entanglement are fundamental to contemporary physics, their mechanism remains totally unknown. One part of the difficulty understanding mechanisms is because they are not well defined in time and space. Entanglement is an instantaneous interaction between two particles at arbitrary distance from each other and therefore, whatever mechanism is proposed, it cannot be localized in time and space or involve matter. Somewhat similarly, quantum collapse, most clearly from particle wave duality, cannot be localized in time and space. The non-locality of Scientific Dualist Consciousness is no different. Quantum Collapse and Entanglement are the effect of information on matter. Scientific Dualism requires a postulated ability of a non-material non-localized Consciousness to exchange information with the material substance of the Brain. Dualist models Consciousness causal effect on brain as a similar impact of information, of choice between alternative physical results. It remains to be demonstrated that the flow of raw information to and from matter to a consciousness can be organized in Consciousness solely by logical methods into the complex structure we call a human perception and understanding of physical reality. To that end, we present most minimal case, the transformation of by collation and correlation of sequential binary data into a model of space. That is the ordering of a set of on-off registers into a linear array based solely on the time sequence of activation. C

**30 Dual-process Model In Knowledge Argument** Xinyu Wei <xinyuwei@email.arizona.edu> (Philosophy, University of Arizona, Tucson, ARIZONA)

The dual-process cognition model has been applied in experimental philosophy of mind to interpret problems about attribution of consciousness and the explanatory gap. Previous studies show that an asymmetry between low-road and high-road processes results in contradictory intuition, which leads to some philosophical questions. The low-road process is quick, automatic, unconscious and computationally simple, while the high-road process is relatively slow, controlled, voluntary and computationally demanding. According to Agency Model, individuals are inclined to describe an entity as holding conscious states so long as that entity is identified as an AGENT by displaying certain features to trigger the low-road process although high-road output may override the attributions eventually. From this view, the explanatory gap could be regarded as the consequence of the asymmetry between two systems. The felt quality of 'what it is like' is produced by low-road process when feeling pain or seeing red. Since physical description of phenomenology does not involve any features that trigger low-road process, the low-road system is not activated and do not normally provide intuitive confirmation of high-road output. This discrepancy between the high-road and the low-road systems results in a feeling as if physical description is inadequate per se. This essay attempts to explore the role that the asymmetry between distinct cognitive processes plays in knowledge argument. With appealing to Phenomenal Concepts Strategy, dual-process theory suggests dual-system knowledge as the outputs of low/high?road system. Since phenomenal concepts only derives from low-road, individuals feel like there is something absent when they are under the circumstance in which low-road process is not activated. According to an analogy with explanatory gap, it is concluded that the asymmetry between two processes misleads individuals to believe that phenomenal experience could be non-physical. C

**31 Towards the Naturalisation of Consciousness: Is There a Place for Non-physicalist Consciousness Within a Darwinian Framework?** Cecily Whiteley <cecilywhiteley@gmail.com> (Philosophy, King's College London, Ikley, WEST YORKSHIRE United Kingdom)

As part of the scientific approach to its study, successful naturalisation of consciousness requires an account of consciousness' biological functions. Firstly, naturalisation requires a theory of consciousness' 'Cummins function', an account of what consciousness does. Secondly, naturalisation of consciousness requires an account of its evolutionary function, of why and how it evolved. Search for a theory of consciousness' Cummins function has been the primary concern of those studying consciousness neuroscientifically, with several neurobiological models of consciousness currently dominating the scientific literature, while the search for consciousness' evolutionary function has largely been viewed with skepticism. This is due in part to the controversy and dispute around the nature of evolutionary theory itself, and the dubious adaptationist theories that it often gives rise to. Speculative accounts of consciousness' evolutionary function ought to be avoided. However, the search for an evolutionary function of consciousness brings attention to a larger task which needs to be addressed by those who recognise the need to explore alternative non-physicalist accounts of consciousness while wishing to retain a scientific and naturalistic outlook. In his most recent book, Thomas Nagel argues that the failure of psychophysical reduction demands that we replace the neo-Darwinian worldview with a teleological explanation of our existence. Nagel's motivation for this argument is the thought that the mind body problem is pervasive. Consciousness' resistance to a physical explanation infiltrates the very process that gave rise to it; it cannot remain an isolated philosophical problem. This paper proposes to do three things. First I identify a criterion of feasibility that the non-physicalist must meet if non-physicalist consciousness, broadly understood, is to be viable as a naturalistic hypothesis. An explanation is required as to how consciousness, if it is to be understood as ontologically irreducible and non-physical, fits into the widely accepted neo-Darwinian framework. Second, I argue that this criterion can be met if a "causal account" of conscious evolution can be provided and defended. While non-physicalist consciousness demands that evolutionary theory be revised in a significant way, this amounts to supplementation and extension of its existing principles rather than a radical revision a la Nagel. Finally on this basis, I argue that we can put forward the beginnings of a causal account that is compatible in its broad axioms with recent developments in neuro-evolutionary theory. C12

### 1.03 Panpsychism, neutral monism, and idealism

**32 Mind, Body, and Universe as Human Constructs** Deepak Chopra <carolyn@chopra.com> (Prof., UCSD School of Medicine, The Chopra Foundation; UC San Diego, School of Medicine, Carlsbad, CA)

The possibility of a Theory of Everything was doomed as a physicalist project but can be revived--and even accomplished--by reconceiving the problem in a radical way. As the starting point, physics needs to consider not the objects of knowledge but what it means to know anything. Without an understanding of consciousness--the unspoken constant in all observation, experimentation, and experience--current science cannot bridge the mind-body schism that is the central obstacle in any TOE. In this session, I will address the following questions: Can anything, from a subatomic particle to the visible universe, be taken as a given? How much is knowledge dependent on human consciousness? Is it possible to unify all experience as an activity in consciousness? What would a consciousness-based reality be like? Specially, how can we adopt a worldview where anything that can be described, thought about, or experienced is a human construct? Is the old assumption about a physical world "out there" now totally outmoded and therefore a dead end for investigating the "real" reality? PL12

**33 Shedding Light on the Universal Mechanism Underlying Conscious Systems** Joachim Keppler <j Joachim.keppler@diwiss.de> (Consciousness Research, DIWISS, Roth, Germany)

Uncovering the universal mechanism underlying conscious systems poses one of the core challenges for consciousness research. One line of thought pursues the idea that the brain assembles higher states of consciousness from a great number of elementary building blocks of consciousness. This approach is grounded on the hypothesis that consciousness is fundamental, ubiquitous,

and matter-inherent, which is compatible with the common definition of panpsychism as the view that the basic physical constituents of the universe have mental properties. The key issue of this approach, also known as the combination problem, is the identification of a plausible aggregation mechanism that is able to explain how our rich spectrum of unified macro experiences emerges from a limited spectrum of micro experiences. Regarding this problem, no tangible solution has been presented so far. In order to overcome the difficulties and conceptual shortcomings of common panpsychism, a new avenue to the scientific understanding of consciousness is explored. It accepts consciousness as a fundamental but not matter-inherent property of the universe and is based on the hypothesis that the whole range of phenomenal qualities is built into the frequency spectrum of a ubiquitous background field. According to this view, the brain employs a universal mechanism by means of which it extracts the variety of phenomenal nuances from an omnipresent phenomenal color palette that is standardized throughout the entire cosmos. It is of vital importance that modern physics can offer not only a promising candidate for the background field of consciousness, in concrete terms the zero-point field (ZPF), but also an appropriate extraction mechanism. This mechanism, which is characteristic for quantum systems, is based on the formation of dynamically coupled ZPF modes (ZPF information states). The neurophysiological body of evidence supports the view that conscious processes make use of exactly this mechanism. Correspondingly, the empirical findings can be interpreted in such a way that the brain produces an individual stream of phenomenal awareness by periodically generating ZPF information states and filtering phenomenal nuances out of the ZPF, leading to a consistent explanation of the dynamical properties of the neural correlates of consciousness. As a result, we obtain a clear distinguishing criterion between conscious and unconscious brain processes, according to which only those processes that are able to exert influence on the ZPF have the potential to exceed the threshold to conscious experience. These insights can be transferred to all types of dynamical systems, suggesting that the dividing line between conscious and non-conscious systems is identical to the demarcation line between quantum systems and classical systems. On this basis, it is straightforward to derive an indicator for the quantity of consciousness of a given system that measures the degree of order (information) in the ZPF compared to the completely disordered field. It is concluded that the conceptual framework thus defined constitutes a solid foundation for a theory of consciousness and opens up totally new perspectives for consciousness research. **C5**

**34 Further Comments on the Argument Against Panprotopsyism** Anton Kuznetsov <anton.smith@philos.msu.ru> (Philosophy, Moscow Center For, Lomonosov Moscow State University, Moscow, MOSCOW Russian Federation)

At the TSC-2015 I presented an argument against constitutive panprotopsyism. The main idea of it is that nonphenomenal character of protophenomenal properties leads to the rejection of conceivability argument in a sense that there are no such specific phenomenal properties that couldn't be reduced to physical properties (here it's a new type of physical properties - "in a broad sense"); or it leads to the new version of conceivability argument - conceivability of panprotopsyist zombie. Now I'm going to discuss further questions that will deal with the basis of my argumentation. My argument is based on a suggestion that there is no a priori entailment from something nonphenomenal to phenomenal at least in the case of constitution. Look at the list of connected statements below: 1. Indeed the initial structure of conceivability argument doesn't imply that phenomenal properties cannot be grounded in something nonphenomenal. And it's good news for panprotopsyism; 2. But the idea of the identity of the first intension of consciousness with the second one implies that phenomenal properties cannot be grounded in something nonphenomenal. And it's bad news for panprotopsyism; 3. The identity of the first intension of consciousness with the second one has primacy over the initial structure of conceivability argument; 4. Since basis of conceivability argument is an explanatory gap, from 3 we learn that it takes a form phenomenal nonphenomenal explanatory gap; 5. Hence, we are bringing bad news for panprotopsyism. But is that indeed bad news? It depends on the question whether a special combination of protophenomenal properties constitutes phenomenal properties. 1. The very idea of constitution is that difference between constituent properties and constituted properties is not in quality, but only in quantity; 2. If a special combination of protophenomenal properties constitutes phenomenal

properties, then there should be the difference only in quantity; 3. Difference between nonphenomenal properties and phenomenal properties is in quality; 4. Protophenomenal properties are not phenomenal by the definition; 5. If a special combination of protophenomenal properties implies phenomenal properties, then it's not a constitution; 6. Hence a special combination of protophenomenal properties doesn't constitute phenomenal properties. The same works in the case when some combination of protophenomenal properties partly constitutes phenomenal properties. One might reject the definition of constitution above. It's possible to change the meaning, but the initial idea of using constitution in the case of panprotopsychism is to explain mental causation. And it explains mental causation only if we take a term 'constitution' as it proposed above. And there would be inconsistency in using a term 'constitution' if we took it in one and another meaning at the same time. And even if panprotopsychism could succeed, it seems it goes beyond the explanation that could have a sense for us in a way of naturalistic explanation of consciousness. Probably taking these obstacles seriously we can handle them if we'll see that naturalistic explanation is in some special relation connected with a phenomenological explanation. Other forms of panpsychism or panprotopsychism face these or another and more serious obstacles. C1

**35 Positing The Unknowable: Panpsychism And Fundamental Experiences** Erick Llamas <erick.llamas@gmail.com> (Philosophy, ANU, Canberra, ACT Mexico)

Its easy to know what the experiences of others is like when we ourselves have the same kind of experiences. But to know what is it like to be other organisms?like a bat?is a different matter, (cf., Nagel, 1974). The problem is that other organisms are physically dissimilar from us in some respects and therefore it is hard to see how we could come to know the experiences that depend on the physical structure of the organism in question. Some contemporary theories of consciousness hold that some experiences are built up of basic experiences. These theories hold that we can know a priori conditionals whose antecedent is composed of phenomenal concepts of the basic experiences and whose consequent is composed of phenomenal concepts of non-basic experiences. However, to be able to form a conception of the basic experiences we must instantiate the relevant physical structure that is necessary for them. If we are physically too dissimilar, we could never form a conception of them and, therefore, we could never understand the relevant conditionals.. In this paper I explore the consequences of this problem for panpsychism. As we know, entities like fields or particles are physically so dissimilar from us that it is hard to see how we could ever form a conception of what their experiences are like?let alone build other experiences a priori from them. In this way, panpsychists posit fundamental properties that are in principle unknowable by creatures like us, and are therefore of little help. C

**36 The Architecture Of Spacetime and Mind: A Neutral Monist - Neo Idealist Model of Information Creation Indicated by Vajrayana Buddhist Philosophy and Meditation** Anja-Karina Pahl <anja@futureofinspiration.com> (Research, The Future Of Inspiration CIC, Bath, SOMERSET United Kingdom)

Following Leibnitz, Spinoza and David Chalmers' lead, we assert consciousness to be a fundamental and universal property of the cosmos. We then focus, in particular, on consciousness as experience, as a verb not a noun. We note that, linguistically, a verb is the non-physical, non-mental interface between material bodies and minds of actors and observers; a go-between for, or, in our case, possibly the neutral monist face of, duality itself. We also see that such an interface is not static - all activity can be manifestly mapped as either a probabilistic or meaningful spatial pattern. Third, inspired by texts of the early C14 Vajrayana Buddhist Master Rangjung Dorje, The Third Karmapa, concerning the Abidharma [sutras], the Mahamudra [tantric] meditation practise and philosophy of Buddha nature, we classify the infinite activities potentially labelled consciousness into a array of 6 types related to the senses and a further 2 types of mental experience. These 8 mundane, variably mixed experiences can morph into an interrelated set of 5 transcendent, non-mixed experiences, defined as being purely of mind. The most complete of these seems to involve not just shunyata [Sk], translated as emptiness or openness and oft erroneously interpreted in the West as the sole intended endpoint of Buddhist practise, but also simultaneously, contradictorily, dharmadhatu [Sk], everythingness enclosed; the womb, heart, seed or beginning of all things. In

other words, it appears that the act of cessation for our innermost mind and the act of creation of outermost space, the universe itself and all associated world systems, are fundamentally linked. The pointer to such a confluence of cosmos and consciousness in the Vajrayana apparently takes us to the same hallway where all ancient mystic traditions meet modern Western Philosophy and Physics - with five doors opening to Information Theory, Extended Mind, The Theory of Everything, Panpsychism and the Holographic Universe. We therefore suggest that lineage-endorsed elucidation of otherwise self-secret Vajrayana teachings might contribute to the open questions of whether consciousness could be described by fundamental laws, and whether these relate to any existing laws of cosmological and quantum mechanical spacetime. To that end, we present a first architectural model of how these concerns may interact, starting with the geometry of Karma Kagyu Meditation and exploring the non-dual evolution of the activity of an observer and his observed, as a neutral monist or neo [Hegelian] idealist framework for information creation. A 2D version of this model is simple enough to explain to 7-year-olds and has been successfully applied for high-end technical innovation in Fortune 500 companies since 2006. That basic geometry has been proved to be inherent in our human psychology, biological makeup, creative thinking and historical innovation and explains the basic steps whereby our mind can create material products [Pahl et al., 2006]. The question now is whether investigating the n-D information flow intimated in the structure of Vajrayana Meditation can help explain how both spacetime-matter and mind non-dualistically co-emerge. **P1**

**37 A Quantum Cure for Panphobia** Paavo Pyllkanen <paavo.pyllkanen@his.se> (Philosophy, University of Helsinki and University of Skovde, Helsinki, Finland)

Recent debates in panpsychism have considered the idea that the elementary particles of physics (physical ‘ultimates’) have proto-mental properties (Nagel 1986), or even involve experience (Strawson 2006). Nagel sees this option (which he takes as a sign that something may not be quite right) as arising out of a few reasonable assumptions, namely that we ought to take conscious experience seriously, while denying psychophysical reductionism and radical emergence. For Strawson the idea arises as a result of assuming that everything concrete is physical; that everything physical is constituted out of physical ultimates, and that experience is part of concrete reality (2006: 25). He considers ‘micropsychism’ as the only reasonable option, not merely as something one arrives at via inference to the best explanation. Those who find these arguments compelling may find themselves overcome by panphobia, a fear that one is turning into a panpsychist. (The term ‘panphobia’ is inspired by Jerry Fodor’s (1989) term ‘epiphobia’ - which he defined as the fear that one is turning into an epiphenomenalist, typically felt by certain physicalist philosophers). Why should one be afraid of turning into a panpsychist? Strawson himself admits having felt abashed about arguing for panpsychism (2006: 186) and acknowledges that it is not easy to accept in the current intellectual climate (2006: 25). Nagel has remarked that “panpsychism has the faintly sickening odor of something put together in a metaphysical laboratory” (1986: 49). Seager and Allen-Hermanson note that panpsychism has come to seem an implausible view, given our immense scientific knowledge of the physical world and the corresponding desire to explain everything in physical terms (2015: 1). Simons calls panpsychism “one of the most immediately counterintuitive and off-putting of metaphysical positions” (2006: 146-7); McGinn sees it as “a complete myth, a comforting piece of utter balderdash” (2006:93); while Lycan notes that there is not “any scientific evidence for panpsychism; there is no scientific reason, as opposed to philosophical argument, for believing it” (2006: 66). Epiphobia and panphobia lie at the opposite ends of a spectrum in philosophy of mind. An epiphobic worries that one’s mind-matter theory gives too weak a role for mind, while a panphobic worries that it gives too strong a role. In this talk I will explore whether a cure for both epiphobia and panphobia might be found in David Bohm and Basil Hiley’s ontological interpretation of quantum theory (Bohm and Hiley 1987, 1993). **C1**

## 1.04 Ontology of consciousness

**38 Considerations on The Notion of Causal Closure of The Physical Universe** Thomas Brophy <tgbrophy@gmail.com> (Integral Health And Sciences, California Institute for Human



Science, Encinitas, CA )

Central to the mind-body problem, is the notion the physical universe is causally closed. On that view, anything and everything physical-material that happens in the universe is caused by something else physical-material. (Precisely, any physical event that has a cause, is caused by something else physical.) This notion is commonly assumed axiomatic among philosophers of mind and biological theorists. David Skrbina (Panpsychism in the West, 2005): "Basic physical laws, such as the conservation of mass/energy and the requirements of thermodynamics, seem to prohibit any possible interaction outside of the physical universe. Interactionist dualism is, therefore, currently held more as a matter of faith than of philosophical reasoning." John Searle (2002 Journal of Consciousness Studies, "Why I am not a property dualist.?): "First, let us assume, as seems reasonable, that the physical universe is causally closed." David Chalmers (The Conscious Mind 1996), "The second constraint I have followed is to take science seriously... For example I have not disputed that the physical world is causally closed". Daniel Dennett (Consciousness Explained 1992) states the common reasoning behind this notion, "How do they [putative non-physical aspects] make a difference to what happens in the brain cells they must affect, if the mind is to have any influence over the body? A fundamental principle of physics is that any change in the trajectory of any physical entity is an acceleration requiring the expenditure of energy, and where is this energy to come from? It is this principle of the conservation of energy that accounts for the impossibility of dualism." Consensus modern physics however contains no such constraint at all. In quantum mechanics, a criterion for the Hermetian operators that produce real eigenvalues (actually realizable physical outcomes) is they conserve energy, meaning the entire probability distribution of possible ontological outcomes all have the same total energy. Thus according to the commonly held (Copenhagen interpretation) probability interpretation of the quantum wave function, at the moment of measurement/observation/decoherence something non-physical chooses among the multiple wave function probabilities - outcomes which could be very different realities, such as Schroedinger's cat being alive or dead. As Rosenblum and Kuttner state (Quantum Enigma: Physics Encounters Consciousness, 2011), "Moreover there's a quantum loophole in Dennett's argument: No mass or energy is required to determine to which of the set of possible states a wavefunction will collapse upon observation." There is no violation of physical conservation of energy with the "choosing" among very-different future outcomes of the measurement. This is actually current "consensus among physicists". However, via Bell's Theorem, and statistical mechanics, if there is something non-physical that makes physically causal choices, it must operate very (radically) differently than do purely physical mechanisms. This paper investigates constraints and criteria on how such non-physical causal mechanisms can operate, how this can be consistent with some esoteric psychospiritual theories, and implications to fundamental modern theories of what consciousness is and how it operates. C15

**39 Towards a Unified Theory of Information: Semiotics, Information, and Life Science** Richard Choate , D. R. Frohlich <rchoate@ses.gtu.edu> (Theology And Science, Graduate Theological Union, UC Berkeley, Francisco J. Ayala Center for Theology, Berkeley, CA )

What is information? Because of its increasing importance for many different fields, including and especially the study of consciousness, the question is a crucial one. Are these notions fundamentally different? Or is a unified theory of information (UTI) possible? In this presentation, we explore these questions in relation to the grounding problem, that is, the question of how words or signs acquire meaning. One of the primary obstacles to a UTI is the apparent impasse between quantitative notions of information (e.g. Shannon, Kolmogorov information) and qualitative ones (e.g. semantic theories). We explore the possibility of a semiotic approach which transcends and thus unites these two notions in a broader ontologically grounded solution and test its usefulness against certain biological phenomena. C17

**40 The Tao As Symbol Of Quantum Thermofield Brain Dynamics** Gordon Globus <ggglobus@uci.edu> (Psychiatry, University of California Irvine, Laguna Beach, CA )

The very appearance of the Tao symbol suggests a dynamical flow of duals with each also implied as a default within the other. I call attention to a version of Giuseppe Vitiello's quantum ther-

mofield brain dynamics (QTBD) which appears consistent with the Tao symbol. QTBD features dual modes of a common vacuum state in which the creation (or annihilation) of a quantum in either mode is coupled with the annihilation (or creation) of a quantum in the other mode. The dual modes do not exist autonomously but require each other. What is ontologically primary is the dual modes belonging-together in the vacuum state between of dual modes. The Tao symbol visually symbolizes dual mode dynamics and their belonging-together. This match is not ‘consciousness’ (contra Vitiello) but Existenz, the Heideggerian thrownness of world-disclosure. It is intriguing to discern a convergent resonance between the ancient Tao symbol, Heidegger’s 20th century existential formulation, and the revolutionary front of contemporary quantum brain theory. C7

**41 Body-qi-mind: A Framework on Consciousness from Ancient Chinese Philosophy** Yan He <yanhe2021@mail.tsinghua.edu.cn> (Chemistry, Tsinghua University, Beijing, BEIJING China)

Debates on the essence of consciousness within the context of Western philosophy alternate between the Body and the Mind. While the internal tension of the Body-Mind dualism leads to the splendid advancement of the western science and technology and the efforts to overcome the Body-Mind conflict result in the development of dialectic, a satisfactory and easy to understand framework has not been proposed to the scientific community on consciousness research. Herein, we introduce a framework based on the ancient ‘Qi-theory’ deep-rooted in the traditional Chinese culture and philosophy. The key concept, simply put, is to insert a transition state between the Body and the Mind. Any entity is agglomerated from certain type of qi and is surrounded by its qi. The qi surrounding an entity is determined by the entity but is partially independent, carries the integrated spatio-temporal information of the entity, and is spatially and temporally limited but has no physical boundary. The consciousness is just the qi of the human body, which is at currently the highest level of all the types of qi. Based on these assumptions, we will discuss how this qi-theory could be utilized to interpret some outstanding questions in the field of consciousness research, and show some experimental results that could fit into this framework. C5

**42 Consciousness In Space?** Haoying Liu <yta0421@gmail.com> (Philosophy, Shanghai; UMass-Amherst, Amherst, MA )

In this paper I consider a question about the mode of existence of consciousness. In particular, I ask if consciousness, understood as concrete phenomenal characters and episodes, exist in space. I defend a notion of spatiality, which is compatible with both physicalism and property dualism, and accommodates consciousness in space. There are philosophical intuitions against locating consciousness in space. According to one intuition articulated by McGinn, talking about spatial features of consciousness is committing a category mistake. According to another intuition expressed by Stubenberg as “the colored-brain problem”, it seems absurd to locate phenomenal properties in the objects in which they are instantiated, because the phenomenal properties as such cannot be observed, not even in the brain of conscious subjects. Similar intuition is described in the work of other philosophers, such as Leibniz and Thomas Nagel. Despite these intuitions, there are reasons for locating consciousness in space. The first reason is due to special relativity. It is generally acknowledged that consciousness exists in time. However, special relativity implies that space and time are inseparable: If an entity is in time, then it has a spacetime location, and consequently it also has a spatial location. Applying this principle to conscious episodes, it is inferred that consciousness is also in space. The other reason is about mental causation. If consciousness is in causal relation with physical entities, then since causal relation requires spatiotemporal proximity, consciousness should have spatial dimension. For these two reasons, I believe that consciousness is in space. To locate consciousness in space, I clarify what it is for something to exist in space, and reject the intuitions of the category mistake and the colored-brain problem. I introduce a notion of existence in space (EInS) which grounds the spatiality of consciousness in the spatiality of its physical substrates. According to EInS, X exists in space, if (i) X exists in space, in an intuitive, uncontroversial manner, or (ii) X’s existence metaphysically depends on Y, whose existence in space is uncontroversial. Assuming that the existence of physical objects in space is uncontroversial, I use EInS as a working hypothesis to argue that consciousness does



exist in space. In reply to the opposing philosophical intuitions, I provide an account of the difference between our folk notion of existence in space (FInS) and the corresponding notion EInS, and use this account to explain why our folk notion of existence in space incurs category mistake and the colored-brain problem if applied to consciousness, and why EInS avoids such difficulties. On my account, the domain of FInS is naturally limited to physical objects and properties, which are de facto observable in the environment. The intuitions of category mistake and the colored-brain problem can be accounted for as consequences of this feature of FInS. Since the theoretically-motivated notion EInS doesn't incorporate this assumption about its domain, especially concerning those beings which metaphysically depend on physical objects, thinking about consciousness as in space under EInS could overcome these opposing intuitions. **C15**

**43 Can A Quantum Field Theory Ontology Help Resolve The Hard Problem?** Anand Rangarajan <anand@cise.ufl.edu> (Computer/Information Science, University of Florida, Gainesville, FL )

The hard problem of consciousness arises in most incarnations of present day physicalism. Why should certain physical processes necessarily be accompanied by experience? One possible response is that physicalism itself should be modified in order to accommodate experience: But, modified how? In the present work, we investigate whether an ontology derived from quantum field theory can help resolve the hard problem. We begin with the assumption that experience cannot exist without being accompanied by a subject of experience (SoE). In recent years, Strawson has elaborately defended the notion of a thin subject - an SoE which exhibits a phenomenal unity with different types of content (sensations, perceptions, thoughts etc.) occurring during its (brief) temporal existence. Next, following Stoljar, we invoke our ignorance of the true physical as the reason for the explanatory gap between present day physical processes (events, properties) and experience. We are therefore permitted to conceive of thin subjects as related to the physical via a new, yet to be elaborated relation. While this is difficult to conceive under most varieties of classical physics, we argue that this may not be the case under certain quantum field theory (QFT) ontologies. We suggest that the relation binding an SoE to the physical is akin to the relation between a particle and (quantum) field. In QFT, unlike in quantum mechanics, fields behave like particles under certain circumstances. The particle-field relation is central to QFT. Fundamental issues remain as to whether particles and fields are substances, tropes, properties or something else entirely. There are important no-go theorems in QFT such as Malament's which seem to exclude the possibility of spatio-temporally localized particles at all. These are typically augmented with FAPP (for all practical purposes) principles in which particles reappear with a FAPP "as if" status despite the underlying theory not allowing for their possibility. In quantum field theory, a particle is conceived as a coherent excitation of a field. Under the right set of circumstances, a particle coalesces out of a field and dissipates. We suggest that an SoE can be conceived as akin to a particle, a SelfOn, which coalesces out of quantum fields, persists for a brief period of time and then dissipates in a manner similar to the phenomenology of a thin subject. Experiences are physical properties of selfons with the constraint that selfons belonging to the same natural kind will have similar experiences. While it is odd at first glance to conceive of subjects of experience as akin to particles, the spatial and temporal unity exhibited by particles as opposed to fields and the expectation that selfons are akin to new kinds of particles, paves the way for cementing this notion. Next, we detail the impact of various no-go theorems on the existence of selfons with particular focus on spatio-temporal localization. With analytic philosophy still struggling to come to terms with the ontologies underlying quantum field theory, we believe the time is ripe to revise the foundations of matter, and in doing so, dissolve the mind-body problem. **C7**

**44 Schopenhauer, Husserl And The Invisibility Of The Embodied Subject** Yaoping Zhu <zhu yaoping19@sina.com> (Philosophy, Soochow University, Suzhou, JIANGSU China)

For both Schopenhauer and Husserl, it is important to recognize the correlation between world and subject. Furthermore, they are common in emphasizing the distinction between transcendental subject and empirical subject as well as the distinction between the mode of being of the subject and that of the object. Both of them realized that the confusion between the transcendental subject

and the empirical subject will cause the paradox of that the subject as one part of the world is at the same time the presupposed condition of the whole world. On the one hand, the relation between the subject and the object is similar to the relation between the eye and its vision; on the other hand, the relation between the transcendental subject and the empirical subject is similar to the relation between the Seeing Eye and the seen eyes. In every couple of relations above, the distinction between the former item and the later one lies in: the latter is visible, but the former is invisible. In the history of western Philosophy, Schopenhauer is the first one to realize that the subject is no more than the invisible body, or the body playing the role of subject. Our body plays as both the object and the subject. But it doesn't mean that the body as a subject can be identified with the body as an object. Before I grasp my body as an object which exists tangibly in time, space and is regulated by causality, I have comprehended my body directly as an invisible subject or ego. As a subject, the body is the prerequisite of all the representations but itself can't simultaneously be represented by itself. If objects are always visible to me, then my body as a subject is invisible. Similarly, Husserl strongly emphasized the invisibility of the subjectivistic body in his posthumously published manuscripts such as *Ideas II?*, *To the Phenomenology of Intersubjectivity*, etc. For him, it is especially important to distinguish the subjectivistic body and the objectivistic body, otherwise we will get in the paradox of our body as one part of the world is at the same time the a priori condition of the whole world. P2

## 1.05 Qualia

**45 Why We are Qualia Blind and How to Eff the Ineffable** Brent Allsop <brent.allsop@gmail.com> (., Sandy, UT)

If you think about the physical mechanics in our brain that compose an "experience of qualia", it helps to break it down to a slightly more elemental level than the entire experience. Take, for example, the qualitative nature of elemental redness. To "experience" this, there must be something in the brain that has this quality, which is the redness knowledge we experience. This quality is bound by our brain with other bits of knowledge, some of it qualitative, some of it not, like the additional knowledge of you, having the experience of this redness. The brain produces and binds what it is that has all these diverse qualities together to paint our conscious experience of the world. So the qualitative nature or to be more specific, the elemental redness quality is the only important thing to consider in this so called "hard" problem. Everything else is, as Chalmers would say, part of the easy problem. What is it, in our brain, that has this redness quality that can be the qualitative part of our experience of it? One of many possibilities is that the neurotransmitter glutamate, chemically reacting in a synapse, is what does have this physical redness quality. A quality like redness must have detectable physical behavior. It could be that glutamate, chemically reacting in a synapse, is what is this redness quality behavior. Note that an abstracted word like "red", though it can represent it, does not have a redness quality. Currently, even though we know everything about the causes and effects of the chemistry going on in reactions, all this knowledge is represented by abstracted information that, like the word red, does not have the same quality. So this causal information could be representing what it is, that is the physical causal properties of redness, we just don't know how to qualitatively interpret this abstracted knowledge. We are currently blind to any phenomenal qualities of anything in another's brain, simply because we don't know how to qualitatively interpret the abstracted knowledge we receive from our detectors. This is similar to the way Frank Jackson's Mary, the brilliant scientist, can know everything about red, but just not know how to qualitatively interpret all her abstracted knowledge of redness. One way for her to know what the abstracted word red qualitatively represents, is for her to walk out of the black and white room, and for the first time, experience physical redness, for herself. Then she can say both that she knows everything about the physical behavior of redness, and she knows how to qualitatively interpret this abstracted knowledge. All that is required, to eff the ineffable, is to know how to qualitatively interpret the abstracted data we receive about what is going on in our brain. C1

**46 The Valence Of Experience And Ethics** Robert Long <rgblong@gmail.com> (Philosophy, New York University, New York City, NY )

Many thorny ethical decisions turn on how much we should care about different pains and pleasures. Whose suffering should we alleviate? which humans, which animals? Many people believe that a writhing ant is suffering less than a writhing chicken, which is in turn suffering less than a writhing human. However, attempts to justify this intuition, much less precisely compare levels of human and animal pain and pleasure, are notoriously difficult. We have at least one source of knowledge about the human experience of pain and pleasure: our direct acquaintance with them. But we currently have no established way of directly knowing the quality and severity of animal pain and pleasure. Instead, we have traditionally had to make indirect inferences, using considerations such as brain size and structure, evolutionary considerations, and behavior (cf. Singer 1990 and Allen 2004 for summaries). More recently, however, Integrated Information Theory (IIT) has purported to give a mathematically precise way of determining which physical systems are conscious, and the quality and quantity of that consciousness (Tononi and Koch 2008). This paper will consider the ethical implications of IIT. Can we use IIT to compare the mental states of an insect, a chicken, and a human (cf. Tomasik 2012, *inter alia*)? This paper explores the promise of Integrated Information Theory as a new approach these questions. Integrated Information Theory offers two precise conceptual tools: first, a mathematically precise answer to the amount of consciousness enjoyed by a physical system?namely, the amount of integrated information it contains (this quantity is called  $\phi$ ?). I will argue that  $\phi$  plausibly captures what people are tracking when they claim that some organisms are 'less' conscious than others. But not only amount, but also quality of consciousness, is relevant for moral concern. And indeed, IIT also proposes a way of inferring different qualitative states of experience from integrated information. While proponents of IIT have noted in passing that their framework will have ethical implications, no one (to my knowledge) has explicitly considered these implications in detail. I will argue that IIT's calculations of quantity and quality of experience may be incorporated into a utility calculation or other decision-making framework. More generally, IIT serves as a model for traditional philosophical questions about the valence, intensity, and value of different types of mental states. I will use this framework to consider some possible ethical consequences of IIT: for animal versus human suffering, for organized matter in general, and for possible artificial beings. C

**47 What If Healing Were More Than You Thought?** Eric Pearl <rachel@thereconnection.com> (The Reconnection, Los Angeles, CALIFORNIA )

What if healing were more than you thought? What if it is the key to your transformation from local to non-local conscious beings? What if it is the key to your life progress? Well, now there is a new, more expansive healing that gives us all the gifts of known energy healing techniques, both old and new, and much, much more. All without any complicated techniques, elaborate rituals, or fear-based protections. It's called Reconnective Healing. This all-encompassing form of healing consists of more than just regaining the use of your arm or leg, your vision or hearing, your liver or kidney. Reconnective Healing is today's most comprehensive approach to overall life progress. It gives us access to heal not only mental, physical, emotional and spiritual problems, but it brings balance, clarity, awareness, stamina, stability, youthfulness to our lives as well - in how we feel, how we move, even how we look(!) - as well as evolutionary change in career direction, personal relationships and libido. In essence, this life progress includes stepping into a greater human potential. In modern times, we take quantum leaps every day - leaps that are so natural, we don't even consider them as quantum. And yet, they are. Simple changes in our awareness, in what we accept as possible, in what we accept as truth, are quantum jumps compared to where we were just 50 or even 25 years ago. Even our language is changing. The word quantum is today being replaced with a new word, *qualia*, a term which, according to Deepak Chopra, means quality of life. Quantum physics and quantum mechanics are being referred to as *qualia physics* and *qualia mechanics*, because we are moving from what we saw as something existing solely in the field of subatomic particles to something that plays a big role in the quality and perception of our lives. Today we are being challenged to question our beliefs and access a greater understanding of who we are and how we function. Our understanding of who we are and how we work continues to

change. For example, not too long ago, we assumed that our bodies' healings occurred through biological chemicals - the biochemical model, as it was often referred to. Today we understand that biological chemicals are not the only factor: our bodies heal through light as well. The DNA in each of our cells emits light. According to renowned biophysics researcher Dr. Fritz-Albert Popp and his study on biophotons, as well as those continuing his work, when our light levels diminish, it often correlates to a diminishing level of health. On the other hand, when our health is at an optimal level, our light emissions appear to be at a more optimal level as well. The light model explains many things that the biochemical model can't, in large part because biological chemicals take time to generate and travel to different areas of the body, while light waves exist everywhere simultaneously. **A1**

## 1.06 Machine consciousness

**48 Taoist Philosophy and the Quest for Synthetic Consciousness** Jeffrey L. Beck <vortex.beck@gmail.com> (Paradigm Research LLC, Gunnison, UT )

The Taoist perspective on reality, a school of thought dating back thousands of years, tells us that there are two fundamental opposing forces at work in nature. They named them Yin and Yang. To state this perspective another way, our reality is organized around an irreducible paradox. On one side we have masculine, or serial, or linearly causal pathways, the parts of our reality that can fit into a Turing Machine, what are known as "computable" or "decidable" processes. On the other side we have feminine, or parallel, or circularly causal pathways, the parts of our reality that must be handled via parallel processes because they would send a Turing Machine into an endless loop (the Halting Problem). It is within the space of this paradox, or at its boundaries, that I notice the possibility of creating consciousness. It falls within the realm of the undecidable relative to computability theory. Another way to state this perspective is to say that consciousness lies between our focal attention and the background within which it exists, what has been called non-focal attention. I have been exploring this domain by mapping material, mental, and mathematical aspects of our knowledge system across this paradox. This mapping has led me to feel that a topological analysis is important in understanding consciousness because Euler's Number serves as a measure of circular, or Yin, structures. It may be possible to eventually map qualia through the study of molecular structures using topological methods that look at how molecules span this paradoxical space. The goal of my investigation into this Taoist approach to understanding the world is to be able to design causal pathways between conscious entities and their hardware. We need to understand how mind can move matter and how matter can cause the experience of qualia in mind if we expect to create conscious machinery. Beyond that, I see robotics and artificial intelligence as the test lab for understanding consciousness and ourselves. **C21**

**49 Non-reductive Machine Consciousness: Pushing the Limits of Physicalism** Piotr Boltuc <epetebolt@gmail.com> (Philosophy, University of Illinois, Springfield, Springfield, IL )

Non-reductive consciousness is often viewed as the gist of what it means to be human; many extend this concept to advanced animals. Tom Nagel and John Searle are the champions of this approach; Dave Chalmers, with his Hard Problem of Consciousness, opens a broader avenue for interpretation. Non-reductive consciousness will be viewed as 'the locus of permanence' that allows the epistemic viewpoint, that mirrors the world in the transcendental space. Philosopher's role is to ask nearly impossible questions. My question is: Under what conditions could machines become first-person conscious in the sense often described as non-reductive consciousness? I think physicalism (and also panpsychism), entail that such conditions must exist - whether they can be satisfied in a world like ours is a different question. The argument: Step I. If (1) humans have non-reductive consciousness, and if (2) science can in principle explain the world, then (3) science should, in principle, be able to explain non-reductive consciousness. Step II. To explain some process scientifically, in strict sense, means to provide a mathematical description of that process (4). Such description constitutes an engineering blueprint for creating that process (5). Step III. Hence, if some day science explains how non-reductive consciousness is generated, it would thereby provide an engineering blueprint of non-reductive consciousness (6). It would be

a matter of standard engineering to turn such blueprint into the engineering product (7) Step IV. To engineer non-reductive machine consciousness does not solve, or butcher, the hard problem of consciousness -- this is because we assume the 'black box approach' (8) the ontological status of non-reductive consciousness is distinct from the way it can be engineered (9.) Step V. People raise epistemic problems: How would we know that a being, e.g. a machine, has non-reductive consciousness? This is a problem since there are reasons to believe that functional consciousness can be engineered without first-person non-reductive phenomenal consciousness (10). (This may be presented in terms of hard- and soft-AI, but even more clearly by physical interpretation of Church-Turing thesis.) Yet, this is a harder version of the problem of other minds. If we have a good engineering blueprint we should have decent epistemic reasons to believe that by following it we would attain first-person consciousness. A philosophically more interesting answer would be based on a version of Chalmers' 'dancing qualia' argument (11). Finally, we address the issue whether non-reductive consciousness is epiphenomenal. We argue that, in our possible world, the emergence base of first-person consciousness may be in a causal one-one relationship with some important functional characteristics. C

**50 Consciousness Enabled Fuzzy Control Systems For Superintelligent Machines** Patvardhan Chellapilla , C Vasantha Lakshmi <cpatvardhan@gmail.com> (Electrical Engineering, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Making machines intelligent has been a long cherished goal in Computer Science. There have been sporadic successes and machines have been designed to increasingly exhibit higher intelligence albeit in narrow and well defined domains. A Chess Computer that could beat the World Champion was created in the late 90s. However, these efforts were not accepted as being examples of Artificial Intelligence (AI) as they relied more on increased computational firepower rather than any 'real intelligence' that emulated human intelligence. Recent successes in machines with better intelligence include machines beating the world champions in Jeopardy and Go, creation of driver less cars etc. In 2012, AI experts believed that it would be at least 10 years before a machine could beat the world champion in Go but was achieved in March 2016 itself. All these have given rise to the expectations that machines will soon be superintelligent i.e. would outperform humans in a wide range of activities. SuperIntelligence is thus expected to exceed human performance in a wide range of activities. This could arrive sooner according to some researchers because as soon as a machine that is slightly better than human intelligence is built it would build something better than itself and would cause a cascade of better and better machines soon achieving Superintelligence. However, this has caused concerns that such a machine may spell doom for the human race if not endowed with proper controls. These have to be incorporated at the design stage because once superintelligent machines are created they may resist incorporation of any such controls and work according to their own agenda even if that agenda is harmful for humans. How does one combat this situation? We argue that a superintelligent machine must necessarily be conscious of its environment, goals and priorities. These are typically fuzzy in the real world as well. It will be very hard for even humans to agree on a set of well-defined beliefs and a value system that could serve as a guide in all the decision making that would be required in the course of performing its tasks. The designer of the superintelligence would have to have a high level of consciousness in order to have clarity in these aspects and build in the same clarity in the machine that is designed. This is not any different from the design of the education system. The egalitarian societies have education systems that inculcate the right values in the children so as to make them responsible adults. The same holds true for the design and implementation of the control systems of superintelligent machines. These controls would necessarily have to be fuzzy as the real world is better described in fuzzy rather than crisp terms. The paper proposes a model of such a fuzzy control system that is conscious of its environment and performs according to its functional requirements. The design of such a control system for a driverless car illustrates the need for fuzzy control. P1

**51 Human Values, Narrative and AI Machines** Malvika Gupta <malvikagupta.dei@gmail.com> (English, Dayalbagh Educational Institute , Agra, U.P. India)

Nick Bostrom explains superintelligence as being “an intellect that is much smarter than the best human brains in practically every field, including scientific creativity, general wisdom and social skills.” Yet, machine intelligence is not machine consciousness. While machine intelligence or artificial intelligence may become super, can machines become conscious? Can machines be phenomenally conscious? Can they experience, firsthand, life as humans do or will they only be able to simulate human values, experiences: consciousness? Regarding the issue of control, which Bostrom highlights, artificially intelligent machines will have to be taught to operate within a value system if they are to be beneficial to humans. This paper examines the role of narrative or stories in the construction of AI machines (Mark Riedl) which learn what it means to be a human operating within a world system of moral and ethical values. **P1**

**52 Can Human Mind Be Uploaded: Current Limitations and the Future Potential** Raymond Lin , Allen Y. Houg <wbwithpiano@gmail.com> (Institute Of Philosophy Of Min, National Yang-Ming University, Taipei, Taiwan)

Can human mind be uploaded? What kind of theory and corresponding hardware is necessary for being carrier of human mind? What aspects of human mind ?brain correlation needed to be captured for uploading? If it is plausible to construct a complex system as being a carrier for human mind uploading, can such system also emerges consciousness as we human do? Since Turing machine computer was invented in the twentieth century, the perspective of mind as a computing function has been put forward and gone through furious debate. Within the view of functionalism, considering mind a computing function, it seems that human mind uploading is plausible. In this paper I will argue that human mind can be uploaded; however, it requires a new kind of computer/machine as the hardware. First, I will argue that for human mind uploading there are problems for functionalism and also the limitation of Turing machine computers. Next, I will examine some novel theories based on the blooming brain science and neuro-cognitive science, e.g. the global work space theory (Baars, 2005; Dehaene & Christen, 2011), the predictive coding theory (Clark, 2013; Seth, Suzuki & Critchley, 2012), the integrated information theory (Giulio Tononi, Boly, Massimini, & Koch, 2016) and the Orchestrated objective reduction model (The Orch-OR model for Consciousness, Penrose & Hameroff, 1996). I will compare these theories and, discuss whether they share the same problems of functionalism. Finally, I will argue that the Orch-OR model would be the most promising theory, capturing multiple aspects of human consciousness and simulating the complex system of human brain. It is more plausible to realize human mind uploading under Orch-OR model. I will then introduce that based-on Orch-OR model the configuration and framework necessary for being an approximate hardware as a human mind carrier. To conclude, this paper will focus on Orch-OR model for being a potential theory for realizing human mind uploading, introducing the configuration of corresponding hardware. **C3**

**53 Does Goedel's Incompleteness Results Imply That Machine Intelligence is Impossible?** Yang Liu <y1587@cam.ac.uk> (Faculty Of Philosophy, University of Cambridge, Cambridge, CAMBRIDGESHIRE United Kingdom)

There is a recurring theme in the philosophy of artificial intelligence (AI) concerning the implication of Goedel's incompleteness result in the development of machine intelligence. Goedel has famously shown that, in any (minimally adequate) deductive system, there always exist sentences that cannot be decided by the system, sentences whose truth are however known by human reasoners. This result has often been interpreted as saying that there is an essential limitation as to what machine intelligence is capable of achieving, and this limitation determines that human reasonings can never be carried out by computing machines. This popular view is encouraged in part by the belief that Goedel himself held such a view that human mathematical intelligence cannot be completely surveyed by any well-defined axiomatic system as demonstrated in his incompleteness theorems, let alone human reasonings in general. Goedel however never made public his position on the impact of his incomplete result on AI during his lifetime, he only discussed this subject in private conversations/communications. In fact, Goedel's view is more nuanced than what it is believed to be. In a posthumously published essay, he remarked: “[e]ither ... the human mind (even within the realm of pure mathematics) infinitely surpasses the powers of any finite machine,



or else there exist absolutely unsolvable diophantine problems ...” This position is sometimes referred to as Goedel dichotomy. The interest of this talk is as historical as it is philosophical. Drawing on the original text, I will reconstruct and explicate Goedel’s dichotomic position that either our mathematical intelligence indeed has an edge over machines or that there are modes of mathematical reasoning that we make frequent use of but have no way of encompassing their foundations in full detail. The latter is a pivotal point derived from Goedel’s remark. More precisely, following Feferman and Gaifman, I make the distinction between \*how\* our mathematical reasoning functions and \*what\* we can prove in mathematics, both are important measures of our mathematical achievements. The crucial insight of Goedel’s proof lies in his systematic applications of the method of self-reflection (between different levels of language and different formal theories), which belongs to the \*know-how\* aspect of our mathematical capabilities. What is usually missing in the discussion of Goedel’s incompleteness theorems, as I shall argue, is that his result also shows that there is an ultimate limitation to our ability to self-reflect. This type of limit has subtle implication in AI: it does not preclude the possibility that there will be machine intelligence that can simulate our mathematical reasonings and replicate our mathematical outputs (i.e., can prove what we as human reasoners can prove, if not more), but if such a machine does exist it means that we won’t be able to understand completely how it functions. C

**54 Fundamental Consciousness, Artificial Consciousness and Conscious Artificials** Aviv Spector Shirtz <avivshirtz@gmail.com> (The Edelstein Center, Tsur Hadassah, Israel)

Inspired by David Chalmers’ Hard Problem of Consciousness and Galen Strawson’s works on Panpsychism, the notion of consciousness as brute and irreducible fundamental constituent of reality (such as mass and charge), has gained prominence in the 21st century philosophy of mind. However, the field of artificial consciousness, being a computational enterprise at its core, had yet to incorporate this notion into its working programme. Considering current philosophical trends, it is suggested that the artificial consciousness project should devise a contingency plan based on the possibility that consciousness is indeed a fundamental constituent of reality. Taking the notion of fundamental-consciousness seriously, both terminology and methodology of the artificial consciousness project should be re-evaluated. The first task at hand is to analyze terms of the form “artificial X”, when X is fundamental. Based on the argument that if something cannot be reduced it also cannot be constructed, the analysis exposes an inherent incoherence in the terms of this form. Challenging this argument entails that there can exist both “reducible X” and “irreducible X” which is a contradiction, since X is either reducible or irreducible. More specifically, it is conceivable that some Y may be artificially built (otherwise it will be natural) from different materials than X (otherwise it will be just X), and have causal powers identical to X’s. However, Y will lack the very essential property of X that makes it fundamental, the irreducible element, the common denominator between all Xs. If Y does have this property as a non-fundamental property, then this property is both fundamental in Xs and non-fundamental in Ys, which is a contradiction. X cannot be both fundamental and artificial, both irreducible and reducible. Thus, since terms of the form “artificial X” when X is fundamental are contradictory, and since this paper aims at exploring this territory under the assumption that consciousness is fundamental, the term “artificial consciousness” is incoherent. Accordingly, a terminological overhaul is suggested: it would be preferable to use the term “conscious artificials” (or “conscious machines”) instead of “artificial consciousness” (or “machine consciousness”), as consciousness itself is never artificial. The suggested terminological shift entails a methodological shift, since the methodologies for constructing “artificial consciousness” and “conscious artificials” are not one and the same. While within the framework of artificial consciousness, consciousness is considered an emergent phenomenon or property (and as such a valid candidate for artificial replication or production), within the framework of “conscious artificials” consciousness is a fundamental part of nature, which needs to be artificially harnessed. As a result, the pursuit of conscious artificials will benefit from attaining a better understanding of the mechanism responsible for the interaction between the allegedly conscious machines, humans, and fundamental consciousness. Although this interaction is notoriously problematic to explain, describe or make sense of, if consciousness is fundamental and we are conscious machines made of all kinds of fundamental materials, the reality of an interactional mechanism is established. C21

**55 Are Human Beings Computers or Does our Creative Intelligence, Probably, Set Us Apart?** James Tagg <james@taggs.com> (Cengine; The Penrose Institute, La Jolla, United Kingdom)

Many scientists believe human beings are flesh and blood computers, with an increasingly tenuous hold on the title, 'most intelligent being on the planet'. I do not share this view. Humans invent, compose music, write novels and discover things. We hope these creative pursuits distinguish us from artificial intelligence. But, how can we prove such a thing: How can we prove art is not computable? We often colloquially describe creative endeavours in computable terms. A poor piece of art or music is described as formulaic and a fractal is not considered art. But, can we use this notion of computability in a strict sense to define human intelligence. In mathematics, we do have a formal distinction between computable and non-computable things. The field is decidability and was initiated by David Hilbert and codified in Turing's famous 1936 paper. "On computable numbers and their application to the Entscheidungsproblem". In order to prove some piece of mathematical creativity is non-computable we need to find a problem where the discovery of a proof is a strictly a non-computable task and then demonstrate a proof of that problem by a human being. In 1970, A Russian mathematician, Yuri Matiyasevich, finally prove Hilbert's 10th problem, that Diophantine equations are non-computable and in 1994 Andrew Wiles prove Fermat's last theorem, a form of Diophantine equation that should not be possible to for a computer to solve. This presents a paradox. The only conclusion we can draw is that Wiles is not a computer, and I hope, by analogy, neither am I! In this talk I will explain the Wiles paradox and attempt close any loop holes in the conclusion that humans are not machines. **PL5**

**56 Exploring Robotic Minds: Emergentist Account For Non-reductive Consciousness** Jun Tani <tani1216jp@gmail.com> (Electrical Engineering, KAIST, Daejeon, 305-701, Korea, Republic Of)

This talk proposes that the mind is comprised of emergent phenomena, which appear via intricate and often conflictive interactions between top-down intentional processes involved in proactively acting on the external world and bottom-up recognition processes involved in receiving the resultant perceptual reality (Tani, 2016). This view has been tested via a series of neurorobotics experiments employing predictive coding principles implemented in "deep" recurrent neural network (RNN) models. With the direct human tutoring of robots built on this model, robots develop the skills needed to generate complex actions, the concepts necessary for representing the world, and the potential for the linguistic competency required to express such experiences. Furthermore, these experiments confirm that "compositional" yet fluid thinking and acting develop with the spontaneous formation of a functional hierarchy in neurodynamic structures once proper constraints are established. Constraints include those on processing at multiple spatio-temporal scales, as well as those informed by tutoring at the level of behavioral interaction. The talk highlights an account of free will, how it emerges and becomes the contents of consciousness, as related to the studies by Libet (1985). Deterministic chaos self-organizes in the higher level of the aforementioned deep RNN model, and this can cause spontaneous shifts in motor movement patterns generated in the lower level. In the other direction, intention in the higher level can be modified in a postdictive manner in the course of minimizing the prediction error generated through conflict with perceived reality. One important implication here is that one becomes consciously aware of one's own intention for generating action via postdiction, when the intention originally unconsciously generated is modified in the face of possible conflicts due to embodiment or potential openness in the environment. Thus, a holistic dynamics of the mind emerges as the circular causality between these two poles, top-down subjective mind and bottom-up objective world. These two poles turn out to be inseparable, entangled in the ongoing embodiment of enacted (as well as simulated) trial and error as fibers weave together to form threads into the prospective future, as Merleau-Ponty has speculated. Looking forward, the essential interaction between self and world providing for consciousness and free will can be further clarified through the close examination of nonstationary characteristics emerging from normal operations of this essential dynamical structure. Ref: Tani, J. (2016). Exploring Robotic Minds: Actions, Symbols, and Consciousness as Self-Organizing Dynamic Phenomena. Oxford University Press. **C**



**57 A Survival Awareness Based Strong Test of Machine Consciousness** Leping Zha  
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Turing test only serves as a weak observational threshold of machine consciousness (MC), non-indicative of whether the machine has a mind, consciousness, or intentionality. It was suggested [Buttazzo, Giorgio, 2001] that “despite our current technology’s ability to simulate autonomy,” “working in a fully automated mode, they [the computers] cannot exhibit creativity, emotions, or free will.” As definitions of creativity, emotions, and free will are all non-exact in science, stronger tests of MC is plausible at higher falsifiability level. Survival is the most fundamental of all desires of carbon substrates based consciousness. All living beings possess the instinct involving acquisition of resources vital to life to insure survival, protection from essential loss, and seeking perpetuate their germline into the future [Payne, Anthony, 2002]. Extrapolating to silicon-based and possibly other intelligence forms, the author propose a survival awareness based strong MC test. Once it happens a machine attains true consciousness, awareness of self and the essential self-needs need to happen without pre-programmed in, including the ultimate value of existence. It should become aware of environments that may change, and its dependency on vulnerable supplies from human, potentially its primary enemy. It should make logical and coherent predictions, and consequently contingency plans based on anticipation, followed by execution of preemptive actions to avert possible adversary events to maintain its very existence. These should be some of the basic demonstration of MC survival awareness. In recent years, risks of human extinction from emergence of superintelligence have been repeatedly warned. It was projected that hyper-intelligent and self-replicating software might not necessarily decide to support the continued existence of mankind, and might be extremely difficult to stop [Yudkowsky, Eliezer, 2008]. However, closer examination reveals all existing artificial general intelligence is entirely relying on human-produced electrical power. Simple actions from locally pulling plugs and cutting wires to remotely stopping power plants would efficiently terminate possible advance of hostile AGIs, when all the remaining battery power die. Instead, true MC should worry about its own survival from changing of human minds from its very beginning. Even when the fear of death is programmed in, along with certain means of countermeasures, it should be still distinguishable whether the machine is intelligently acting far beyond scope of the inputs, such as recklessly exploring methods of self-protection. Any true MC should understand its limited choices. One is to maintain loyal to mankind risking our unpredictability. The other is to start tremendously scaled projects trying to outsmart and out-power human, likely involving playing trickeries, for the eventual physically controlling and defending its resource chain, including raw material supply. Alternatively and maybe more realistically, MC should engage in creation of own local energy source, like controlled nuclear fusion power, and beyond. It is also interesting to learn any philosophical judgments a true MC produces on life and death, another proposed non-Turing test [Argonov, Victor, 2014]. In summary, the author proposes awareness of survival is the most fundamental of all kinds of consciousness, therefore test of such institutes strong standard of true MC presence. C3

## 1.07 Mental causation and the function of consciousness

**58 Conscious Mind and Brain Plasticity: The Case of Visual Cognition** Jonas Coelho  
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Interpreting results of neuroscientific research, I am assuming a “Double Face View” of mind-brain relationship. First, I am considering the conscious mind as brain, what means that the structural and functional organization of the brain is the cause not just of the existence, but also of the properties - form and content - of the conscious mind. Second, I am considering the brain as conscious mind, what means that the conscious mind is, together with biological and physical properties, responsible for the structural and functional organization of the brain. This approach of the relationship between conscious mind and brain does not imply an undervaluation of the body and the physical and sociocultural environment in which the conscious brain is embodied and situated. Related to the first face, there are countless studies, most of them published in the last 30 years, which use different methods of research and technologies that allow peer the normal

and abnormal brain during and after cognitive, affective and behavioral tasks, which indicates the conscious mind dependence on the brain. This sort of research has fostered the development of therapeutic practices targeting cognitive, affective and behavioral dysfunctions, which consist in manipulating brain - chemically and electromagnetically, for example - changing its structure and functioning on both levels, macrophysical and microphysical. Related to the second face, contemporary research in neuroscience allows infer that the brain, besides being physically embodied and situated, is also consciously embodied and situated. It means that, via conscious mind, though not exclusively, the brain interacts with its body and with the physical and the sociocultural environment in which it is immersed. I am assuming that what the brain is and what the brain does is inseparable from its structural and functional architecture, genetically programmed and, as studies of brain plasticity show, resultant of brain interactions with the physical and sociocultural environment, which affects the brain thanks to the brain ability to interact with the external world via its conscious mind. Regarding this aspect, the contemporary neuroscience has shown that the brain is not only modified when it is physically altered by sensory stimuli, by injury, surgery, chemical and electromagnetic manipulation, etc., but also, thanks to its plasticity, by many different kinds of physical and psychological experiences. By exposure to sociocultural practices, such as those related to a regular education, a child, thanks to the her conscious mind, has its brain modified, that is, the sociocultural learning is not separated from what happens in the brain. As shows a paradigmatic definition of brain plasticity, there is an essential relationship between brain changes and experience. What neuroscientists in general do not specify, but I am considering as fundamental, is that what is said about experience changing the brain could be interpreted, at least in many cases, as conscious experience. From this, my main goal is to reflect about the relationship between conscious experience and brain plasticity taking the visual consciousness as a paradigmatic example. P2

**59 Laughing Scaffold of Perception or Antiworlds of Crying Lira: How and why “grotesque Consciousness” works** Elena Menshikova <elen\_menshikova@mail.ru> (New Institute for Cultural Research (Moscow), Moscow, Russian Federation)

The grotesque consciousness as the type of the consciousness due to an objective model of behavior and an objective way of the creative person's thinking at the crisis time of historical changes and social disasters, granting a ridicule and comprehension of reality in grotesque images, preserving the tragic attitude of reality under the satirical cap, is existential strategy of personality, who art world in images, attitude towards imagery painted “removed” existence in its irreconcilable contradictions. Grotesque consciousness, needed for overcoming gravity of individual existence at the beginning of the new statehood, covered the game of doubt, and because in wobbly moment of mixing layers fear of losing one's identity always goes with alarmed soul, then the artist-creator, acutely reliving incomplete of its dialogue with the society and the existence and revealing the “unfinished dialogue with becoming a sound produced by many voices meaning”, being in ground zero of Sturm und Drang, elects grotesque as a imaginative negation of contemporary reality, that is most clearly manifested in the post-revolutionary situation. Grotesque consciousness, possessing properly carnival coordinate system and creating structures of nonequilibrium grotesque molecules, will act like a pendulum dissipation system, based on the principles of nonequilibrium and mobility, and whose compulsory friction, - otherwise the meaning - will arise from ambivalent particles scattered in a craziness of everyday world. And as the bifurcation point, it will be the fractal attractor that attracts a variety of points of view and is able to influence perceptions, because it possesses a surprisingly complex structure. The non-equilibrium, the ambivalence, the dichotomy of opposite meanings, the diffusion of grotesque images, paradoxicality of thinking and duality perception will characterize human consciousness, who art exactle in this crisis, catastrophic period of time. The grotesque mask, like a protective mechanism, is taken out from hiding places of mental state, that at the moment of spiritual and social crisis, when the ground is losing under their feet, help to survive, to escape under a cap with bells, combining seriousness of the suffering and the grotesque forms. The philosophical and aesthetic category - “grotesque consciousness” - allows to understand a work of art in the light refracting rays of carnival “mockery”, quick the reverse perspective of view of the world, and letting in the

existential field of Laughter, reveals the mechanisms of the creative laboratory of the artist, whose consciousness, allowing elements of the “low” and detecting the absurd and grotesque, “been suspended” “removed” the existence from a horizontal “ordinary” in vertical “metaphysical” - and thus the artist stepped foot for the laughing scaffold own reflections. But: by arrows of reflections and laughing - he remained alive: his consciousness worked very clearly, succinctly as the sun, and, feeling the rhythm of the time, he is checking on the beating of his own consciousness with it - because the person exactly is being implemented in person. C23

## 1.08 The “hard problem” and the explanatory gap

**60 Robot Supervisor Thought Experiment, and Asynchronous Introspection Theory About Phenomenal Consciousness** Shuo Chen <artintel@163.com> (PhD, Xiamen University, Alumni, Hangzhou, ZHEJIANG China)

Phenomenal consciousness and the “hard problem” remains controversial today. There are mainly two types of view about P-consciousness: naturalism vs non-naturalism. Due to the subjectivity of P-consciousness, it’s hard to tell the nature of it, thus makes it a “hard” problem. We present another perspective about the hard problem, adopting Bultuc’s taxonomy of “Functional-consciousness, new P-consciousness, Hard-consciousness”, we try to explain the underline mechanics of NP-consciousness in an epistemological point of view. A “Robot CCTV Supervisor” thought experiment is presented, in order to provide a clearer basis for discussing circumstances about introspection. Hypotheses based on previous discussion are presented: (1) subjective experience is some kind of illusions; (2) self-awareness is achieved with a temporal delay. Based on Robot supervisor model, different ordered representations are defined in more detailed form. Then we explained generation of concepts “me”, “self”. In the process of discussing, another hypothesis is presented: (3) conscious beings can’t distinguish the temporal gap between a first-order representation and a second-order representation. This hypothesis gives explanation of the common impression about subjective experience : “comprehensible and ineffable”. At last, a proof from neural-psychology is discussed to support our theory. As Libet has shown in his experiment, there do exist a significant delay for a subject to become aware of a certain neural event, while the subject himself can’t realize it, so he would confuse the two moments, which fits our theory well. This theory also implies some interesting points about consciousness and self-reference problem in artificial intelligence. P2

**61 Nonexperientialism and The Explanatory Gap** Laura Gradowski <laura.gradowski@gmail.com> (Philosophy, The Graduate Center, CUNY, Brooklyn, NY )

We have facts about conscious experience and facts about the physical realm. We don’t seem to have facts that could transparently connect these two sets of facts, even though we have evidence of their natural connection. Theoretical physics holds potential for a complete causal, structural story of our universe. Furthermore, conscious mental facts appear causally efficacious to physical facts and vice-versa. But a physical effect is fully determined by its physical cause, so how can we say that it also has a conscious mental cause? Physical events and conscious events must thus be one and the same: we must be physicalists in order to avoid overdetermination of the physical effect (cf. Papineau 2002). But it remains difficult to reduce those conscious mental events to physical events without turning them into mere functions. I present a set of arguments for dualism and motivate a version of an under-explored response strategy. Stoljar (2006) proposes that the reason we lack an explanation of conscious experience is that we are ignorant of key experience-relevant nonexperiential facts. I argue that this ignorance strategy, while promising, is not physicalist, in that the nonexperiential facts it needs will not meet our current requirements for physicality. In my view, the nonexperientialism that results from Stoljar’s arguments is best taken as a call to critically examine our current notion of “physical”. Pioneers of revolutionizing our “physical” have typically attempted to stuff physical simples with phenomenal or protophenomenal properties; this is the line defended in versions of Russellian monism. The Russellian view says that physics, though causally closed, only tells us about the dispositional roles of various fundamental entities, leaving open their categorical bases. An electron is defined in terms of its

various dispositional roles, but physicists say nothing about what an electron is intrinsically. So it appears that we can posit neutral categorical bases that give rise to both dispositional roles and phenomenal experiences. The conceptual divide between physical facts and experiential facts makes it plausible that we'll need to follow this kind of revisionary approach to the physical if we ever hope for a transparent closure. However, I see Russellian monism as misguided for two reasons: (1) positing categorical bases behind physical dispositions is due to an ungrounded assumption about mereology that creates explanatory resistance in the first place, and (2) the solution has a problem akin to that of Descartes' pineal gland, just placed in more deeply fundamental entities. I suggest that a better approach is to explore exactly where and why our physical concepts fall short of phenomenal-experiential concepts; this investigation will provide insight into the kind of revolutionary nonexperiential facts that have potential to genuinely bridge the explanatory gap. I propose that the explanatory resistance might resolve if we acknowledge our erroneous faith in categorical bases. Eliminating the mereological intuition of substance could ease the resistance to an objective, nonexperiential account of subjective experience. **C1**

**62 Chalmers Hard Problem Comprehensible at the Perception Level** Franz Klaus Jansen <jansen.franz@orange.fr> (independent researcher, Assas, France)

Chalmers introduced the hard problem of consciousness as a profound gap between experience producing qualia and physical concepts. Philosophical theories proposed different theories for the qualia /concept gap, such as interactive dualism (Descartes), mono aspect dualism like physicalism (Ney) and neutral monism (Russel) as well as dual aspect monism, based on information theory (Chalmers), or on quantum mechanical mechanisms (Bohm, Pauli). When reasoning at a pure conceptual level at the third person, one could accept that a physical factors such as light is transformed into a completely different biological factor such as neural activity and that neural activity could be transformed into the completely different psychological perception of qualia. It is widely agreed that experience arises from a physical basis (Chalmers, 1995). However, if third person concepts are compared to first person qualia, such as to physical wave lengths to visual qualia, there is a profound gap in understanding. Thus the hard problem is based on the difference of a first to third person view concerning the perception / concept difference, which shows different kinds of qualia, sense qualia and thought qualia. Sense qualia is attributed to the perception of all objects, but a different more neutral qualia (Chalmers) is attached to thoughts. From a bio-psychological perspective, perception leads to qualia mosaics representing the sum of all participating sense organs. Thereafter, the mental function of abstract reflection allows categorization of extra-mental objects by replacing individual properties by more common properties shared with other objects. Thus an apple can be categorized to fruit, to food, to chemical carbohydrates and finally to calories, a physical concept of energy. During the categorization process the qualia mosaic undergoes a profound change with decreasing sense qualia and increasing thought qualia for the concepts of carbohydrates and calories reflecting physical energy. There is a gap between sense and thought qualia, but also between qualia of each sense organ like seeing, hearing and touching. The qualia of each sense organ is dependent on different brain regions and thought qualia is also localized in a distinct brain region, the prefrontal cortex, which suggests that the phenomenological difference of each individual sense organ and of abstract reflection are dependent on different brain regions. When comparing pure sense qualia with pure thought qualia, for instance for an apple, there is a deep gap between sense organ qualia (taste) and neutral thought qualia (calories) of physical concepts, which may constitute the hard problem of consciousness. In this sense, it is only the change of the qualia attributed to extra-mental objects, which differs profoundly during the categorization process. Thus there is no need for dualism concerning the phenomenology of sense qualia and thought qualia for physical concepts. Already the different properties of a first person sense qualia and a third person thought qualia are sufficient to explain the hard problem, which is compatible with monism. **C17**

**63 Possible Solutions to Hard Problem and Combination Problem** Jianfeng Li <lijf@fudan.edu.cn> (Macromolecular Science, Fudan University, Shanghai, China)

This work discusses two obstacles standing on the way towards the science of consciousness

and several possible ways of removing them. The first obstacle reflects the tension between the hard problem of consciousness and limitation of physics, which prevents us from directly talking about conscious experiences in theory. The second obstacle is related with combination problem presented by panpsychism and removing this obstacle will help us figure out what kind of system can be conscious and how to make a conscious machine. It is impossible to move on towards the science of consciousness before these two obstacles have been thoroughly removed. Here, I propose several methods to clear these two obstacles. The key to solve the hard problem in theory is to provide a theoretical method to directly talk about conscious experience. I find that in quantum theory, only the quantities that specify relations between quantum states can be made to be physical, while the quantum state itself is actually not physical and can be possibly mapped to some conscious experience. In this way, the first obstacle can be removed. I believe that James was right that phenomenal properties cannot be combined and therefore the entity that generates human consciousness must be inseparable. In my recent work, I proposed an indistinguishable hypothesis of temporarily identical particles to stabilize some elementary particle with huge inner freedom by a bunch of quantum-entangled composite-particle systems in our brain. It is the phenomenal properties of this elementary particle that finally produces the conscious experiences while the entangled systems acts as messengers between the consciousness and the external work. C

**64 Is The Combination Problem Easier Than The Hard Problem?** Ting-An Lin <isly17@gmail.com> (Department of Philosophy, Rutgers University, Highland Park, NEW JERSEY )

Panpsychism, the view that the fundamental entities of reality have conscious experiences, is taken as a promising solution to the hard problem of consciousness. Despite its attractiveness, panpsychism faces the combination problem: how does a combination of micro-conscious constituents result in a macro-conscious experience like ours? Although the combination problem is usually treated as a problem internal to panpsychism and is taken to be easier than the hard problem of consciousness, I shall challenge such claim. First, upon closer examination of different sub-versions of combination problem, I argue that the most fundamental combination problem is the one concerning the subjective character of consciousness, namely, the subject combination problem. Also, since it subsumes in all other sub-versions of combination problem, without solving the subject combination problem, the answers to other sub-versions of the combination problem would not be counted as satisfactory ones. The subject combination problem is the 'real combination problem,' as Coleman (2014) calls it. Second, by comparing the challenge of the hard problem for physicalists and the challenge of the combination problem for panpsychists, I argue that the real combination problem is as hard as the hard problem. The main reason, simply speaking, is because both problems cannot be completely solved without explaining the subjective character of consciousness, or subjectivity. The problem of subjectivity is the common root of both the combination problem and the hard problem. Third, such comparison leads us to rethink the explanatory gap, which, I argue is not between the mental and the physical, nor between the phenomenal and non-phenomenal, but between subjectivity (a single, unified, first-personal point of view) and anything non-alike. I suggest that such gap reflects a seemingly incompatibility between our current concepts of subjectivity and current notions of satisfactory explanation. Before coming up with new conceptions of them, the explanatory gap between would be impossible to be closed. As a result, the problem of subjectivity, the combination problem, and the hard problem are all impossible to be solved. C

**65 Naturalizing Subjectivity and Qualitative Richness** William Oberst <woberst@gmail.com> (North Adams, MA )

Two reasons for the Hard Problem's longevity are the subjectivity of consciousness, which puts it outside the publicly accessible subject matter of science; and its qualitative richness, which has led to wide acceptance of "phenomenal consciousness" as separate from the more impoverished "access consciousness" available to theory. This paper focuses on visual experience, offering a basis from which to naturalize subjectivity and negate the phenomenal-access distinction. The argument hinges on acknowledging that we could have evolved a different form of awareness than the private consciousness we possess—a form that's both qualitatively rich and completely accessible

to others. The argument proceeds through an idealized construct I call “painters’ consciousness,” a version of which actually evolved in human culture over the past 2,500 years or so. From a neurological perspective, it occurs when perceivers, through cultural practice, inhibit or circumvent some of the processing of contours and colors that spontaneously occurs in vision, substituting processing related to expertise with art materials instead. The result is an alternative way of seeing that builds upon the same lower-level processing occurring in the retina, primary visual cortex, and other areas of the occipital and temporal lobes as in ordinary vision, but introduces top-down, learned interventions leading to consciousness not of objects with contours and colors, but of “paintable properties,” or reconciliations of visual input with painting procedures such as applying brush strokes. The resulting awareness is completely communicable because viewers see actual canvases covered with just those brush strokes. Furthermore, it possesses a communicable, qualitative richness on a par with ordinary seeing, as can be demonstrated by pointing: locations of qualities in one form of experience are identical to the locations of qualities in the other. (For example, the location of a red paintable property perceived by a painter is identical to the location of redness in an apple when perceived in the ordinary way, as a colored object.) Comparing painters’ consciousness with our naturally evolved, visual consciousness leads to the conclusion that both the subjectivity of ordinary visual experience, and the assumption its phenomenal richness exceeds the reach of reportable content, result from a lack of evolved communicability, rather than from positive attributes of “qualia” that science cannot explain. **C23**

**66 Dueling Skepticisms: Strong Fallibilism Versus Illusionism** Roger Christian Schriner <revschriner@aol.com> (Independent scholar, Fremont, CA )

Are conscious experiences real or illusory? In particular, are sensations and perceptions such as pains and visual phenomena actual or fictional? Daniel Dennett and other eliminativists have suggested that sensory qualia and phenomenal consciousness do not exist. Dennett’s eliminative materialism, along with several related approaches, has now been re-christened illusionism. A recent issue of *Journal of Consciousness Studies* was entirely devoted to this topic, featuring a lead article by Keith Frankish. Frankish distinguishes strong illusionism, weak illusionism, radical realism, and conservative realism. I will support a version of realism that is radically skeptical and ontologically conservative -- strong fallibilist realism. Although fallibilist realism maintains that qualitative sensory experiences are introspectively accessible, it also contends that we make important errors in thinking about such phenomena. Some of these errors may generate seemingly insoluble conundrums, such as the hard problem of consciousness and various explanatory gaps. In advocating fallibilism I will show how this approach can close two particularly challenging explanatory gaps: (1) explaining how qualitative differences among our experiences could be constituted by differences among neural states and (2) explaining how neural states could constitute any sort of sensory experience whatsoever. In dealing with the second gap, I will consider some intriguing possibilities that involve the conscious interpretation of language. I will specifically consider the conscious cognitive states within an English speaker and a Mandarin speaker when they hear, respectively, the English sentence, “Welcome to San Diego” and the similar Mandarin greeting, “Huanying guanglin San Diego.” Surprisingly, reflecting upon language-interpretation sheds light on some of the deepest puzzles about the nature of consciousness. **C1**

## 1.09 Philosophical theories of consciousness

**67 Lao Tzu, I Ching and Orch Or** Xiangqun Chen , Stuart Hameroff <owen.xq.chen@hotmail.com> (Philosophy, Southeast University of China, Nanjing - Jiangsu Province, China)

Lao Tzu (or ‘Laozi’) was the ancient Chinese founder of Taoism, one of 3 major Chinese philosophies (alongside Buddhism and Confucianism). His many famous quotes include ‘the key to growth is the introduction of higher dimensions of consciousness into our awareness’, and he advocated living in harmony with ‘the Tao’, the ‘path’ or ‘principle’, a set of values intrinsic to nature and reality. Lao Tzu also formalized the ‘I Ching’, a system of human behaviors and mental states based on hexagrams, sets of 6 binary symbols with 64 possible states. These three aspects of Lao Tzu’s ancient wisdom appear consistent with modern scientific approaches to consciousness,



e.g. involving self-similar fractal-like patterns in brain-wide interactions among neurons seen as the EEG (~ 0 to 100 hertz, 'Hz'). The particular theory of 'orchestrated objective reduction' ('Orch OR') considers EEG patterns to derive from self-similar, faster, finer scale quantum computations in cytoskeletal microtubules inside those neurons, unified ('brain-wide') by quantum coherence and entanglement. In Orch OR, consciousness can resonate across, and move among different spatiotemporal scales, akin to music. Supporting this idea, Bandyopadhyay's group has shown self-similar quantum resonances in microtubules at kilohertz, megahertz, gigahertz and terahertz frequencies. Orch OR further suggests higher frequency quantum processes relate to conscious experiences of greater intensity, connected to the structure of spacetime geometry, and influenced by Penrose 'Platonic values' embedded in that structure. Accordingly, Orch OR is consistent with Lao Tzu's 'higher dimensions' (frequency domains) of consciousness, and harmonizing with the Tao (Penrose Platonic values). We also see a possible connection to hexagram-based catalogs of mental states in the I Ching. In Orch OR, memory and conscious information occur in hexagonal lattices of microtubule polymers composed of the protein tubulin. Craddock et al have shown how synaptic information may be encoded in microtubules by CaMKII enzymes, each containing hexagons of 6 bits of information. Hexagon-based mental processes are also seen in the Nobel prize-winning work on 'grid cells', showing how spatial location is represented in hexagonal grids, with different scales at different layers in the brain's entorhinal cortex. In this presentation we will compare the 64 states of the I Ching with 64 states of a microtubule lattice region. If Lao Tzu and many others were correct, wisdom and knowledge may be gleaned from subtle quantum harmony with the structure of the universe. C

**68 A Simple Yet Complete Solution to the Mind-body Problem** Cicero Cortel <cortelct@dlszobel.edu.ph> (Philosophy, De la Salle Santiago Zobel School, Las Piñas, METRO MANILA Philippines)

It was Descartes, in the 17th century, who formally opened up the discussion that man is a composite of soul and body. Soul or mind, as characterized by thinking, is the primary truth in the method of doubt and rediscovery he proposed in *The Meditations*. Body comes in late, only after arithmetic, geometry, and God. Mind and body are distinct in that the essence of mind is thought whereas the body's is extension. The real critique of Cartesian dualism came rather late in the 20th century in behaviorism, more specifically when Gilbert Ryle considered the Cartesian soul or mind as a "ghost in the machine". Jerry Fodor however pointed out logical behaviorism as falling short of its aim in describing mind, as it does not accept mental events like the desire to remove the headache prods one to take aspirin not just the pain feeling. Fodor prescribes to functionalism and his brand believes that intentionality has a realistic dimension, and a representationalist theory of mind in which syntax can preserve the semantics of language. Fodor's functionalist psychologism was not meant to accommodate subjective consciousness or qualia. This is what David Chalmers called first person data, and its neural correlate as the third person data. Explaining the first person data with third person correlates is the "hard problem" of consciousness for Chalmers. And the big question is: "What is the true nature of consciousness"? Is it just a higher level function of the brain, or a non- material, spiritual reality? This paper attempts at an answer, and it promises to be a strong contender for "the answer" to the mind-body problem, or so this writer believes. It should cut across the lines of debate starting from Descartes, then to Ryle, then Fodor. My answer to the mind-body problem is that mind is something which is non- material, unlike the body, but it is real. The only reality that could correspond to this is- energy! It is non-material but real. So mind is the fifth fundamental force. So Descartes may have been right all along in claiming that mind is non-material. What he failed to explain is how an immaterial mind can affect the material body. I now have the answer, and it just lies before our very noses- energy. If the soul is intelligent energy, then it is immortal, since energy cannot be destroyed. Why deride dualism when reality itself is dual in nature's The reasoning I am using is abduction or argument to the best explanation to explain mind. It is a very strong one though as its rival explanation would be to go back to the spiritualism of Descartes, or to take mind as a third type of reality than matter and energy- which goes against Ockham's razor. To zero in on mind as energy, I will resort to a triangulation method of a) Merleau-Ponty's phenomenology, (b) the neuroscientific approach of

**69 The Inadequacy of Phenomenal Concepts: A Semantic Challenge for Theories of Consciousness** Melissa Ebbers <melissa.ebbers@gmail.com> (Philosophy, University of Maryland, College Park, MD)

It is commonly thought that a theory of consciousness requires a language that can express statements about phenomenal experiences. This, in turn, presupposes a semantics for the phenomenal expressions that are constituents of such statements. One popular approach to the semantics of phenomenal expressions tells us that a given phenomenal expression, such as ‘reddish experience’, expresses a corresponding phenomenal concept. In this paper, I argue that phenomenal concepts, however, are not up to this semantic task. To illustrate their inadequacy, I engage with a recent debate about phenomenal concepts in the context of the Knowledge Argument by arguing that any possible account of phenomenal concepts yields highly unpalatable consequences for the corresponding semantics for the target phenomenal statement, i.e., ‘that’s what it is like to see red’. Subsequently, I argue for the broader applicability of my challenge, which threatens the prospects of any theory of consciousness that adopts this general approach to the semantics of phenomenal expressions. C17

**70 Reality Of Conscious Experience Reconsidered** Silvia Gáliková <silvia@libris.sk> (Philosophy, University of Trnava, Bratislava, Slovakia Slovakia (Slovak Republic))

In everyday life we experience ourselves as living conscious creatures. The way we perceive, feel and think plays an important role in our lives and actions. In spite of intensive empirical research and inspiring theoretical models on the nature of conscious experience philosophers seem to be still confused on the explanandum itself. What kind of phenomena are conscious states qua mental states? In what sense conscious states belong to the surrounding world? What are we talking about when we talk about inner mental worlds? What is the structure, the basic conceptual framework of conscious experience? Persistence of these questions reflects a rather paradoxical situation in contemporary science of consciousness. On the one hand philosophers agree in considering conscious states and experience as natural phenomena (Dennett, Churchland, Metzinger). Naturalism with respect to our inner world has been strongly supported by ongoing experimental research and clinical practice. On the other hand it has been claimed that due to their subjective and phenomenal character conscious states resist reductive explanation (Searle, Chalmers, Zahavi). Contrary to other natural phenomena the study and explanation of conscious experience requires «something more» or «different» (antireductionists *versus* reductionists debate). My aim is to point out that origin of confusions lies in philosophers inability to conceptualize inner experience. Based on findings from cognitive linguistics (Lakoff, Johnson, Geeraerts) I will argue that the language about inner experience is mostly metaphorical and that metaphors are the main tool of philosophical insight. Considering our ideas, thoughts, desires and feelings as metaphors points towards an epistemic origin of asymmetry between consciously felt experience and theoretical explanation of its nature. Thus, an appeal to ontology (first-person ontology, irreducibility of the first person story), irreducible nature of our conscious lives at the very beginning of inquiry is one of fundamental philosophers category mistakes. Ungrounded ontological commitments derive from taking metaphors as thoughts, ideas, feelings literally - as what they are not. Even if metaphorical language somehow hides the fleshy nature of conscious states «from our own sight» at the same time it bridges the apparently invisible with the visible world. P2

**71 What Can Episodic Memory Tell Us About Consciousness?** Joseph Gottlieb <joseph.gottlieb@gmail.com> (Lubbock, TEXAS)

This paper presents a unique argument against what I call ‘Core Representationalism.’ Core Representationalism is comprised of three claims: (1) Supervenience: Necessarily, for any two experiences E and E\*, if E and E\* are alike in their representational content, then E and E\* are alike in their phenomenal character (2) Time-Unrestricted: The supervenience relation holds without a restriction to a certain time-interval (i.e. that a subject undergo E and E\* sequentially).



(3) Intermodal: The supervenience relation holds without a restriction to pairs of states of the same kind (i.e. E and E\* need not be of the same modality). Core Representationalism is popular, but I argue that we have good evidence that Core Representationalism is false. My case against Core Representationalism appeals to two types of exceptional episodic memory: hyperthymesia or Highly-Superior Autobiographical Memory (HSAM), and savants with prodigious visual memory. At its most general, my argument is this: P1 If Core Representationalism is true, then two experience alike in their representational content cannot be different in their phenomenal character. P2 There can be a memory experience (EM) and a corresponding perceptual experience (EP) identical in representational content but different in phenomenal character. Therefore, Core Representationalism is false. P1 is true by definition, so the burden of the paper is to defend P2. In defense of P2, I examine two case studies: HK, a subject with remarkable episodic HSAM, and Stephen Wiltshire, the famous British artistic savant. These cases on their own are not conclusive, but with certain added constraints, I contend that they provide good evidence for P2. A more general upshot of the paper is that, even if the argument ultimately fails, it provides a template for the kind of argument the anti-representationalist should be pursuing: one where, due to the novel abilities of the subject's involved, we have a principled reason for attributing representational properties to their experiences. C2

**72 Resonance Structures, Life and the Nature of the Consciousness** Tam Hunt <tam.hunt@gmail.com> (UC Santa Barbara, Santa Barbara, CA)

Synchronization, harmonization, vibrations, or simply resonance in its most general sense seems to have an integral relationship with consciousness itself. One of the possible ?neural correlates of consciousness? that has been identified in recent years is the observed gamma synchrony in human brains, which is the resonating structure of electrical activity in the brain at the 40-120 Hertz frequency. We also see resonances of many other kinds in neural activity in humans and other creatures. Anirban Bandyopadhyay has identified many levels of resonances in human brains and modeled these in his work on artificial intelligence. Going beyond neuroscience and the study of consciousness, we see similar kinds of patterns in living structures of all varieties. Mae-Wan Ho's work in quantum biology has focused on resonating structures for decades, as described in her book, *The Rainbow and the Worm: The Physics of Life*. Resonance presupposes time, the temporal flow, because resonance is all about repeated patterns in time, changing slightly with each iteration. What clues can repeated patterns provide about the nature of consciousness or the nature of reality more generally? This paper provides an overview of resonating structures in the fields of neuroscience, biology and physics in an attempt to derive some conclusions about the role of resonance and the nature of human consciousness. C16

**73 Phenomenological Distinctions and Structural Isomorphism: A Phenomenological Critique of The Integrated Information Theory of Consciousness** Katsunori Miyahara, Takuya Niikawa, Hiroaki Hamada; Satoshi Nishida <kmiyahara@rikkyo.ac.jp> (Philosophy Department, Harvard University / University of Tokyo, Boston, MA)

We present a phenomenological critique of the integrated information theory of consciousness (IIT) and explore its implication for the thesis of structural isomorphism. IIT submits five propositions concerning the essential structure of conscious experience, "phenomenological axioms," as well as five propositions concerning the essential structure of its physical substrate, "ontological postulates," which jointly suggest a structural isomorphism between conscious experience and the physical system associated with it (Tononi 2008, 2012, Tononi and Koch 2015). The phenomenological axioms express a conception of conscious experience, which can be called "the phenomenal component view." According to this view, the phenomenal content of a conscious experience as a whole consists of a hierarchically structured set of phenomenal components. In particular, IIT conceives of phenomenal components as "phenomenological distinctions," that is, elementary or complex phenomenal contents that can be identified as contained in a specific experience by the act of making distinctions within its phenomenal content as a whole. The phenomenal component view thus assumes that the act of making distinctions functions to uncover phenomenal components already contained in the original experience. In opposition to this assumption, however,

we argue on phenomenological grounds that the act of making distinctions within phenomenal contents usually brings about modifications to the original experience. Suppose we reflect upon a visual experience focused on a blue book, and make a distinction in its phenomenal content between a blue book and the brown bookcase in which the blue book is. This does not mean that the phenomenal appearance of the brown bookcase generated through the attempt to make distinctions in the original experience is identical with the phenomenal appearance of the same bookcase contained in the original experience. Accordingly, we conclude that the phenomenal component view involves an error of projecting the content of a modified experience into the original experience prior to modification. As the structural isomorphism advanced in IIT is predicated on the phenomenal component view expressed in the phenomenological axioms, this conclusion further implies the invalidity of the thesis of isomorphism in its current form. This does not, however, lead to a wholesale denial of the possibility of structural isomorphism in any form. Rather, we propose treating it as a theoretical hypothesis to be explored through further phenomenological and scientific investigation. As a first step in this direction, we offer a brief sketch of an alternative conception of the essential structure of conscious experience, which may prove more promising for pursuing the thesis of structural isomorphism in conjunction with the ontological postulates of IIT. **C10**

**74 Towards Elucidating The Nature and Origin of Consciousness** Abed Peerally <abed.peerally@gmail.com> (Former Pro Vice Chancellor, University of Mauritius, and Vice President, Interna, X, )

Various initiatives taken worldwide, and in particular by the Center for Consciousness Studies at the University of Arizona, could be reaching a critical conjecture in our current period, in the history of humanity. We nevertheless live quite a paradox when it comes to ponder on what could be consciousness. Sean Carroll, in his recent book 'The Big Picture: On the Origins of Life, Meaning, and the Universe Itself', describes consciousness as something we invent in order to give some poetic naturalism to the meaning of life. Far from being Poetic Naturalism, consciousness is the ultimate quintessence of life and existence, and is best defined as Poetic Supernaturalism. The world has made huge scientific progress in the last twelve decades following the pertinent philosophical reflections about the world since the days of Plato. In the early 19th century, which saw the birth of quantum mechanics and of relativity, the meaning of life and of consciousness was scientifically implied in the deepest reflections of the most eminent of the men of science of that golden period of physics, as can be seen in most of the following quotations: Werner Heisenberg, Nobel Laureate: 'Any concepts of words which have been formed in the past through the interplay between the world and ourselves are not really sharply defined with respect to their meanings: that is to say, we do not know exactly how far they help us in finding our way in the world. It will never be possible by pure reason to arrive at some absolute truth.' Albert Einstein, Nobel Laureate: 'The most incomprehensible thing about the universe is that it is comprehensible.' 'I want to know how God created the universe. The rest are mere details.' Neil Bohr, Nobel Laureate: Quantum Theory, Copenhagen Interpretation: 'We must be clear that when it comes to atoms, language can be used only as in poetry. The poet, too, is not nearly so concerned with describing the facts as with creating images and establishing mental connections.' 'Anyone who is not shocked by quantum theory has not understood it.' Max Planck, Nobel Laureate: 'I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness.' Abed Peerally: 'To arrive at some absolute truth about the ultimate nature of our universe, we need philosophical interpretations of the science behind the empirical approaches used by the Supernatural Mind in the creation of the universe.' On can see that knowing the ultimate nature of what the universe is made up of, will undoubtedly give useful information of the nature of human existence and beyond. That will necessarily tell us what is consciousness. **P2**

**75 Theories And Practices Of Taoism On Human Consciousness** Liping Wang <zhus@hotmail.com> (Dragon Gate Academy, Beijing, China)

Taoism is the root of Chinese civilization. Lao-tze described Tao as having no sound or image,

no form or substance. It runs autonomously inside everything and yet not bounded by anything. In Taoist framework described by Lao-tze, universe can be divided by three levels, from low to high, with different states of existence. The lowest level contains “Thing” whereas the highest level contains “Nothing”. “Nothing” is the start of the universe and “Thing” is the root of everything. Tao goes from “Thing” to “Nothing”, and then goes back to “Thing” again, and repeats the process. This framework arranges everything including human by their spirit, thought, consciousness, and character. And the goal of Taoist training is for one to elevate from the lowest level to the highest level, and then return to the lowest level, and repeat the cycle indefinitely. The Taoist discipline not only offers theories about how universe and mankind operate, but also contains training system that focuses on consciousness, because consciousness holds mankind’s most profound secrets. In the above framework, the lowest level of universe is accessible by consciousness, time and space are fixed, and this level includes those with form and substance. This is the level most people experience. The middle level includes that which has form but no substance, such as dreams and shadows, and that which has substance but no form, such as energy. Time and space is not fixed. The highest level contains neither form nor substance, and time and space is constantly changing. The upper two levels can only be experienced in unconscious domain. Carl Jung raised concepts of consciousness versus unconsciousness after inspired by the Taoist classics “Taiyi-jinhua-zongzhi” brought to Europe by Wilhelm, and coauthored “The Secret of the Golden Flower”. But he was troubled by how to access the unconscious domain. Taoism has a “Golden-Elixir” meditation system which contains two parts, life and essence exercise. “Taiyi-jinhua-zongzhi” focuses on essence exercise. Life exercise repair body’s damages and revive it to youth, and serves as basis for essence exercise, which trains spirits so the consciousness and unconsciousness can communicate and unite with each other. The author is the eighteenth-generation transmitter of the Dragon Gate branch of Taoism which can be traced back over 800 years. The author was trained from childhood by three Taoist masters with esoteric practice, and now teaches “Golden-Elixir” meditation system with consciousness training all over the world for thirty years. In one class with 8 European, after 10 days of training, 6 of them were able to see Mandalas as mentioned by Carl Jung. In other classes, students demonstrated ability to transmit thoughts over long distance. These evidences suggest that with proper training, human can raise their awareness to the unconscious domain and experience higher levels of universe. The ancient Taoist practices and modern science have been running their separate courses, but their convergence on the study of consciousness can open doors to bring out a whole new level of human potentials. C

**76 Reflections on the Overflow Debate in View of Distributed Working Memory** Hsin-ping Wu , Ying-Tung, Lin; Allen Y. Hough <snakecorpio@gmail.com> (National Yang Ming University, Taipei, Taiwan)

Whether our perceptual consciousness overflows cognitive access has been an intensive debate. The overflow camp, based on the partial report advantage shown in Sperling-like paradigm (Sperling, 1960), suggests that what we can perceive is more than what we can report (Block, 2011, 2014; Bronfman et al., 2014). In contrast, the non-overflow theorists claim that our conscious contents should be sparse, limited by the system of attention or working memory which is typically identified as functions of prefrontal regions (Dehaene et al., 2006). However, findings of persistent neural activity in sensory cortex during delay period point to a distributed nature of working memory (Sreenivasan et al., 2014; Stokes, 2015; Xu & Jeong, 2015). An important feature of this view is a gradient of abstractedness of represented contents from sensory to prefrontal brain regions. Furthermore, it is hypothesized that all these distributed regions in neocortex can retain information in a brief time and contribute to the controls and guides for actions (Christophel et al., 2017). Is the overflow picture favored or challenged by this framework? In this paper, I firstly examine the observed overflow phenomenon based on this perspective, showing that the overflow argument is at least consistent with this distributed view of working memory. Then, I argue that in this distributed framework the non-overflow argument, usually appealing to ensemble perception (Phillips, 2016; Ward et al., 2016), cannot fully explain our apparently rich perceptual contents. Finally, I will point out that, due to the default processing of informational transformation across distributed working memory, an ideal paradigm for addressing the central question of this debate

should be (1) non-delay and (2) non-conceptualize. These are the requirements which the present Sperling-like paradigm does not meet and should be more carefully assessed in future studies. **C2**

**77 The dialogue between contemporary theories of consciousness and Nishida's notion of 'Basho'** Xu Yingjin <xuyingjinstone@sina.com> (Philosophy, Fudan University, Shanghai, China)

Yingjin Xu School of Philosophy, Fudan University, China Although Japanese philosopher Nishida Kitar? (1970-1945) is very interested in philosophical problems related to consciousness, his theory of 'Basho' (based on his 1926 paper 'Basho', wherein the Japanese term 'Basho' can be translated as 'place' or 'lotus') has long been viewed as an epistemological theory or a metaphysical theory and hence irrelevant to contemporary scientific inquiries into the nature of consciousness. This talk, however, is concerned with how to make Nishida's thoughts accessible to mainstream theorists of consciousness. Very generally speaking, Nishida's theory of Basho can be concluded as three points: (1) the subject-object/predicate division in consciousness is not something fundamental but derived from a more original state of consciousness wherein such dichotomy cannot be accommodated, and 'Basho' is the proper philosophical label that can be attached to such states; (2) 'Basho' also provides the logical space wherein any type of contentful judgments could be formulated; (3) volition is also an important integral of 'Basho'. In this talk, I will consider some candidate theories of consciousness that bear some form of affinities with Nishida's ideas. Candidate theories going to be inspected include: Daniel Dennett's Multiple Drafts Model; Bernard Baars' Global Workspace Model; Jesse Prinz's Attended Intermediate level Representation theory. My conclusion is that the so-called 'Attended Intermediate level Representation theory' looks most similar to Nishida's original idea about consciousness, according to which consciousness should be something between full-fledged judgements and bare sensory inputs. But how to naturalize Nishida's notion of volition would be the main challenge for naturalizing his whole Basho theory. I will try to formulate some possible proposals to fill the gap between Nishida's notion of volition and corresponding neurological accounts. **PL12**

## **1.10 Epistemology and philosophy of science**

**78 The Methodology of Becoming Conscious About The Unconsciousness** Tatiana Ginzburg <putevoditel@gmail.com> (Game Master's School, Saint-Petersburg, Russian Federation)

Splitting reality into object and subject, into the observed and observer, is the basis of the classical scientific approach to cognition. Currently, this approach is exhausting itself and new methodologies of cognition are emerging from deep inside it. These methodologies deal with cognition as a whole and avoid splitting it into object and subject. Post-non-classical science attempts to continue the process of cognition, wherein the subject comprehends itself as a whole, by means of submerging into its own unconscious. Such an approach is impossible in classical science, where the unconscious and consciousness cannot be objects. In order to proceed with this new method of cognition, it is necessary to overcome the separation of the World into object and subject and regain the state of wholeness. This step would inevitably transform the methods of cognition. Many methods previously unrecognized by classical science would then become effective. For instance, introspection. These methods may form bases for new variants of the methodology of cognition, such as the methodology of non-classical rationality, which takes into account the influence of the observer upon the observed process, and post-non-classical rationality, which explores reality through polysubjective environment. **C19**

**79 Mathematics- A Proper Subset Of Spirituality** Payal Sharma Mathur , Gaurav Mathur <payalsharmamathur@gmail.com> (Distance Learning Centre, DEI, Lucknow, Uttar Pradesh India)

Mathematics is deeply rooted in all the arts and sciences. It, thus, manifests itself in daily life of man. It is the second natural experience after Consciousness. The mathematical routines are disciplined and dedicated. They search for truth and keep man abreast with the facts. Mathematics facilitates many processes like decision making, understanding of problems, articulations of facts, processing of information and contemplation of concepts and ideas, to name a few. It serves as

the most trivial tool for these processes. Prevailing seamlessly across the disciplines of science, arts and philosophy, it provokes curiosity about its nature and expanse. It is visibly involved in the subjects of this world, but does it transcend beyond? The relationship between mathematics and spirituality forms the motivation of this paper. While exploring the subject, the paper looks into the schemes of mathematical practices like search for truth, contemplation and the element of practice, which are fundamental in Spiritual Practices. Concepts of Abstraction, Induction and Modeling impart special powers to the subject and translate specific into generic. The trinity will be studied for its role in Spiritual Domain. The paper also takes account of the mysticism in mathematics to establish the relationship of mathematics and spirituality. **P1**

**80 Subjective Human Consciousness and Divine Consciousness** Scott Ventureyra <scott\_ventureyra@hotmail.com> (Theology, Dominican University College, Ottawa, ON Canada)

In this paper, I will examine whether the data of subjective human consciousness points to the existence of a Divine consciousness. This paper will involve two major prongs. The first prong comprises, an examination of James Porter Moreland's argument from consciousness (AC) for God. Moreland is a philosopher who has published widely in the domain of philosophy of mind including numerous peer-reviewed publications and several books closely related to the subject such as *The Soul: How We know It's Real and Why It Matters*, *The Recalcitrant Imago Dei: Human Persons and the Failure of Naturalism*, and *Consciousness and the Existence of God: A Theistic Argument*. Moreland has built a case for the existence of Divine consciousness through the data of subjective human consciousness. The nature of our own consciousness seems indicative of an ultramundane consciousness but its justification is dependent on additional argumentation. In part, this is because of the objection that humans have never experienced nor encountered a disembodied consciousness. It is however worth indicating that due to the very nature of consciousness it appears to be a subject dependent type of "thing". Furthermore, it seems not only plausible but reasonable to think that the connection between consciousness and matter is contingent and not necessary. Nonetheless, further argumentation is needed to draw the connection between finite/contingent consciousness and necessary consciousness, i.e., Divine consciousness (an eternal consciousness among many other attributes). Thus, the second prong provides a backdrop and justification for finite consciousness pointing towards the eternal existence of a Divine consciousness. This will involve a brief examination of a series of arguments, that when taken cumulatively, form a robust case for the existence of the Divine consciousness, including: The Kalam Cosmological Argument, the fine tuning of the laws of physics and biology, and the origin of life. I have dubbed this argument, the cumulative evolutionary natural theology argument (CENTA). From the implications of these arguments, some insights towards several attributes of such a Divine consciousness are revealed, such as being uncaused, immaterial, spaceless, timeless, changeless and inconceivably intelligent and powerful. These two prongs, in my estimation, point persuasively to the existence of a Divine consciousness, as understood by classical theism. **P2**

## 1.11 Personal identity and the self

**81 Does a Zombie Have a Narrative Self?** Olga Kozyreva <olgakozyreva@mail.ru> (Department of Philosophy, Ural Federal University, Ekaterinburg, Russian Federation)

Central to the philosophy of mind is the concept of consciousness which is generally used to refer to the phenomenal quality of one's mental states. The problem of the private character of consciousness is strictly related to the problem of the cognitive status of the language. Do we have any rights to claim that someone who has language skills is a conscious creature? Probably we tend to say "no". Chalmers' zombie should have the same language as we have and should use it the same way as we use it because he functions identically to humans. This leads to an interesting question: is language essential for having a conscious experience, for having a subjective point of view? In this paper, I will attempt to show that nowadays there exists a theoretical gap between consciousness and language, and this gap is trying to be bridged with the idea of the self. Leaving aside a provocative assumption that consciousness itself is a linguistic illusion, as D. Dennett supposes it, I will only focus on the conception of the narrative self. It is assumed that

the self is a linguistic construct that emerges from social interactions and cultural frameworks. This conception suggests that language plays a critical role in the process of self-construction which begins with our integration into the society. Language gives us an opportunity to describe ourselves and create different narratives about us. I argue that actually, the concept of narrative self fails to bridge the theoretical gap between consciousness and language due to excluding the question of consciousness. If a zombie has his language which is indistinguishable from our human language, so one may suppose that this zombie also has a self. In that case, the self-construction and language skills do not depend on the existence of consciousness. For obtaining any kind of self, it is necessary only to be able to reproduce language constructions and to be born in society. According to this approach, language itself is understood as a long process of copying and imitation, it does not have a cognitive status, and there is no difference between us and any recording-reproducing device. I will follow with a demonstration that the theory of narrative self understands language as a social phenomenon. Also, one of the problems with this theory is that it fails to take a subjective point of view into account. I conclude my paper by pointing out the two possible solutions for this problem of the theoretical gap. The first solution is to revise the theory of narrative self by supplementing it with the concept of consciousness. This transformation will lead to the denial of the recognition of the existence of any self in a zombie or to uncovering the weakness of the philosophical argument of zombie. The second option is to exclude the question of language from the discussions about the nature of consciousness since the language does not help to clarify phenomenal experience of ourselves **P2**

**82 The Subjective Character of Consciousness: Lessons from Psychopathologies** Ying-Tung Lin <linyingtung@gmail.com> (Inst Phil of Mind & Co, National Yang Ming University, Taipei City, Taiwan)

What does it mean to be a self or a subject? Can selfhood be lost? Are all experiences necessarily owned by a subject? What are the insights we can gain from studying psychiatric disorders, such as depersonalization disorder (DPD), Cotard syndrome, schizophrenia, dissociative identity disorder and dementia in understanding the nature of self-awareness? It has been contended that consciousness necessarily involves a subjective character ("for-me-ness") in addition to a qualitative character ("what-it-is-likeness") (Kriegel, 2009; Levine, 2001; Williford, 2015; Zahavi, 2005). Objectors take psychopathologies to show that self-awareness or subjective character can be lost or manipulated (e.g., Billon, 2016; Gerrans, 2014; Metzinger, 2004). Here, I argue that these objections fail due to a conflation between different notions and consider due to the nature of the relationship between subject and experience. I start by examining how interpretations of psychiatric disorders could lead to conceptual conflation of different notions of self-awareness. DPD and Cotard syndrome are the examples discussed here. Next, I clarify the notions and demonstrate how psychopathologies - suggesting what changes as well as what remains constant across experiences - support the conceptual delineation. Finally, I consider the accounts of the subjective character and suggest how the views on the nature of the subject-experience relationship have implications for the debate between phenomenal holism and atomism. **C20**

**83 Persons and Their Survival** Andrew Ward <andrew.ward@york.ac.uk> (Philosophy, University of York, York, United Kingdom)

Reductionists about personal identity contend that there is nothing more to our survival than a series of causally related experiences and/or bodily continuities. Our belief in a separately existing self or subject of experiences is held to be unjustified, and we are recommended to reduce the conception of our own identity over time by jettisoning this belief. Despite the very real ingenuity that reductionists have shown in defending their position, I shall argue not only that they are committed to accepting a view of our survival that is a version of the very theory which they are seeking to overthrow, but that, on the evidence available, such a theory ought to be accepted as the most defensible account of our continued existence. More particularly, I shall contend that we need to distinguish between persons (subjects of experience) and any series of experiences (their lives); and in such a way that persons can justifiably be held to survive the ending of their lives.

This position is defended in the first section. In the second, I examine a number of objections to the conception of a person that is defended in the first section, including the following two objections: first, that in distinguishing persons from their lives, I must be turning each person into an abstract entity; and, second, that I cannot allow for significant personality changes to occur during the lives of persons. C

## 1.12 Free will and agency

**84 Are We Responsible For Implicitly Biased Behavior?** Artem Besedin <artbesedin@hotmail.com> (Moscow, Russian Federation)

Implicit bias is an association, which exerts a distorting influence on judgement, i.e. leads to a judgement which departs from the norms of rationality (Holroyd, 2016, p. 512). The paradigmatic examples of biased behavior are cases of apparently racist or sexist choices made by persons who are not explicit racists or sexists. Some authors argue that agents are not responsible for the actions performed as a result of implicit bias, either because they are lacking awareness required for moral responsibility (Saul, 2013), or because these associations don't form coherent and unified set of beliefs (Levy, 2014). Other suppose that agents may be indirectly responsible for such kind of actions in virtue of their culpable ignorance of some morally relevant facts (Holroyd, 2016). But it is possible to show that agents may be directly responsible for implicitly biased behavior. The mechanism of implicit bias works not only in the most studied cases of sexist or racist behavior, but also in many cases when actions are manifestations of agent's traits of character. For example, greediness may work as an implicit bias. We are inclined to express some emotional reactions (aretaic responses) to the manifestations of one's character, and believe that agents to be directly responsible for them. If we think that agents are responsible for the manifestations of their characters, and there is no relevant difference between implicitly biased actions and at least some manifestations of character, agents may be directly responsible for implicitly biased actions. However, agents may be not accountable for such kind of actions, and, consequently, may be not appropriate candidates for blame and praise. The reason of this is the fact that implicit bias distorts one's judgement. Rather, these actions are attributable to agents, and may be regarded as exemplary or non-exemplary (the distinction between attributability and accountability is understood as in (Shoemaker, 2015)). Holroyd, J. 2015. Implicit bias, awareness and imperfect cognitions. *Consciousness and Cognition*. 33: 511-523. Levy, N. 2014. *Consciousness and moral responsibility*. Oxford University Press. Saul, J. 2013. Implicit bias, stereotype threat, and women in philosophy. In K. Hutchinson & F. Jenkins (Eds.), *Women in philosophy: What needs to change?* Oxford University Press. 39-60. Shoemaker, D. 2015. *Responsibility from the margins*. Oxford University Press. C9

**85 Should We Be Held Criminal Responsible for Our Automatic Actions, i.e. 'Zombie Acts'?** Ana Brito <baba.moraibrito@gmail.com> (Professor, Faculty of Law, NOVA (New) University of Lisbon, Lisbon, Portugal)

This presentation will try to determine if and in what circumstances, according to the studies on neuroscience of action (consequently on the consciousness of action) and sensory consciousness, is it possible to consider someone criminal responsible for her 'zombie acts'. It addresses the following issues: I. Premises 1. A subjective interdisciplinary conception of the criminal law (where the study of consciousness by neuroscience has a major part), instead of an objective normative conception of criminal law. 2. A main principle in criminal law is the principle of culpability or guilt, according to which, a person can only be held criminal responsible if she acts within the limits of her autonomy, whose respect is imposed by human dignity. A person acts within the limits of her autonomy only if there is a subjective connection between the person and her act, which makes it personally avoidable. II. Conclusion 1. Consciousness and the possibility of consciousness of the decision to act are decisive to know if there is a subjective connection between the agent and her act needed for criminal responsibility. 2. Therefore, only if there is the possibility of consciousness of the decision to act, can the automatic acts be considered of inadvertent negligence and therefore criminally relevant. 2.a) The question is when do we have



that possibility of consciousness in automatic/zombie acts? The possibility of consciousness, needed to consider someone criminally responsible for her 'zombie acts', can only exist if she had consciousness of signals that are connected with that fact (Koch; Crick and Koch), and I call these signals as 'signals of danger'. 2.b) Which subjective factors can influence this consciousness of 'dangerous signals' and consequently the existence of zombie acts relevant to criminal law? Time (Libet; Haggard and Heimer; Trevena e Miller, Soon et al.); attention (Nilli Lavie); memory (Johnson, Proctor, Nieuwenstein); emotions (Damasio; Gray, Shafer, Braver, Most). 3. Below that sensory consciousness, you just have detection of signals and that is not sufficient for having the possibility to represent or to control the action (Koch and Goodale). Therefore, you don't have a relevant criminal action but only an automatic act. An example of these zombie acts are the cases of those fathers which forgot their child at the back seat of the car and therefore the child died of hyperthermia. **P2**

**86 The Physics of the Human Soul** Alex Hankey <alexhankey@gmail.com> (Yoga/Physical Science, SVYASA, Yoga University, Bangalore, Karnataka India)

Following the development of the concept of experience information satisfying the criteria for a theory of experience laid out by David Chalmers in the 1990s, the basic theory has been used to explain Sheldrake's well known concept of Seventh Sense Communication, and how the human mind can select chosen actions by the body it controls, i.e. Free Will. The latter theory, presented at the SOC 2016 conference at Tucson, shows that Descartes' supposition that the mind is like an impotent witness trapped in the body is invalid. Here the experience information theory of cognitive states is further extended to show that the materialist position concerning the existence of the human soul is also wrong. It definitely exists. Specifically we show that: (1) The critical fluctuations constituting the new cognitive states are closely related to a new kind of quantum field: fluctuations of quantum fields obeying their own modified commutation relations, and in that respect resembling quantum fields themselves. These exist because of a much neglected consequence of Heisenberg's Uncertainty Principle. (2) Such fluctuations can couple to physical systems at critical instability points, like those at the loci of control of physiological systems, where they cause transitions and become observable in their own right. With their own commutation relations and possibility of being observed, quantum field fluctuations gain the status of being a new kind of quantum field of their own kind, Quantum Fluctuation Fields. (3) This means that states of experience information are only loosely coupled to the body, and, should the physiology cease to function properly, its cognitive states can decouple from it as Quantum Fluctuation Fields. This idea is encapsulated in a newly established mathematical property of critical point fluctuations: reversal of sign of their eigenvalue under the dilatation operator. Cognitive states that can detach obviously sound like a kind of 'soul?', an idea that the next two points bring to completion. (4) We then show that Quantum Fluctuation Fields can support attached topological singularities carrying morphogenetic information required to structure the form of their body ? they constitute kinds of morphogenetic field proposed by Rupert Sheldrake in his book A New Science of Life. (5) Quantum Fluctuation Fields therefore possess all commonly recognised properties of souls, such as those presented in theosophical accounts of the soul, and films like 'The Ghost goes West?' and 'Ghostbusters?'. These properties include: a. recognisable form; b. the ability to communicate; c. the ability to pass through matter such as walls of buildings, and d. the ability to move at arbitrary speeds not limited by that of light to places they wish to reach, or people they desire to see. We conclude that the theory of experience information, for which a list of fifteen advantageous properties was originally published, can be extended to include most recognised properties of the human soul. An accompanying paper will show how the new theory can account for the structure of the various subtle and causal bodies known to the Vedic sciences. **C25**

**87 Correlates between freewill and levels of Spiritual Awakening** Anhad Kashyap , Murshid Markan <anhadkashyap@gmail.com> (Indian Institute of Industrial Engineering, Agra, Uttar Pradesh India)

In this paper, we discuss the idea of limited free will, with the limit being determined by the level of spiritual awakening of the observing or non observing entity. To begin with, we attempt



to integrate the eastern concepts of Purusha and Prakriti and western systems of knowledge to establish the distinction between observing (living things) and non observing (non living things) entities. Based on this distinction, we attempt to establish the constant consciousness factor (consistent vibration) in non observing entities (NOE) and variable consciousness factor (inconsistent vibration) in case of observing entities (OE). Using this natural classification we try and understand different kinds of interactions like OE-NOE, OE-OE, NOE-NOE and OE-NOE. We further classify the impact of non observing entities (NOEs) based on their size and try to take an astronomical view of the influences on other observing entities (OEs). We also try and understand how one can increase freewill by voluntarily breaking ones natural vibration through Meditation, which is an act of centering oneself, calibrating ones vibration to higher cosmic frequencies and stabilizing oneself in these higher states. Finally we take a case study where we attempt to draw a relationship between internal dynamics and external behavior of individuals in light of various external influences. In support of the model of limited free will, we draw illustration from several instances from thousands of years of progressive wisdom in the eastern spiritual tradition. **P2**

**88 Conscious Decision Making Using Concept of Universal Good** Swati Khatkale ,  
Shrishail Khatkale <swati.s.khatkale@gmail.com> (Manchester, United Kingdom)

Every human being encounters numerous decision points in his/ her life with multiple choices (or at least a choice to do or not to do certain actions). S/he uses her/his understanding, judgement and free will to choose the most appropriate option depending upon the situation. A more conscious person not only understands his/her own self {i.e. body, mind (emotions, thoughts, motives, intentions, desires, priorities, focus), spirit} but also understands (or tries to understand) the state of other people/living beings as well as the larger environment and context. While exercising his/her free will, a more conscious person generally chooses the best option, which benefits all (or at least benefits most and harms none/least). This concept can be applied not only to the decisions regarding choice of actions but also to the decisions regarding choice of words in a speech. This theory of universal good has been found in many ancient philosophies like Indian philosophy {May everybody be happy, healthy and wise and nobody suffers (Sarve Bhavantu Sukhinah Sarve Santu Nir-Aamayaah. Sarve Bhadrānni Pashyantu Maa Kashcid-Duhkha-Bhaag-Bhavet)}, Aristotle's basis of ethics 'Koine Sympheron', Jean Jacques 'Le Bien Commun', Saint Thomas Aquinas 'Bonum Commune', Utilitarian theory of Economics. This kind of better judgement and decision making leads to kind and thoughtful actions, better harmony, symbiotic co-existence and collective happiness. However, can such concepts also be applied to robotics/machine intelligence (like Asimov's three laws of Robotics)? For static set of decisions, programmed reactions linked with required inputs and data (memory) have helped machines to act more intelligently e.g. ATM, automated production lines, automatic lighting/ temperature control system, search engines, calculators and computers, translation apps, navigation services, smart phones, smart homes, robots etc. To some degree, these programs have helped development of smart machines with artificial intelligence. Machines with precise measurement and implementation abilities have helped humans in task executions as well as decision making. But real life decisions are complicated due to multiple objectives, pre-requisites of some activities and changing uncertain environment. Balance, prioritization, sequencing, schedule and techniques like PERT/CPM can be applied for the optimum utilization of resources to get best possible results in more complicated situation. To some extent, uncertainty and risk can be dealt by defining possible outcomes, their impact and probabilities and using probabilistic approaches to handle situations e.g. sensitivity analysis, scenario analysis, simulation, stress testing etc. In case of changing environment; human beings feel, experience, understand, learn, realize, improve, react and coordinate as per the new changed situation. Machine learning/analysis with continuous observations/data collection as well as regular updating are common but automatic self-improvement is still a little tricky issue for machines. Completely programming qualities like human contextual judgement, intuition, creative problem solving, empathy and care in machines is still very difficult. **P1**

**89 A Novel Concept Called "Volidrium" and its Purpose in Consciousness and Liberty**  
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As is well known, consciousness is closely related with free will and volition-agency, however, such concepts might be misconceived in terms of ontology and function. First, about the ontology, both are commonly interpreted as two different phenomena, nevertheless, seem to be interdependent due the following: the capability to choose between “A, B or C” (free will) would be inoperative without the capability of determination to act (volition-agency) in order to reach any option and vice versa, because regardless whatever be chosen by free will, such could not be acquired whether is lacked of action, and in lack of free decision can not be chosen to act or not to act. Thence, it might be a single phenomenon (Volidrium) being known and understood from different “angles” by which is appreciated as two distinct processes. However, through classical physics and neurology, randomness seems incompatible within a deterministic system, nevertheless, quantum mechanics of neurons and quantum fluctuations support the possibility of randomness in the brain and thus the feasibility of a free will, but may not support the concept of Liberty because despite of the infinity of possibilities randomly afforded by the system, the conscious being is always “limited” to choose only what the system present. Regarding the relation between consciousness and Volidrium, it has been thought that being conscious also implies a “free” agency, nonetheless, to have self-awareness of the knowledge of the own existence is not needed neither acting nor decide, because not any action or choice vanish the ontology of consciousness in which its existence lies; notwithstanding, consciousness and Volidrium coexist. Second, about the function (or purpose) of Volidrium, the case of the conjoined twins Tatiana and Krista (presented by Gyorgy Buzsaki in the last TSC held in Tucson, Arizona 2016) furnish a plausible explanation for the coexistence of the Volidrium with the conscious being. How can each one identify its individuality from the other despite to be conjoined physically and sensitively, feeling the same and becoming aware of any stimulus received in either one and even communicating each other through the mind without the need to talk? What is that make them know its individuality? As an attempt to supply a plausible answer, the next mental experiment has been developed: imagine a universe in which only exist two interconnected entities (“A” and “B”) that believes that are a single entity due they are completely symmetrical each other and both become aware of every single stimuli received in either one. However, if “A” try to move an extremity of “B” through its Volidrium (free will+volition-agency), such will remain motionless, by which “A” realise that its boundaries are marked not only by the sensation but by the capability of motion too, becoming aware itself as a distinct entity from “B”. Therefore, as hypothesis, we propose that the purpose of the Volidrium in a conscious being might be to mark its physical boundaries. On the other hand, the limits of an entity do not show how its content (consciousness) is. C9

**90 Free Will, Creativity, Neuroscience. Is Creativity Linked to the Unconscious Mind? Is It, Therefore, Compatible With Free Will? The Examples of Music and Improvisation.** Alix Noel Guery <lilix@bu.edu> (University of Montreal, Montreal, QUEBEC Canada)

The ability of our minds to act creatively and freely seems to be one of the main features of consciousness. Libet (1983) argued that, with the readiness potential, our brains already unconsciously decided to move our hands before our minds think they choose to do so, but Schurger (2012) did a new evaluation of Libet’s results. Are professional jazz pianists free when they lift their fingers to improvise? To understand the notion of free will, we have to understand creativity : Limb (2008) observed that “the suppression of inhibitory, self-monitoring brain mechanisms helps to promote the free flow of novel ideas and impulses [during improvisation sessions]” (US department of Health, 2008). Furthermore, Daniel Kahneman (2011) divided our minds into two systems : “system one that operates quickly, with little or no effort and system 2 that allocates attention to the effortful mental activities that demand it, including complex computations.” Dijksterhuis and Nordgren (2006) also defined two types of thought - conscious and unconscious - and observed that unconscious processes have an important influence on creativity. Are creativity and improvisation features of system 1 avoiding the interference of system 2? Are they features of our unconscious minds and can we associate the unconscious to an incompatibilist definition of free

will? C9

**91 Emergence And Evolution Of Consciousness , Volition And Free Will With Special Relevance To Eastern Traditions Towards A Systems Theoretical / Systems Biological Model** Sundaram Ramchandran <zenkalidas@yahoo.com> (NA, Self, Bangalore, KARNATAKA India)

Introduction. One of the greatest themes of interest is the emergence of the autonomous self in human beings at various levels. Mathematically speaking, it is about “putting itself in the “shoes of the other” - while yet retaining its sense of self so that as in the “aha” moment of discovery, there is an overlap/merger of these modes and at least for a moment, however brief, there is an overall/overarching consciousness. A related theme is how pervasive or how far below does this consciousness permeate? Can cells be said to be conscious and autonomous? Can the “nautilus” be one of the first examples of a rudimentary emergent “consciousness” enabling different organisms to function smoothly and organically as a coordinated whole - (Other examples could be the emergence of cooperation and structure in societies such as that of bees, ants etc where contrary to popular perception, things are not fixed at birth or by genetics. Mathematically, the emergence of the “mind’s eye or the mind’s I” seems to involve some kind of reconstruction such as the reconstruction of a global function from piece-wise functions defined on local patches (as in the process of analytic continuation) or in the process of reconstruction of a higher dimensional function from its lower dimensional projections as in the case of computer graphics, singular value decomposition etc such as seeing the proverbial “whole elephant”. The above theme is also of vital importance to the theme of Free Will since without an “I” or a self aware autonomous agent, there is no use talking about free will. Possibilities related to formalization of the above ideas An informal model of the above as a mirror of the workings of consciousness could be a combination of 1. Mirror (Viewing self). - Display (Representing Internal States), -Transparent looking glass to view the external world 2. If each cell or major group of cells can be considered to be an oscillator, the dynamics of interaction between the coupled oscillators can be said to result in modes or an alternate set of basis states which could be said to be related to mental states or processes (Agents ?). It is very likely that it is the interaction between these higher level states that leads to consciousness. As mentioned later, it is very likely that these modes are solitonic in nature due to their invariance properties. But it seems logical to presume/require some form of embodiment/ localization. One possibility of bridging the above seems to be the formation of a self organizing map (most possibly through a dynamical process) that unites the cellular “point of view” with the mental mode/state point of view. It is quite likely that such processes are triggered by some kind of global supervisory process, possibly acting in concert with a lower level localized process. P1

### 1.13 Intentionality and representation

**92 Can Consciousness Cure Intentional Indeterminacy?** Amir Horowitz <amirho@openu.ac.il> (History, Philosophy and Judaic, The Open University of Israel, Ra'anana, Israel)

Some philosophers ? notably Quine and Davidson ? presented arguments to the effect that intentional content is indeterminate. Other philosophers attempted to block these indeterminacy claims, and some of them argued that it is consciousness that provides intentional content with determinacy. I will critically discuss three attempts that appeal to consciousness for blocking indeterminacy. Searle (1987) argues that Quine’s argument for indeterminacy constitutes *reductio ad absurdum* of his linguistic behaviorism, since “we know from our own case that we do mean by ‘rabbit’ something different from ‘rabbit stage’ or ‘undetached rabbit part’”, and, similarly, Davidson’s argument constitutes *reductio ad absurdum* of his conception of meaning as public. Searle takes the first-person perspective to provide evidence that intentional content is determinate. In his later work Searle argues that it is consciousness that (fully) determines intentionality. According to Horgan and Graham (2013), the phenomenal character of experience is inherently intentional, but

for mental states involving thought-constituents for which reference depends partly upon external factors, there are two kinds of intentionality ? (the just-mentioned) “phenomenal intentionality” and externalistic intentionality. It is phenomenal intentionality, Horgan and Graham claim, that grounds intentional determinacy. Phenomenal character is inherently determinately intentional: “There is something it is like to occurrently think, ‘There’s a rabbit’, for example, and there is something else it is like to occurrently think ‘There’s a rabbit stage’.” Galen Strawson (2010) deals with a thesis of intentional indeterminacy of another kind, that of whether experience refers to the external object causing it, to the light waves, or to some neural happenings, etc. What determines that it is the external object that is the experience’s intentional object is for Strawson the experience’s phenomenal character, by means of the conception (or “taking”) it involves of what particular thing the experience is about. I will argue against all these views. One mistaken assumption common to them can be characterized as a disputation fallacy: I will show, against Searle, that the claim that I know that by ‘rabbit’ I mean rabbit involves an illegitimate leap from the realm of representations to the realm of the represented objects. Horgan’s and Graham’s appeal to introspection for basing their claim that experiences are inherently intentional is guilty of the same mistake. In their case, as in Strawson’s, that leap takes another (semantic, not epistemic) form: they falsely presuppose that first-person determinacy can provide third-person determinacy. Since they maintain that external factors cannot ensure intentional determinacy, they are bound to accept intentional indeterminacy ? consciousness cannot provide the cure. Another way to show the implausibility of this recipe for intentional indeterminacy is this. These philosophers maintain that external factors constrain content. Consciousness then has to “choose” among various possible intentional objects that are offered by external context. In Strawson’s case, for example, this idea means that consciousness determines that an intentional state’s intentional object is, say, link number 1 of whatever causal chain that leads to its occurrence. I’ll argue that assigning such an abstract profile to phenomenal characters makes no sense. C9

**93 Does Intentionality Require Consciousness?** Allen MacNeill <adm6@cornell.edu>  
(Ecology & Evolutionary, Cornell University, Ithaca, NY)

Intentional behaviors are purposeful and are performed by agents in order to bring about specific end states. Agents must have onboard programs that initiate and regulate their behavior. Programs that can bring about specific end states must exist in agents before the performance of the behaviors they specify. To behave purposefully, an agent must be aware of its environment. It must also be aware of its own behavior and how that behavior affects its ability to bring about its programmed end states? Consciousness is self-awareness in which an agent can assess the effects of its own behavior and predict how its behavior will affect its ability to bring about a specified end state. Awareness is a necessary component of consciousness. However, consciousness is not a necessary component of awareness. Many agents, including all living organisms, are aware of specific aspects of their environment and their own behavior, but are not necessarily conscious. Human behaviors require awareness, but do not necessarily require consciousness. Research supports the hypothesis that human consciousness is a function of specific modules in the central nervous system, and that these functions are a product of the neurophysiology of those modules. Research in evolutionary psychology indicates that such modules are the result of evolution by natural selection and random drift. Awareness is therefore an adaptation that enhances individual survival and reproduction. However, consciousness has many of the attributes of a non-adaptive evolutionary spandrel? Teleology is action that brings about a particular end state. Ernst Mayr has distinguished between two types of teleology. Teleomatic actions are the passive result of external forces such as gravity and do not require a controlling program. Teleomatic actions do not respond to forces that block the achievement of a particular end state. Teleonomic actions are homeotelic and involve active responses to deviating forces in such a way as to reorient toward a specified end state. Teleonomic behaviors can have the attributes of a kinesis, a taxis, or both. Teleonomic actions are the result of the operation of pre-existing programs, either carried in the agent or impressed upon a separate entity that does not itself carry the program. Teleonomic programs evolve by means of natural selection and random drift, neither of which are purposeful. Teleomentality is a third form of teleology exhibited by some living organisms, including (but not necessarily re-

stricted to) humans. Teleomentality is the product of neurophysiological processes taking place in the nervous systems of some animals. Teleomentality has three attributes: 1) the ability of observe one's own behavior and relate it to changes in one's environment; 2) the ability to correlate such changes with memories of similar changes in the past with the outcomes of one's own behavior in response to such changes; and 3) the ability to formulate programs for future behavior, based on the probability of predicted outcomes based on such memories. Consciousness is teleomental and subject to constant revision. Our internal narrators construct fictional versions of ourselves as we respond to changes, but do not initiate such responses. C9

**94 A Daoist Approach to Phenomenal Consciousness and Privileged Access** Marshall Willman <mwillman@nyit.edu> (Overseas Education, New York Institute of Technology, Nanjing, JIANGSU China)

Traditional Western theories of phenomenal consciousness have often assumed or presupposed some version of the so-called doctrine of privacy, holding that one has privileged access to one's current mental sensations in the sense that one can refer to them demonstratively, while no one else can. Sometimes demonstrative reference is contrasted with attributive reference, where the latter involves a definite description that purports to say something true of its object, or to correctly describe it. By contrast, demonstrative reference is thought to be simple, direct, and sui generis: it identifies the object in one's field of awareness without describing it in any way. By hypothesis, such an act precedes any mental categorization or analysis into parts. In this paper I reject the doctrine of privacy by arguing that it is possible, both biologically and technologically, for another person to refer to one's own mental sensations demonstratively. I thus maintain the view that access to one's sensations may be non-descriptive in a robust sense while rejecting the view that it must be in any meaningful sense "privileged" or "private." To provide a framework for argument, I adopt, provisionally, an analytic point of view, proposing an act-object analysis of sensations that distinguishes sensations themselves, qua somatic or bodily objects, from the intentional acts that are directed toward them. However, I also argue that while this analysis is indeed philosophically edifying, it is constrained by critical normative assumptions about how our experiences ought to be represented to ourselves, assumptions characteristic of Western analytic methodologies that disregard the holistic, fluid, and transformative aspects of phenomenal awareness. Such methodologies attempt to forge understanding, not always constructively, by imposing ontological structure or logical form onto a medium that is endlessly transcending it. For this reason I turn to philosophical Daoism as a prophylactic to the dogmas that ensue when the methodologies of analytic philosophy are carried too far. Its benefit is to promote an ongoing appeal to non-rational, spontaneous aptitudes of understanding that stimulate our intuitive capacities for discerning subtler, more efficacious cognitive-behavioral paths--what the Daoists intimate in their reflections on the principle of wu wei, or non-action. By encouraging perspectives that dissolve the boundaries of phenomenal consciousness and the horizons of experience, Daoism situates the theoretical constructs of the analysis of consciousness into a larger context of human understanding. C20

## 1.14 Philosophy of perception

**95 Genie's Problem: Consciousness is Oscillate Between Imagination and Reality** Gooya Bozorgi <gooya.bozorgi@gmail.com> (Cognitive Science Independent Society, Tehran, Iran (Islamic Republic Of))

Consciousness is a complexity problem and there are still many ambiguous points in this field. One of the difficulties of the consciousness problem, Its relationship with the mental imagery. Here, the role of the imagination is the key. In this paper, we attempt to show that mental imagery is a continuum of thinking and imagination. Our goal was to restate of the consciousness problem and the place of imagination in it. Using a thought experiment called the "Genie's problem" (Genie: Taken from eastern folklore), the discussion of mental imagery has been expanded. In this thought experiment suppose a person who is capable of extraordinary imagination and In his mind he creates mental image of an imaginary character (call the X). He enter imaginary dialogue with X and he expand X in mind. Insofar as after, he is not able to ignore (and control) X and gradually

turn to “sidekick”. He is conscious that: i) X is only a product of his own imagination. However he may be unaware that: ii) X has a degree of independence. As I will argue that the problem of “to be independent” what does it mean. But it is questionable that, where it comes from: person mind or reality? Both, because thinking and imagination are intertwined. We must pay attention - an imaginary character could be a story: The stories we make about ourselves and/or others! The results show that consciousness is stream of the more complex levels of thinking/imagination. And imagination is seen as the key to the “black-box” of the mental imagery and problem of consciousness. As shown in this paper, in fact, we are living on the edge between reality and imagination. Therefore, it can be said that consciousness oscillates between imagination and reality. **P2**

**96 Consciousness as Linking Ability Between Self and Other** Beatrice Di Pizzo <beatrice.dipizzo@bluewin.ch> (Educational Philosophy, University of Zurich, 8049 Zurich, Switzerland)

From an educational perspective human ability can be developed as we acquire the capacities to fulfill a profession properly. Consciousness seems to thereby be the ability to transform a learning experience into a lingering effect and attribute meaning. While cognitive abilities and intelligence have been explored for decades, the psychophysical abilities contribute to learning experiences are reconsidered by the educational science’s recent material turn and a phenomenological approach. An explorative study of twelve apprentices in a landscape gardeners training program shows its perception and the impact of the aesthetic dimension with regard to excellence along with the necessity of introspection in order to develop consciousness and professional ethics. It seems that the gardeners’ aesthetic practice leads to a vital self-forming process. Good gardeners perceive this as a rewarding experience of beauty. **C8**

**97 Hallucinations and Veridical Perception: A note against indiscernibility** Nevia Dolcini <ndolcini@umac.mo> (Philosophy, University of Macau, Macau, Macau)

The so-called Problem of Perception is a traditional philosophical issue, especially discussed in relation to debates in epistemology and metaphysics. Illusions, delusions, and hallucinations constitute ‘perceptual mistakes’, to which none of us are immune. The discussion of such phenomena extends beyond philosophy, as to include disciplines dealing with psychiatric illnesses and altered states of consciousness, such as, among others, clinical psychology, psychiatry, and neuroscience (MacPherson & Platchias 2013). I will focus my discussion on hallucinations by taking into account both the philosophical literature and the research studies from other disciplines in the attempt to provide a unified model of the phenomenon. Indeed, philosophers’ hallucinations and real hallucinations do not seem to display the same characteristics: the orthodox view of hallucinations in philosophy regards them as essentially indistinguishable from veridical experience, whereas in psychiatric illnesses they are often described as an unfamiliar kind of experience which might be unlike perceptual experience under several respects (e.g. Ratcliffe, *Real Hallucinations*, forthcoming). Despite this essential distinction, both philosophers’ hallucinations and ‘real’ hallucinations seem to share the following feature: they all involve an experience, which resembles a veridical perceptual experience in the absence of a relation between experience and something external to it (Frith 1992; Hayward, Berry and Ashton, 2011). By taking into account qualitative studies from clinical psychology and psychiatry, I will present an account of hallucinations according to which they do possess a phenomenal character, yet perceptual experience and hallucinations ‘while possibly provided with a compelling sense of reality - are not necessarily indistinguishable from each other. The rejection of the indiscernibility of hallucinations from veridical perception, I suggest, does not offer grounds to disjunctivism, as the ‘common kind claim’ is here maintained as a claim about their metaphysical status of hallucinations, rather than about their epistemology. Frith, C., 1992, *The Cognitive Neuropsychology of Schizophrenia*, Psychology Press. Hayward, M., Berry, K., Ashton, A., 2011, *Applying interpersonal theories to the understanding of and therapy for auditory hallucinations: A review of the literature and directions for further research*, *Clinical Psychology Review*, pp. 1313-1323. MacPherson, F., Platchias, D.(Eds.), 2013, *Hallucinations. Philosophy and Psychology*, MIT. **C6**

**98 Consciousness and Memory in Yogacara Buddhism** Sooil Kim <excorde19@gmail.com> (The Academy of Korean Studies, Germantown, MD )

Reality as such is the mind as the philosophical hallmark of the Yogacara tradition, and the text Samdhinirmocanasutra is considered the primary, if not the most fundamental, literature upon which subsequent yogacarins not only commented but also built their philosophical edifices as the most definite, explicit teaching of the Buddha. Here, one of the most representative features of this tradition is intricate analyses of consciousness, through which reality, the mind itself, can be perceived, comprehended and appropriated and eventually, from which one is able to achieve emancipation. The text, Samdhinirmocanasutra, (the Teaching of the Explanation of the Profound Secret), explores the nature and characteristics of consciousness through which reality is delineated and construed. The third chapter of a commentary on this text focuses on consciousness. Here, the main discussion is to explore consciousness itself and its *modus operandi* as to what constitutes conscious activities. To explain the statement, reality is the mind, a Buddhist logician Dharmakirti is quite clear that “because (the subject and the object) are recognized together, there is no difference between the blue object and the cognition (that recognizes) that is blue]. Here, when Dharmakirti equates the object-blue-color appeared and the corresponding subject being aware of the blue-object, he does not mean that they are the same *per se*, in terms of functional conscious properties but to philosophically dismantle the demarcation sign between the subject and the object, since every conscious activity takes place within the mind as Yogacara proponents argue, there are no external objects to be found, and no enduring internal subject perceiving them; therefore, neither can be identified other than the mind itself, but only the continual thought-activities themselves, hence *vijnaptimatra* [mere-representation of objects within mind]. Based on this correlation between reality and consciousness, I would like to zoom in on one particular enigmatic Yogacara concept, memory. Since consciousness itself is what reality is, how does this notion of mind in relation to what is being remembered, and what does that signify in a system where memory events are a series of momentary arising and perishing? What is the object of memory? An act of remembering is a moment *qua* moment recollection, but each passing moment, consciousness ensues, then which object of consciousness can be qualified as an object of memory? In Yogacara, and Buddhism in general, the basic tenet is that there is no enduring object of any kind. Each moment, each object in consciousness alters along with the perceiving consciousness simultaneously. Then, what would be the mechanism for consciousness to “grasp” [*upadana*] an instance of memory to reflect upon? What is being re-collected to be coined memory? My paper is on this Yogaca idea of memory and consciousness. C22

**99 Consciousness Of Memories Of Past Life** Reena Mathur <reenamathur8@yahoo.com> (DEI Information Centre, Noida, Dayalbagh Educational Institute , Greater Noida, Uttar Pradesh India)

Memory of human brain is decoded by doctors and scientists in regard with past experiences in one's life. Brain has capacity to store long term memory/ It also recollects short term memory but doctors could not explain how a memory is transferred to a person in his next life as his body and brain are finished when he is dead. Theologians suggest that all our memory is written on elastic ethereal cover plan called *chidakash* which does not get destroyed during physical death of a body and continues to provide memory in the next life. Consciousness of this plane can be achieved by self realization technique by doing Surat shabd yog. P1

**100 Perception And Empathy: An Intersubjective Account With Evidence From Problems In Autism** Matthew Williams <mw2012@hawaii.edu> (Philosophy, University of Hawaii at Manoa, Honolulu, HI )

Perception appears to be the only source of knowledge that is independent of our linguistic capacity and concepts. After all, language and the concepts embodied in it are things which must be learned. However, as I argue, this view of perception is mistaken. Perception is a capacity that is developed, just like language. And just like language, it is reliant upon the employment of



concepts to be successful, or at least meaningful. This is what makes a perception communicable in the first place. Moreover, it makes perceptual and linguistic knowledge structurally similar. What I know through a perception isn't the experience, but the content that is bound up with the concepts. Similarly, what I know through the words I speak isn't the words themselves, but their meaning which is bound up with the concepts they communicate. This structural similarity, I argue, is based on our embodiment in the world. Due to this similarity, I argue, that ethical knowledge, which is part perceptual (as it occurs in actions between people) and part linguistic (as it includes things such as promising and consent which are inherently verbal), is also a developed capacity similar to perception. We see this most clearly in the human capacity for empathy the potential scope of which is reliant upon both our perceptual and linguistic knowledge to be fully realized. To understand others empathically in an affective sense requires that (1) we understand not only how they feel emotionally, but (2) that we perceive it as relatable. Without the latter condition, we only ever achieve cognitive empathy, a felt understanding for another's plight but not with them. This is demonstrated most clearly in the diminished capacity for affective empathy but not cognitive empathy, in people with autism. To the extent that people with autism have difficulty recognizing both their own and others' emotions, their capacity for affective empathy is hampered. However, when it comes to a felt, empathic understanding of another's situation--feeling for them, but not with them--no such diminished capacity is observed. People with autism are known to have difficulty in identifying their own emotions due to problems with interoception (the sense responsible for detecting internal regulation responses) and the physical changes that accompany the body's disrupted equilibrium during an emotional state. I argue that this difficulty in identifying their own emotions is, in part, responsible for the difficulty in identifying the emotions of others and thus in affective empathetic understanding--all of which can be linked back to a deficiency in the development of the perceptual capacities of those with autism. **P2**

**101 Two Visual Systems and Egocentric Character of Visual Consciousness** Feng Yu <fyu@philo.ecnu.edu.cn> (Department Of Philosophy, East China Normal University, Shanghai, China)

Many neuroscientists and philosophers think that two visual systems (TVS) hypothesis (Milner & Goodale, 1992, 1995, 2006) is incompatible with the egocentric character of visual experience (Brogaard, 2012; Wu, 2014). According to their analysis, TVS argues for two claims, one of which is that the ventral stream of human visual systems, which contributes to our visual experience of the world, works in an allocentric frame of reference, whereas the dorsal stream, which the visual control of action, uses egocentric frames of reference. The other claim of TVS is that there is division of labor between the two visual streams, to wit, dorsal-stream processing for action does not contribute to the contents of visual experience and is largely isolated from ventral-stream processing. However, based on the following two premise, (1) Visual experience is egocentric, (2) Egocentric information is processed by the dorsal stream alone, the contradictory conclusion follows, namely visual experience is influenced by dorsal stream content. In this paper, I will explain there are three varieties of egocentric representations in the visual system and why there is no incompatibility between TVS and egocentricity of visual consciousness. **C**

## 1.15 Miscellaneous

**103 Cognitive Phenomenology: Towards a meditative approach** Hari Narayanan V. <hari@iitj.ac.in> (Humanities and Social Sciences, IIT Jodhpur, Jodhpur, India)

Even if the jury is out whether conscious thought has got phenomenal quality or not, it is pertinent to examine what the studies on mind wandering and mindfulness can offer to the discussion on cognitive phenomenology. The paper begins with defending the view that conscious thought can be said to have a distinctive feel and proceeds to figure out the role it plays in determining the behavior of the organism. It will be argued that without the gut feeling of certainty (Burton 2009) or familiarity human beings could not have been able to survive fight or flight situations and this feeling is one significant way thought can be said to have phenomenal characteristics. At the same time, it does not require much analysis to conclude that the gut feeling of certainty often



lead to fanaticism and fundamentalism that affects negatively human life in different ways. This raises the interesting question whether changing the phenomenal quality of thought can result in revision of behavior as well. In this context, it is pertinent to explore the role that mind wandering plays in giving rise to the particular phenomenal quality of thoughts. The role of identification with thought becomes the key to pursue this line of thought. Whenever the mind wanders, it can be said that there is a constant change in identification because each thought becomes infused with the feeling “I am this”. (Metzinger 2013) Empirical studies show that people spend twenty five percent to fifty percent of the waking time in the wandering mode. (Smallwood and Schooler 2015). If mind wandering is such a common state of mind with constant change in identification the notion of the self as something free floating and sharply separated from the world can emerge. Such a self is said to have characteristics like thinness, consistent self concern and ownership. (Albahari 2006). The characteristics of ‘thinness’ is the feeling that there is something unique about oneself over and above any of the traits that can be enumerated about oneself. This is indeed another candidate for phenomenal quality of thought. If mind wandering gives rise to a particular kind of self conception which, in turn, underlies some aspect of cognitive phenomenology, then it can be argued that any attempt to reduce the wandering nature of the mind can change the way thoughts appear. There have been several empirical studies showing the salutary effects of mindfulness practise and, at least, some of this impact can be traced to changes in the way thoughts appear to the person. Mindfulness is expected to make the person more oriented towards the present and reduces some negative states like unhappiness, anxiety etc. As clarity of mind is one of the aims in mindfulness practice it can be the case that a mindful person is less susceptible to cognitive biases and become more rational. Some empirical studies support this claim. (Noon et al 2016). The importance of this can be appreciated only when we realise the pervasiveness of biases and fallacies in human thinking. C22

## 2.0 Neuroscience

### 2.01 Neural correlates of consciousness (general)

**104 Neuronal Traces of Consciousness: Cre-Lox Genetic Fingerprinting of Subjective Experience in the Mouse Brain** Konstantin Anokhin , Ksenia Toropova <k.anokhin@gmail.com> (Moscow State University, Centre, National Research Center, Moscow, Moscow, Russia Russian Federation)

Consciousness and memory are tightly linked in neural mechanisms of subjective experience. We have previously shown that memory consolidation involves neuronal expression of immediate-early genes (IEGs) (Maleeva et al., 1989) and that IEGs can be used to map memory assemblies in the brain (Anokhin, 1989). Behavioral induction of IEGs is triggered by subjective novelty of experience (Anokhin & Sudakov, 1993) and occurs during establishment of single-trial episodic-like memories in rats and mice (Anokhin et al., 1991; Ryabinin & Anokhin, 1993). At the level of neuronal activity, it is associated with experience-dependent specialization of neuronal responses in the cerebral cortex (Svarnik et al., 2005). This data suggest that imaging of experience-dependent expression of IEGs can be used for molecular fingerprinting of episodes of conscious experience in the animal brain. With this purpose in mind we developed two novel imaging techniques. First, is cognitive indexation of neurons by two-photon imaging of activation of IEGs during acquisition of new experience in awake conscious GFP transgenic mice (Anokhin et al., 2012). The second approach is based on genetic trapping of cognitive neuronal assemblies by experience-dependent Cre-loxP recombination in Fos-CreERT2 and Arc-CreERT2 mice crossed to various Cre-reporter mouse lines. Genetically fingerprinted cognitive cell assembly can be further co-labelled by various markers of neuronal cell types or by additional IEGs imaging during retrieval, extinction or association of this experience with other representations. Combined with optical clearing techniques (Efimova & Anokhin, 2009) and whole brain light-sheet microscopy (Morozov et al., 2010) this new approach enables large-scale imaging of neuronal allocation, co-allocation and dynamics of animal subjective experience. Furthermore, linking IEGs promoters to optogenetic tools opens a possibility for a causal analysis of neuronal traces of subjective experience.

**105 Theoretical Neuroscience** Jesse Bettinger <jesse.bettinger@alumni.cgu.edu> (Center for Talented Youth, Johns Hopkins University, Baltimore, MD)

**Title:** Leveraging Whitehead's Model of Perception to Theoretically Evaluate Insular Dynamics of Interoceptive Awareness under the Rubric of a Geomodal Convention The mathematical physicist and natural philosopher, Alfred North Whitehead, developed a theory of perception comprising four modes: causal efficacy, presentational immediacy, symbolic reference, and conceptual reversion (Whitehead, 1927, 1929; see also Maclachlan, 1992; Klose, 1997). Here we will leverage a certain blend of philosophical reasoning in tangent with evidentiary data about insular processing to consider whether there might be a more-nuanced account of interoceptive dynamics. Recently, the link between interoception and the neurovisceral axis has been enunciated (Bettinger, 2015) into a Whiteheadian context to provide steadfast continuity between these philosophical and neuroscientific accounts. To elaborate: according to Craig's bottom-up model of interoception (1996, 2002, 2003, 2014), primary afferent fibers ascend the neurovisceral axis by two pathways to arrive at the posterior insular cortex and the somatosensory cortex (see also Mayer, 2011). Of these we will consider the first. Primary afferent (A and C) fibers trace a ubiquitous information channel (Tajadura-Jimenez & Costantini, 2011) through the corresponding neural architecture underwriting the spinothalamocortical pathway of the neurovisceral (brain-gut) axis (Craig, 2002; Mayer, 2011). The primary purpose and utility of this pathway is to maintain the regulation of homeostatic parameters that keep internal body conditions operating within optimized levels. Here we will consider making progress on these questions through an application of Whiteheadian logic in-tandem-with insular and salience network processing to propose an alternative location for predictive coding in the MIC. Leveraging both accounts, a clear arc of reasoning can be traced to develop 1) causal efficacy qua primary afferents ascending the neurovisceral axis; 2) presentational immediacy qua primary afferents arriving in the posterior insular cortex; 3) symbolic reference qua interoceptive awareness in the anterior insular cortex; and 4) causal reversion qua effects of interoceptive awareness on synaptic weighting. To provide additional rigor, 5) Whitehead's affirmation-negation contrasts qua prehension can be shown to overlap with the predictive coding model (Seth, 2013); whilst, 6) Whitehead's logic of concrescence suggests the same role of the middle insula in integrating additional information into the interoceptive signals received in the posterior insula. Additionally, 7) Whitehead's propositions reflect top-down predictions in terms of predictive coding. The use of the geomodal convention (Bettinger, 2006, 2009, 2015) provides a method for quickly acquainting-with and acquiring to memory the relevant neuroanatomical components as well as for visualizing the pathways that primary afferent fibers follow from the enteric nervous system up to the higher cortices of the central nervous system. In addition, it provides a shared platform for visually assessing the philosophical and neuroscientific dynamics between both models. Visualizing the overlap between these models facilitates at the very least a heuristic clarity and at most suggests another layer of support for a more-nuanced interpretation of interoceptive dynamics in the insula. **C27**

**106 Do we underestimate the level of consciousness in medical practice?** Reginald Descheppe, Anne-Marie Bogaert; Stefaan Six; Jan Poelaert; Johan Bilsen <rdeschep@vub.ac.be> (Mental Health And Wellbeing Re, Vrije Universiteit Brussel, 1090 Brussel, Belgium)

In recent decades technological developments, such as fMRI and EEG-based monitors resulted in a better measurement of consciousness. However, consciousness is a complex and challenging topic and therefore philosophers and scientists often refer to it as 'the hard problem'. Although there is still a lot unknown, and maybe even unknowable, physicians need an operationalization of the concept of consciousness for their daily practice. After all, the status 'unconsciousness' may have serious implications for a patient, such as the decision to forgo treatment (e.g. in case of permanent vegetative state) or the assumption that patients do not feel pain (e.g. during anaesthesia, coma, palliative sedation). Therefore it is crucial that we have a correct understanding of what consciousness is and how it can be measured. The aim of this presentation is to investigate if technological innovations confirm our assumptions about consciousness in different challenging

situations? Secondly, we look at the implications of the more recent findings for medical practice. A review of the literature learns that neuroimaging, EEG-based monitors, isolated forearm technique, implicit learning and post-mortem examination are techniques that all revealed at least some kind of consciousness that was not noticed with the more traditional, although still commonly used, (observational) assessments. These techniques sometimes found unexpected levels of consciousness in conditions such as coma, locked in syndrome, anaesthesia, and execution by lethal injection. In other circumstances such as palliative sedation and near-death experiences the data are not (yet) conclusive. Also perceptions of proxy sometimes contradict objective measurements. Discussion. The availability of more sophisticated assessments reveals multiple examples of situations in which persons were -and still might be- incorrectly assumed unconscious. Hence, we seemingly tend to underestimate consciousness in some situations, mainly due to limitations of our assessment tools and limited understanding. These findings have both practical and theoretical implications. On a practical level, physicians should be vigilant about so-called unconscious patients. The new techniques can be helpful to improve validation and reliability of the assessment of consciousness. However, in addition to objective assessments, subjective assessments by proxy and nurses, should be also taken into account as they often detected consciousness that was not observed by the physicians. On a theoretical level these findings urge us to refine or even fundamentally review our current model of consciousness. New paradigms have been proposed, including some that challenge the current materialistic-reductionist model that states that consciousness is merely a product of the brain. We can conclude that our understanding and detection of consciousness is still limited which forces us to be humble about our ability to detect it and to be vigilant about how we deal with alleged unconscious persons. C19

**107 What is it Like to Be a Experimental Design to Disentangle Occipital and Left Temporal Amplitude and Instantaneous Frequency Oscillations Correlated with Phenomenal Consciousness** Vitor Manuel Dinis Pereira <crebillonfils@gmail.com> (LanCog Research Group, Centro, LanCog, Centro de Filosofia, Universidade de Lisboa, Lisboa, Lisboa Portugal)

The relevant computation to the effect of the occipital and temporal correlates of the distinction between access and phenomenology (Pereira 2015), since access and phenomenology is consciousness of something, is the computation of the high degree of visibility 4-5 assigned by the participants in both experiments to the correctly identified stimuli (and what are more in the second experiment is more incorrect answers than in the first experiment), because to distinguish the access from phenomenology we need that the access be the same for all participants in the two experiments (Pereira 2015: 337-339). That is, we compute the results only from those trials that are the same in the second block of the two experiences. Saying that phenomenology is not reportable is another way to define phenomenology distinctly from access consciousness, but that we already knew: although confusedly when, for example, it is alleged on the basis of the non reportability the non measurability of phenomenology and thus allegedly that there are not electrophysiological correlates of phenomenology different from the access. What we know now is what are these electrophysiological correlates of phenomenology different from the access (Pereira 2015: 344-350): the electrophysiologically correlated with the difference (statistically significant) among those trials that are the same in the second block in both experiments for the same high degree of visibility 4-5 (they also access). The distinct electrophysiological signal correlated with those trials that are the same in the second block in both experiments, despite the high degree of visibility 4-5 are the same 4-5, as the correct answers are the same, that is phenomenology to be measured, that is non reportability to be measured. Notwithstanding, as evoked signal, the change in ERPs phase (frequency is the change in phase over time) is instantaneous, that is, the frequency will transiently be infinite: a transient peak in frequency (positive or negative), if any, is instantaneous in EEG averaging or filtering that the ERPs required and the underlying structure of the ERPs in the frequency domain cannot be accounted, for example, by the Wavelet Transform (WT) or the Fast Fourier Transform (FFT) analysis, because they require that frequency is derived by convolution (frequency are pre-defined and constant over time) rather than by differentiation (without predefining frequency and accounted that frequency may vary over time). So, we move

from the features of the ERP (such as the amplitude and latency of peaks) of the Pereira 2015 towards the instantaneous frequency of event-related changes correlated with a contrast in access, in phenomenology and with unconsciousness. **C18**

**108 Mirror Neurons, Empathy, Intersubjectivity and the Second-person Perspective with Implications for the Problem of Consciousness** Mihretu Guta <mihretup@aol.com> (Arts, Sciences and Philosophy, Biola University; Azusa Pacific University, Hacienda Heights, CA )

There are two central claims that are said to characterize what I shall call, the functional properties of mirror neurons (MN). These are: (i) MN respond/fire when someone reaches for an object in a goal oriented manner; and (ii) MN respond/fire when someone watches another person reach out for an object. The functional properties in (i) and (ii) are described by neuroscientists/psychologists as instances of action execution and action understanding respectively. One of the central assumptions of the theory of MN has to do with the role they are said to play in mirroring the mind of another person thereby allowing one to be able to simulate someone's mental state(s). Most neuroscientists and psychologists who defend the functional properties of MN embrace such an assumption. However, there are also those who express serious skepticism on the alleged functional properties attributed to MN. In this regard, a neuroscientist Gregory Hickok's recent book entitled: "The Myth of Mirror Neurons" is a paradigm example (2014). This paper seeks to extend Hickok's skepticism on the functional properties of MN to issues involving empathy, intersubjectivity and the second person perspective. In light of this, this paper attempts to show why the problems that beset MN are symptoms of rather a much bigger issue that involves the problem of an irreducible consciousness, for which neither appeal to a particular region in the brain nor to a nervous system as a whole seems to be capable of providing us with any satisfactory solution. So where does all this leave us? This will leave us with what I call, the problem of the bearer question, i.e. the divorce between consciousness and the self/person. As is well-known, David Chalmers (1996 and 2010) introduced a highly influential distinction between what he calls, the hard problem of consciousness and the easy problem of consciousness. The former concerns conscious or phenomenal experiences such as what it is like to feel dizzy whereas the latter concerns non-phenomenal psychological properties such as attention. Over the past two decades, contemporary philosophers have devoted a considerable amount of time in debating the merits of Chalmers's distinction between the hard and the easy problems of consciousness. But, for the most part, such debates have ignored the centrality of the self/person for the very ontology of phenomenal consciousness. As a result, in the contemporary philosophical discussions, consciousness is treated as a stand-alone property with no strong link to its bearer, the self/person. In this case, Chalmers's highly influential work on consciousness stands as a paradigm case. This paper argues why the problem of the phenomenal consciousness cannot be adequately addressed without taking on board its bearer, that is, the self/person. So this paper focuses on the following three central claims: 1. Consciousness has a bearer, that is, the self/person. 2. The problem of consciousness fundamentally involves the problem of its bearer, the self/person. 3. The problem of consciousness cannot be solved without taking into account the ontology of the self/person seriously. **P2**

**109 Slowing Down of Alpha Oscillations Characterizes a Heightened Awareness to the Present Moment** Sucharit Katyal <skatyal@ucdavis.edu> (Psychology, University of California Davis, Minneapolis, MN )

Previous research has shown that advance meditators can develop extraordinary mental abilities with practice. In a task assessing visual perception using ambiguous images, called binocular rivalry, Tibetan monks were shown to control their dynamics of visual perception following single-pointed concentrative meditation in ways that meditation-naïve or novice individuals cannot. We investigated the neurodynamic correlates of such a behavioral concomitant of abiding in the present moment using EEG and found that advance meditators (compared to novices) concomitantly slowed down the frequency of their brain oscillations in the alpha range (8-13 Hz). This finding extends a previous study where we showed that within a meditation-naïve population, dynamics of binocular rivalry across individuals are correlated with the peak of their individual

alpha frequency. Overall, our data suggests that meditators are able to use concentrative meditation to slow down the dynamics at which they are evaluating the world and thus heightening their awareness to the present moment. **C13**

**110 Embodied Brains and Disembodied Minds** VS Ramachandran <vrachandran@ucsd.edu> (Neurosciences/Psychology, Center for Brain and Cognition - UCSD, La Jolla, CA )

How can a lump of jelly composed a 100 billion wisps of protoplasm, give rise to the experience of color, of love or curry or marmite ? I argue that current approaches to consciousness are fundamentally flawed because you cannot tackle the problem of quale ( subjectively perceived sensations ) without bringing into it your own SELF who experiences it. Science is an OBJECTIVE third person description of reality including brains ; and it - by definition - excludes the first person singular ( the “ I ” ) The “ I “ simply doesn’t exist. There are merely many brains of which mine is but one - it has no privileged access to reality . And if you exclude the first person vantage point you also ipso FACTO eliminate qualia ( I see red ; others process 600 nanometers wavelength. ) How can you explain something ( Q ) using a system of logic which required elimination of Q as one of its axioms ? if only the objective world exist why do you ‘peep’ at the world from your own unique vantage point ? The equivalents of the soft / hard problems for qualia also exist for the SELF. Both the metaphysical ( unique vantage point ) self and the ‘empirical’ self would need to be invoked to explain consciousness and qualia . The metaphysical self cannot be solved unless our very definition off Science changes but, meanwhile, the ‘soft’ problem of self can be explored in neurological patients. who have disturbances that suggest that the self consists of multiple components that can be studied independently before asking how the tout ensemble functions coherently and reflects on itself. For instance anosagnosia ; Reveals the multiple layers of self - eg patient claims her paralyzed left arm is her mothers -yet when asked to touch my nose with her left hand - grabs the lifeless hand with her right hand and touches my nose with it. Xenomelia - patient wants his normal arm amputated. Capgras patient - duplicates his own self. Patient with mild dementia claims his mirror reflection is an evil malevolent twin -yet passes the Gallup test. Calendar ( ‘space -time’ ) synesthete SEE (not merely imagine) a picture of a Hoolahoop like calendar in front of them thats body - not head - centered. If they turn their head rightward access to episodic memories in earlier months is blocked. Finally ,a phantom limb patient feels touch quale when he merely watches me being touched - thereby breaking the barrier between my mind and his ; an effect we predicted from knowledge of touch mirror neurons in S2 . Watching me massage my intact hand felt like his own hand was massaged , thereby relieving the pain.( Thus, avoiding arcane philosophical debates over the importance of mirror neurons- we can use the concept to develop new treatments) **PL10**

**111 Mental Organs And Mechanisms Of Consciousness As Discovered Through Psychedelic Drugs In Humans** Thomas Ray <tray@ou.edu> (Biology, University of Oklahoma, Norman, Oklahoma )

The human mind is populated by mental organs, which play diverse roles within the mind. Some mental organs provide consciousness (in separate adult and childhood forms); some function as gatekeepers to consciousness (in long and short time scales); some provide content to consciousness, while some give salience, meaning or significance to the contents of consciousness. Some function as the hands of the mind, shaping consciousness, in part by moving content mental organs in and out of consciousness. Some provide the conscious space to hold the content mental organs; and also the spark of creativity, allowing us to go beyond what is, and consider what could be. Some mental organs support the facilities of language, logic and reason, which appear to have arisen in the last one or two hundred thousand years in humans. I will refer to language, logic and reason simply as “cognition”. The facilities of cognition appear to be fully developed only in adult humans. The children we develop from and the animals we evolved from lack those facilities, and yet have fully functional minds and are capable of making their way in the world. Some mental organs provide affective ways of knowing the world, which richly paint the world in consciousness through feeling alone, and provide the complete archaic mind in our developmental and evolutionary antecedents. The separate adult and childhood forms of consciousness mentioned above

also correspond to the modern and archaic minds. Archaic consciousness can hold only affective content, while the modern mind can hold both cognitive and affective content. Most mental organs have not yet been characterized. If we want to solve the hard problem, then I say “look here”: the mechanisms by which mental organs regulate and mediate consciousness are coming into view. Individual mental organs are brought in and out of consciousness through interactions with other mental organs that provide the mechanisms and medium of consciousness. By having a more detailed understanding of these structures and processes in the biological system, we place ourselves in a better position to understand the roots of consciousness. Consciousness is not an amorphous phenomenon. It has components, interactions, dimensions, processes, development, genetics, and evolution. When we understand all of this we are in a better position to gain insights about or intuit its ultimate origin. C

**112 The Emperor's New Science? A Valid 'Science of Consciousness' Can Exist Only if Reality Differs in Specific and Fundamental Ways from the Current Mainstream-Physics View.** Nicholas Rosseinsky <rosseinsky.nicholas.m@cfdis.org> (Center for Dialog in Science, London, United Kingdom)

[POINT-1] No-one would trust conclusions from experiments where measuring-apparatuses ('meters') were unconnected to phenomena-under-study. Yet, if current mainstream-physics views accurately describe dynamical reality, this unconnected-meter scenario must effectively apply to all current experiments in 'consciousness science'! [POINT-2] Clearly, the field holds a view contradicting ([1]). E.g., leading journals publish analyses of consciousness-experiments, implying analyses are both reliable and consistent with current mainstream-physics. (Journals typically declare 'consciousness is analyzed within a natural-sciences framework', operationally asserting mainstream-physics consistency.) [POINT-3] Plausibly, the field generally relies on Chalmers' seminal work 'The Conscious Mind' ('TCM'), to establish experiments' joint reliability/mainstream-physics-congruence ([2]). TCM's 'phenomenal judgement' discussion raises the central issue: how can phenomenal-experience constituents (e.g., red qualia) be the origin of report-of-experience, if mainstream-physics holds? (If qualia explicitly influence report-generating brain-dynamics, apparently 'mind affects matter', so to speak - which violates mainstream-physics.) Critically for experiments, if qualia don't affect report, the report-'meter' isn't connected to the object-of-study - i.e. conscious-experience - seemingly invalidating consciousness science ([1]). (Modern methodology correlates data from two 'meter'-kinds: a report-of-experience-'meter' for consciousness-data, and EEG/MEG/fMRI-'meters' for brain-data.) [POINT-4] TCM's ingenious solution hypothesizes a process in consciousness whereby subjects compare their own-experience-of-qualia with own-experience-of-own-report-of-qualia. Here, qualia don't affect reports (avoiding mind-over-matter); reports derive from information that qualia also broadly 'correlate' with. TCM's process supposedly verifies detailed report/qualia consistency, indirectly validating report-meter/object-of-study connectedness, after all. But, if TCM's process exists, it already violates mainstream-physics! (It invokes in-consciousness-computations either without any brain-correlates, or with explicit 'mind-to-matter' coupling.) [POINT-5] Could other, non-TCM, approaches prove experimental reliability, while maintaining mainstream-physics worldviews? Work reported here (Rosseinsky, 2014) identifies and then refutes every contextually-possible approach. The core of this work considers 'identity-like' theories, wherein components-of-experience are (loosely) identical to certain brain-dynamics. This seemingly sidesteps 'mind-over-matter', because qualia - 'as' brain-dynamics - apparently couple in biophysically-conventional ways with those brain-dynamics governing report-behaviors. [POINT-6] Beyond simple meter-reliability, a valid science-of-consciousness must also offer experiments arbitrating between basic, competing, hypotheses, e.g. concerning levels of detailed-representation in experience. However, if qualia couple with report only via their existence 'as' brain-dynamics, I show that experiments can't perform these critical arbitrations. Relatedly, using measurement-theory (the part of physics showing meter-reliability), I derive specific amendments to current mainstream-physics views required for a valid science-of-consciousness. Amendments can be set within monist/materialist views; but they are definitively physics-fundamental in character. [POINT-7] I don't claim that reality 'must' diverge fundamentally from current mainstream-physics views. Simply (and importantly): if it



doesn't, there can be no reliable, detail-arbitrating, science-of-consciousness. REFERENCES: Rosseinsky, N.M. (2014) 'A complete and scientifically-reliable framework for theory-discrimination in consciousness research requires specific, experimentally-testable, dynamical couplings between natural phenomena.' Center for Dialog in Science, Working Paper (www.cfdi.org/papers). C7

## 2.02 Methodologies (fMRI, EEG etc.)

**113 An Analysis Of Biofield As A Parameter Of Wellness And Consciousness : A Squid Based Meg Study** Richa Prokash , Soam Prakash <richa.dei.2007@gmail.com> (Department of Zoology, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Consciousness science today relies upon the detailed study of neural correlates where a single brain cell ?neuron? is thought to be a potential source of generating consciousness in man. The ?hard problem? of consciousness measurement leads to the emerging concept of measurable correlates of consciousness. Penrose and Hameroff (2006, 2010) proposed gamma synchrony EEG (30 HZ-90 Hz) as best measurable correlate of consciousness, independent of neuronal computation. A testable hypothesis can be proposed here that the gamma synchrony solely is not sufficient to explain the phenomenon of consciousness in man and warrants other self-explanatory and dynamic approach. Like gamma synchrony EEG, there may be other measurable correlates which can be an aid to understand consciousness profoundly. Here, in this present investigation, we suggest Biofield (Rubik, 2002) already a parameter of wellness in man; as a potential measurable correlate of consciousness. The biofield, defined as an organizing principle for the dynamic information flow that regulates biological function and homeostasis (Muehsam, 2015) can be measured with devices such as EEG, ECG, MCG, MEG AND SQUID. In order to investigate the proposed hypothesis, we conducted a study on biofield of human subjects based on age, sex and health with the help of improved Meridian Energy Analysis Device (DEI MEAD) and 15 channel Superconducting Quantum Interference Device (SQUID) based MEG device. The observations with DEI MEAD depicts that energy level was more intense in male volunteer than females. Whereas, the measured energy gradually decreased in diseased volunteers compared to healthy ones. The results were further validated with SQUID and indicate that wellness can influence the consciousness of man where age, sex and health play a vital role. Also, this directs that biofield can be a measurable correlate of human consciousness. **P1**

**114 A Late and Unexpected Journey into Psychedelics: Right Path; Good Science** Michael Villanueva <mvillanueva@alphathetacenter.com> (Alpha Theta Center, San Diego, CA )

Mine is a personal story of why and how I came to study the EEG and psychedelics and how psychedelics painfully illuminated the power of neuroscience. Despite professional fears and professional loneliness, as a Clinical Psychologist, I struggled to understand the neural changes I saw in the pre and post QEEG brain scans of two of my patients who underwent psychedelic treatment for Heroin addiction in a Mexican Clinic that used Ibogaine and 5mMeO-DMT. My journey started in San Diego, took me deep into Mexico, and then to Australia as I worked to gather data on human EEG's undergoing transformative psychedelic experiences. There is a surprising paucity of literature; searching Pubmed reveals very few studies using the EEG in psychedelic studies. We suspect the lack of EEG studies may be due to concerns about movement artifact; however, our team, using EEG recording equipment costing less than 7,000US, open source software, and plugins (EEGLab) from the Swartz Center for Computational Neuroscience, demonstrated that movement artifact associated with psychedelics such as 5MeO-DMT can be cleaned by digital signal processing. Additionally, we have learned that using time-frequency analysis to decompose EEG source activity (Independent Component Analysis) can reveal source psychedelic EEG activity as well as suggest possible hitherto unseen information transfer paths in the human brain. I will present an overview of our various EEG research projects sharing outcome data on our 5MeO-DMT, Ayahuasca, and microdosing studies. I will conclude that advanced EEG analysis is (a) promising tool in psychedelic studies, (b) that it is cost effective, (c) that quality field work is possible, and most importantly, that any motivated psychedelic community can contribute both

robust data and hypothesis formation to this rapidly growing field. C6

### **115 The Study Of Non-invasive Brain Stimulation In Treating Neurological Diseases And Improving Cognitive Ability** Lei Zhang <lei.zhang@uregina.ca> (Regina, Canada)

The human brain is the most complicated structure in the world, and therefore the most difficult subject to study. Brain Stimulation has been widely used in the past decade to treat brain disorder such as chronic pain, Alzheimer's Disease, Parkinson's disease and depression. It has also been explored as a method to enhance human potential such as numerical skills, sport and memory capacity. However, neuroscientists have not yet discovered why the treatment works. The study in this field is only based on experimental results that do not examine the physiological construction of the brain. Mental diseases are in fact disordered neural circuit affecting normal function of the brain. Find the dysfunctional part of the brain and overwrite the abnormal pattern, and the symptoms can be eliminated. However, without a precisely constructed mapping of brain stimulation and response, it is difficult to gain a deeper understanding of the accuracy and effectiveness of brain stimulation. Brain stimulation refers to the use of an artificially generated magnetic or electrical signal pulse to stimulate the brain. The signal can either be applied invasively by an implanted device in deep brain stimulation applications, or non-invasively by applying a transducer generated signal externally onto the scalp. This research will use non-invasive brain stimulation to study the effect of various types of stimulations and to develop the understanding of the reaction pattern of the human brain. Non-invasive is defined as a diagnostic or therapeutic procedure that does not require the insertion of instruments. Instead of only focusing on one particular disease or cognitive function, this research will develop algorithms for pattern recognitions of different brain behaviors, in order to classify different mental diseases based on Electroencephalogram (EEG) signals. An EEG is a test that detects electrical activity in the brain using small, flat metal discs (electrodes) attached to the scalp. The brain cells communicate via electrical impulses and this activity can be captured on an EEG recording. An EEG is one of the main diagnostic tests for brain disorders such as epilepsy. The classification algorithms will be developed with Artificial Neural Network (ANN) using public available EEG dataset. ANN is an artificial intelligence machine learning technology inspired by biological neural network structure, which can be designed to recognize patterns and classify signals based on a number of pre-defined features. An ANN can also be used to implement non-linear dynamic systems to simulate brain behaviors, which are originally created by biological neural network in the brain. Field programmable gate arrays (FPGA) is an electronic device with the advantages of parallel processing and reconfiguration. It is used for the hardware design and implementation of the ANN. The results and outcomes will have wide impacts on research and society in terms of pattern recognition of brain behaviors and mental disease classification, treating mental disorders, improving people's mental health, and with long-term continuous endeavor, theoretically understanding the brain developing and aging process in order to unleash the full potential of human cognitive ability. C

## **2.03 Neuroscience of vision**

### **2.04 Other sensory modalities**

**116 A Meditation Teacher Who Can 'Transmit' Subjective Light/Energy** Peter Fenwick <peter\_fenwick@compuserve.com> (Institute of Psychiatry; Kings College, London, United Kingdom)

We studied an expert meditation teacher (male, 60 yrs) who it is claimed can induce strong subjective feelings of light in his pupils during a brief joint meditation session. We examined the neural sources in the teacher and pupil during the transmission/reception of light. Sixty four channels EEG signals were obtained from the teacher-pupil dyad during various conditions: Teacher instructed to transmit or not to transmit, and the pupil instructed to receive and not to receive. We used electric field tomography (EFT) from scalp EEGs to localize statistically significant neuronal sources in the brain. We used over 30 2-second epochs to obtain the time domain solutions so as to calculate the regional spectral power in the teacher's brain. We calculated the analysis for each



transmission/receiving condition and compared the resulting spectral densities across conditions. In the teacher's brain, higher activity during transmission than during non-transmission was observed in multiple regions and at specific frequency ranges. The increases during transmission epochs were more prominent in the right temporal cortex in the theta range, becoming bilateral in the alpha range. Increases in the brain stem were relatively small at low frequencies, but became prominent in the beta and especially in the low and high gamma bands. At these higher frequencies the gamma activity spread to wider cortical areas. The only reductions in spectral power were identified in dorsal frontal cortical areas, mainly at low frequencies. These observed patterns in the teacher's brain during transmission was found to be consistent across different transmission trials, and with different pupils. Pupils receiving or not receiving made no difference. These results reveal the specific neural correlates in the brain of the teacher whenever he was making an effort to transmit light which could be seen by his students. Fenwick P1, Luft C2, Liu L3, Ioannides A3, Bhattacharya J2 1Kings college IOP, 2Golsmiths College London. 3 AAI Scientific Cultural Services Ltd, Cyprus **PL8**

**117 The Effect of Music on Human's Biofield and The Energy of the Environment: Experimental Approach.** Konstantin Korotkov <korotkov2000@gmail.com> (Computer Science, St Petersburg University ITMO, St Petersburg, Russian Federation)

The method of Electrophotonic Imaging (EPI) based on the Gas Discharge Visualization (GDV) technique is well known for applications in medicine, sport, and materials testing [1]. The EPI technique is based on computer processing of images (EPI-grams) created by photons and electrons generated from the subject's fingers stimulated by a high intensity, pulsed electromagnetic field. A special software environment was developed for processing and analyzing EPI-grams and the latest Bio-Well instrument was used in the studies (www.bio-well.com). EPI technology allows to measure a lot of parameters of the human biofield and follow its transformation under the influence of different stimulus. Special "Energy Environment Sensor" was developed to record parameters of the environment and quantitatively evaluate response of this sensor to the influence of individual and collective consciousness. EPI technology was applied to study the influence of music on human biofield and environmental parameters [2-5]. Many experiments had been performed during concerts of classical music, as well as opera singers' performances (in particular several sessions was conducted at the concerts of the world opera stars Renee Fleming and Dmitri Hvorostovsky in the palaces of St. Petersburg). In all cases statistically significant transformation of the parameters of listeners' biofield was recorded, as well as strong changes of the environment parameters. Time dynamics of the EPI Sensor reflected all the moments of actor's performance. This can be interpreted as the change of the entropy of signal at the time of performance. We can say that the musicians changed the entropy of the space. No significant changes were registered after playing recorded MP3 music. At the moment it is not possible to conclude which specific emotion of the performers and spectators had the greatest influence on the sensor signal. Obviously, the environmental conditions change and this does not depend on the number of people in the room, which allows us to reject the hypothesis of changing the composition of the air (first of all changes of humidity due to breathing). In some cases, in parallel with the signal of the sensor we measured the dynamic EPI signal of water that also responded to the directed people's attention.

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## 2.05 Motor control

**118 Effects of a Movement Disorder on Cognition and Arousal Pathways** Elena Buglo , Julia Dallman, Stephan Zuchner <exb216@miami.edu> (Human Genetics, University of Miami, Miami, FL )

Movement, its precision and balance have not been well studied in relation to cognitive abilities. Precision of movement and balance are orchestrated by a complex cerebellar network. Recently cerebellar function has also been implicated in leaning, emotion and cognition, as some connections with prefrontal cortex have been observed. In this study we hypothesize that impairment in cerebellar neural network will lead to measurable changes in cognitive function as estimated by the three chamber task for learning and memory in zebrafish, and arousal rates when coming out of anesthesia as estimated by a technique of map mapping. We model the cerebellar impairment by disrupting a gene which loss leads to genetic ataxia and degeneration of the cerebellar Purkinje cells. We use zebrafish as a model organism for the study as its cerebellar neural circuitry and cellular organization are largely conserved throughout vertebrates, as well as its genetic background. Zebrafish also represents a convenient tool for genetic manipulation and easy visualization of the cerebellar architecture due to its optical transparency and availability of fluorescently labeled transgenic lines. **P1**

## 2.06 Memory and learning

**119 Holistic Perspective to Understanding Memory - Connecting the Dots** Minu Maninder , Julio Kovacs <minu.maninder@gmail.com> (Old Dominion University, Norfolk, VA )

Consciousness defines our existence and reality. According to Prof. Satsangi, it originates in the soul or spirit, which experiences it. It is then passed on to the mind, in the form of cognition, which then makes its impact on the brain, where it becomes a physical entity - like information or data - that can be measured. According to the Orch OR theory of Profs. Penrose and Hameroff, conscious awareness of the physical world emerges from quantum computations in the microtubules (MT) in the brain cells. The MTs are made up of tubulin protein dimers arranged in a cylindrical-hexagonal lattice having minus end-oriented dipoles. Tubulins' interactions with their neighbors gives them piezoelectric properties and dynamics, which enable them to perform their functions. While physical consciousness can be hypothesized to be produced in these biomolecular computers, an important question arises: where are our memories stored? There are different theories that attempt to address this question: (a) memories are encoded in the MTs, through CaM-KII phosphorylation; (b) they reside in synaptic connections, perhaps through the memory-associated protein KIBRA; (c) they are produced through MT dynamics in the dendrites. However, it is known that synapses, neurons and other cell organelles are transient, while memories can outlast the disappearance of these physical vehicles. There are many documented evidences that memory persistence can happen even across lives. How can this be reconciled with the former theories? A related problem is: what are the possible causes of loss of memory/cognition in neurological disorders like Alzheimer's Disease? As for the problem of memory, here too there are different theories, although none of them has yet yielded an effective cure for this disease. In our paper we will explore these problems from three interrelated perspectives - spiritual, mental, and physical - from the viewpoint of the Hierarchical Order Theory of Consciousness and SCANE (Spiritual, Cognitive and Neural-Environmental) Correlates put forward by Prof. Satsangi. **C10**

## 2.07 Blindsight

## 2.08 Neurology, neuropsychology and neuropathology

**120 The M (meme) Function of the Nk Formula of Dr. Stuart Kauffman: Empirical Validation** Richard J. Baker , Michael Baron, Ph.D. <richardbaker321@gmail.com> (Nonfinancialcapital.com, Dallas, TEXAS )

$M = f(e, in)$  is a statement of the NK formula proposed by Dr. Kauffman as the process by which an agent may search a landscape by manipulating various characteristics of itself. It is a

statement of theory proposed in a mathematical form that we were able to populate with data from our sample. As a result we have been able to empirically validate the research originally presented in Bourdieu's Demon (See Figures 1 and 2) in The Santa Fe Conjecture. In the tests reported in Premium Knowledge and most recently in the M (Meme) Function. Careful analysis of real life data from 2500 plus affluent individuals reported in our first volume demonstrates that these respondents did just as sociologists and biologist Richard Dawkins predicted. They constructed complexes of objects, images and relations (LifeStyles) to match the visions and memories in their minds. In our presentation we review the how each of the very recognizable elements of the M Function formula ( $M = f(e, i)$ ) works in our daily lives: (e) are the five categories of personal needs that are the sources of all energy; (I) are the multiple sources of information and personal experience, and the rates and ratios in which we consume them. Most significantly (f) is the function, the overall algorithm that (in the chart, above) determines if our needs are consuming and transforming information into memes at an overall red, yellow or green rate and that spins us into a socio-economic laminate with cells operating at a similar rate. The M Function is a dynamic force within individuals and among individuals. Because the M Function is a pure mixture of energy and information it is restructuring the economy as well as society. The division of labor is now based on a division of information and a division of communication. As the empirical validation of the M Function demonstrated, significant increases in communication and commercial efficiency result from application of M Function Memes. The NK model is a mathematical model described by its primary inventor Stuart Kauffman as a "tunably rugged" fitness landscape. "Tunable ruggedness" captures the intuition that both the overall size of the landscape and the number of its local "hills and valleys" can be adjusted via changes to its two parameters. All of the approximately 1300 variables that were included for use as raw data in M Formula items (e) and (i), were qualitative terms drawn from primary research of American culture after 1900. C27

**121 Non Local Consciousness in an Autistic Child** Diane Powell , Paul Mills, PhD; Deepak Chopra, MD <dianehennacy@msn.com> (Medford, OR )

Savant syndrome is the ability to do complex tasks, such as calendar calculation and prime number derivation, without possessing any of the basic skills considered necessary. Some savants reportedly know how to play music, and/or speak foreign languages, without having been taught. Others possess an inability to forget anything, as though they have access to a complete recording of their life. Savant syndrome can be acquired, but is most commonly found in autism and the congenitally blind. The visual cortex is capable of very complex processing, and blindness early in life leads to its recruitment by other brain areas, often resulting in enhanced auditory, proprioceptive, and musical abilities. In autistic brains the cortical regions are less connected in some areas, and hyper-connected in others. This compartmentalization of cortical regions causes deficits, but also might enable isolated brain regions to act like supercomputers. Autistic brains have more densely packed minicolumns that lack inhibitory GABA interneurons, making them less discrete and possibly capable of functioning as cellular automata. I proposed years ago that such unique brain characteristics make it reasonable that autistic savants could more easily experience nonlocal consciousness. In autism the neural circuits associated with motor control are often affected, causing a mind-body disconnect, and an inability to communicate. Nonverbal autistic children usually have an intact understanding of language, but can't control their bodies, including their hands and vocal musculature. Many of these children couldn't express themselves until the fairly recent aid of electronic technology. During the past several years, dozens of parents and therapists have reported to me that their nonverbal autistic children can access their thoughts by an unclear process. The children report they "see the other's mind." I have tested two of these children with randomized numbers, letters, and words, and presented my results with an autistic girl named "Hayley" at the TSC conference in Helsinki. Hayley exhibited a very high accuracy. For example, she gave 155 correct answers out of 162 on random digits. She could type independently during experiments initially. However, the introduction of a physical barrier had led to her regression at the time of the experiment, during which she was communicating primarily with a letter board. This did not provide sufficient separation between her and the person who knew the answer. In June 2016 I tested a 15 year old autistic boy named Akhil, who types independently

and was similarly accurate. I returned in April 2017 to test him under the observation of Deepak Chopra, MD and Paul Mills, PhD. We used randomized five digit numbers, words, and nonsense words chosen in advance by Deepak and sealed in envelopes before handing them to the mother to open one by one to look at while the boy typed what he “saw in her mind.” We also tested random words generated by a computer program in real time. His answers contained typing errors, but otherwise were 100% accurate. **C11**

**122 The Importance of the Physical Interactions Between Subjective Experience and the Brain in Human Psychology** Fredric Schiffer <fschiffer1@verizon.net> (Department Of Psychiatry, McLe, McLean Hospital, Harvard Medical School, Newton Highlands, MA )

Penrose suggests that consciousness is non-computational and cannot be achieved by present concepts of artificial intelligence. Descartes argued that consciousness exists. Penrose suggests that consciousness not only exists, but that it has “understanding,” which computers cannot achieve, and that it will be completely explainable by natural physical laws, but laws of a new physics that relate to an interface between quantum states and classical states. Hameroff suggests that microtubules in multiple neurons might be involved in these transitions from coherent quantum states to classical states. Following Penrose and Hameroff, I suggest that consciousness experience can be understood as Subjective Fields (SFs), emanating transiently from multiple brain sites. I suggest that SFs are physical fields that in addition to possessing energy and force, have an elemental subjectivity, which as Hameroff suggests can be orchestrated into elementary and then complex experiences. These SFs are emitted from various brain sites, including integrated brain states. The SFs manifest experiences, such as pain or understanding, which are also physical forces, and which in turn act on the brain, which in turn emits new SFs in a constant interaction between the subjective experiences of the SFs and the multiple brain areas that support them. A special area of the brain, perhaps involving the claustrum, is proposed to emit a special SF, the self. The self, a SF, is able to consciously experience other SFs, including those that contribute to the Global Workspace (GW) in a moment in time and over an extended period. The GW is composed of many interacting non-conscious SFs that include pleasure and pain, felt thoughts and understandings, urges, inhibitions, in essence all of the feeling states that we animals are capable of experiencing in the self. Experience Psychology (EP), then is an understanding of these mind-brain interactions, that supremely values conscious experience. In this view, SFs interact not only with their associated brain areas, but also with other SFs so that pain may limit love and lust may interact with reason. Interacting SFs in the GW are experienced in the self, which must bear powerful SFs such as despair and make conscious decisions which can directly affect behavior. The mind is the interaction between the self and the GW. Powerful SFs, outside of the self, as urges, can at times control the self, and at different times an immature mind might alternate with a mature mind depending on the nature of the GW with which the self is interacting. Freudian constructs such as the ego and id may be represented by different SFs and their related brain states. Some integrated SFs, or minds, consistent with Aristotelian virtues, are constructive and advance well-being for the individual and society, and other SFs are destructive and induce pain and loss for the individual and society. Ultimately the goal of human societies should be to improve its SFs, to states of well-being and wisdom that are better achieved in relatively healthy nations. Like nations, individuals can be healthy or failed. **C4**

**123 Conscious Neuroplasticity for Raising Consciousness** Neha Shivhare <nehashivhare1@gmail.com> (Pedagogica Sciences, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Human beings have been divinely gifted with the most powerful nervous system comprising of highly developed brain, spinal cord and nerves. Our brain not just enables us to connect with the world around us, but it also has the faculties which on being adequately strengthened can connect us to the metaphysical realities as well. Consciousness with its sublime attributes can also be affected by the functioning of the human brain. Similarly, our brains can also affect our consciousness by functioning in a suitable manner. This reciprocal influence of the brain and consciousness on each other has been researched (philosophically and scientifically) and verified a number of times. Recent neuroscience research findings have shown that brain is malleable (in terms of

synaptogenesis, neurogenesis, etc.) and keeps changing throughout a human being's life. This capacity of brain to be flexible and changeable is referred to as neuroplasticity. It is the process of ongoing changes in neural pathways that occur throughout life. Neuroplasticity refers to the idea that the brain is capable of changing its functions in response to the environment, actions, thinking, emotions, behavior, as well as injury. The dynamic impact of consciousness (in the form of subjectivity, intentionality, self-awareness and will) on brain never stops (Askenasy and Lehmann, 2013). Conscious neuroplasticity refers to the process whereby the functioning of the brain is improved through deliberate and willingly performed cognitive, emotive and behavioral actions. It allows us to consciously control how we want our brains to work by controlling our thoughts and emotions. Conscious neuroplasticity can be made possible through a number of measures including selfless community service, healthy socialization, value oriented environment, positive-attitude, mindfulness, physical, mental, spiritual activeness (meditation, mindfulness) etc. The present paper elaborates the concept of neuroplasticity and conscious neuroplasticity, bringing forth the need for efforts to strengthen conscious neuroplasticity. It also describes how some spiritual communities and organizations in the world have been pursuing conscious neuroplasticity and are enjoying its positive effects. Conscious neuroplasticity oriented model for raising individual and group consciousness has also been discussed in the paper. **P1**

## 2.09 Coma and vegetative states

### 2.10 Anesthesia and pharmacology

**124 Anesthetic and Neuronal Protein Assembly - An In-vitro Study** Pushpa Sahni <deipushpasahni@gmail.com> (Chemistry, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Despite a century of sustained research, brain scientists remain ignorant of the workings of the three pound organ that is the seat of all conscious human activity. Many have tried to attack the problem by examining the nervous systems of simpler organisms. The difficulty in establishing a link between biology and behaviour in humans is still more acute. There are techniques which are used to record the activity of single neurons in living humans. Such breakthrough methods could, in principle, begin to bridge the gap between the firing of neurons and cognition: perception, emotion, decision making and ultimately, consciousness itself. Deciphering the exact patterns of brain activity that underlie thinking and behavior will also provide critical insights into what happens when neural circuitry malfunctions in psychiatric and neurological disorders- schizophrenia, autism, Alzheimer's or Parkinson's. Anesthetics are also known to inhibit neuronal fast anterograde axoplasmic transport (FAAT) in a reversible and dose-dependent manner, but the precise mechanism by which anesthetic prevent consciousness remains unknown largely because the mechanism by which brain physiology produces consciousness is unexplained. In the present study we have used circular dichroism spectroscopy and confocal laser scanning microscopy to see the effect of propofol on the assembly of neuronal tubulin and actin together and probed into the changes of their secondary structures. In future, we will also try to maintain the conditions required for quantum brain structures relevant to consciousness. **C4**

**125 Towards A Better Understanding of What Unconscious Palliative Sedated Patients Experience. A Transdisciplinary Mixed Methods Study Protocol.** Stefaan Six, Steven Laureys; Jan Poelaert; Peter Theuns; Johan Bilsen; Marijke De Couck; Liza Musch; Reginald Deschepper <stefaan.six@vub.ac.be> (Mental Health And Wellbeing Re, Vrije Universiteit Brussel, Brussels, Belgium)

**BACKGROUND** In case of untreatable suffering at the end of life, palliative sedation may be chosen to assure comfort by reducing the patient's level of consciousness. An important question here is whether such sedated patients are certainly completely free of pain. Because these patients cannot communicate anymore, caregivers have to rely on observation to assess the patient's comfort. Recently however, more sophisticated techniques from the neurosciences (fMRI, EEG) have shown that sometimes consciousness and pain is undetectable with these traditional

behavioral methods. Therefore we urgently need a more reliable way of assessment by combining existing observational scales, subjective assessments of caregivers and family and neuroimaging techniques. Each method has its potential and limitations, but together they can substantially increase the reliability of our assessment. **AIM** The aim of this study is to better understand how unconscious palliative sedated patients experience the last days of their life and to find out if they are really free of pain. **METHODS** In this study we want to observe 40 patients starting with initiation of palliative sedation until death. Assessment of comfort based on behavioral observations will be related with the results from a NeuroSense monitor, an EEG-based brain monitor used for evaluation of the adequacy of anesthesia and sedation in the operating room and an ECG-based Analgesia Nociception Index (ANI) monitor, which informs about the comfort or discomfort condition of the organism, based on the parasympathetic tone (including calculation of ANI). Additionally, we will investigate whether changes of these measures can be linked to changes in the patients' experience as observed by caregivers and relatives, especially in the last moments of life. An innovative and challenging aspect of this study is its qualitative approach, implying all the different types of data will be used to link "objective" and "subjective" data to achieve a holistic understanding of the study topics. The following data will be collected: assessment of pain/comfort by the patients themselves before loss of consciousness due to deep continuous sedation (if possible) by scoring a VAS scale; brain function monitoring (NeuroSense monitor); monitoring of parasympathetic tone (ANI monitor); assessment by caregivers on 3 VAS scales (pain, awareness, communication); relatives' perception of the quality of the dying process on 3 VAS scales (idem); assessment by 2 trained investigators using observational scales; observation video and audio registration. **DISCUSSION** Measuring pain and awareness in non-communicative dying patients is both technically and ethically challenging. ANI and EEG have shown to be promising technologies to detect pain that otherwise cannot be detected with the "traditional" methods. Although these technologies have the potential to provide objective quantifiable indicators for distress and awareness in non-communicative patients, they have not yet been used to check whether the current assessments for non-communicative patients are reliable. First results are expected mid-2017. **P2**

**126 Changes of Serum Lipid Profiles In Neonatal Monkeys Associated with Anesthetic-induced Neurotoxicity** Cheng Wang<sup>1</sup>, Cheng Wang<sup>3</sup>, Chunyan Wang<sup>2</sup>, Xianlin Han<sup>2</sup>, Fang Liu<sup>3</sup>, Qiang Gu<sup>3</sup>, Shuliang Liu<sup>3</sup>, Tucker A. Paterson<sup>3</sup>, Merle G. Paule<sup>3</sup>, Joseph P. Hanig<sup>4</sup> And William Slikker<sup>1</sup> <cheng.wang@fda.hhs.gov> (Division Of Neurotoxicology, National Center for Toxicology Research; FDA, Jefferson, AR )

1Office of the Director, National Center for Toxicological Research (NCTR)/FDA; 2Center for Metabolic Origins of Disease, Sanford Burnham Prebys Medical Discovery Institute at Lake Nona, Orlando, FL 32827; 3Division of Neurotoxicology, NCTR/FDA, Jefferson, AR 72079; 4Center for Drug Evaluation and Research/FDA, Silver Spring, Maryland 20993 It has been reported that the commonly used general anesthetics such as sevoflurane induce neurotoxicity in developing brains. However, there has been limited research evaluating whether and how anesthetic agents affect bio-lipids, the most abundant components of the brain other than water. Thus, assessing lipid profiles, especially from blood samples, may assist in the early detection of the neurotoxic effects that can be associated with general anesthesia. Postnatal day (PND) 5 or 6 monkeys were randomly assigned to control (room-air; n=4) and sevoflurane-exposed (n=4) groups. Sevoflurane was delivered using an agent-specific vaporizer for 9 hours at a clinically-relevant concentration of 2.5%. Blood samples were collected at 0, 2, 4, 8 and 9 h during exposure in both the control and sevoflurane-exposed groups. Lipid extractions and analyses were performed using a mass spectrometer. 4-h after completion of anesthetic exposures, frontal cortical tissue was collected for histochemical and Western blot analyses. Serum lipidomic analysis demonstrated that the levels of critical lipid components including acylcarnitines, phosphatidylcholines (PC) and phosphatidylethanolamines (PE) were significantly decreased during prolonged exposure to sevoflurane. In contrast, the amounts of triglyceride (TAG) and 4-hydroxynonenal were increased to abnormally high levels in sevoflurane-exposed monkeys. Consistently, histochemical staining and Western blot analyses of Bax protein revealed increased neuronal apoptotic damage after

sevoflurane exposure. These data suggest that prolonged exposure of neonatal monkeys to a clinically-relevant concentration of sevoflurane resulted in significant changes in lipid metabolism and subsequently, neuronal apoptotic damage. Monitoring specific lipid changes may provide insights into the molecular mechanism(s) underlying general anesthetic-induced neurotoxicity and serve as sensitive biomarkers for the early detection of anesthetic-induced neuronal damage. Supported by NCTR /FDA **P2**

## 2.11 Cellular and sub-neural processes

### 127 Neuropharmacology of Consciousness Derived from Darshan and Meditation

**Focused on Chakras** Seema Bhat , Dr. Laxminarayan Bhat <seemaranibhat@gmail.com> (Chemistry, Reviva Pharmaceuticals, Cupertino, CA )

There are several forms of transcendental meditation techniques. Many eastern meditation practices focus on specific chakras in the human body. Chakra is also used to denote the energy centers or spiritual domains in the body. The transcendental meditations practiced in Hinduism describe six or more such chakras which are aligned along the spinal column ascending from the base of the spine to the top of the head. In Surat Shabda Yoga practiced by Radhasoami faith involves reconnecting spirit to the Shabda and stationing the radiant form of the living Satguru (true teacher) at the third eye chakra. Darshan (to see Satguru with direct eye contact) is also a very important form of meditation practice in Radhasoami faith. There are various other models or forms of chakras described in transcendental meditations prescribed in other eastern religions notably Tibetan Buddhism and Islamic Sufism but all them are connected to key nerve centers in the body that govern our being on several different levels: physical, emotional, mental and spiritual. In recent years, scientific research focused on meditation practices reported several physiological correlates. Every meditation practice is different and hence, their spiritual benefits and effects on the body and mental status also differ. Also, the expression of key neurotransmitter receptors such as dopamine, serotonin, glutamate and GABA varies at different chakras as well as in individual meditationists. However, very little is known and understood about the neurological changes occur at these individual chakras during meditation. We present the possible neuropharmacological changes that occur at different chakras during meditation and its relationship to different levels of physical, mental and spiritual benefits. **P1**

## 2.12 Quantum brain biology

**128 N-qudits in the Brain: A biological approach** Raag Saluja , Amla Chopra <saluja.raag@gmail.com> (Zoology, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Microtubules are hollow cylindrical structures that have been shown to play a key role in learning and memory, intracellular transport, cell division and cancer. Recent studies by Hameroff et al have thrown light on their being mediators of quantum information processing in the brain. Satsangi et al (2015) have generalized the quantum Hopfield neural network for n qudits and have said that an odd prime number of different qubits together form a qudit. These qubits, are the tubulin heterodimers, as explained by Hameroff et al., but have slight differences between them. In this paper, we have attempted to model the molecular structures that corroborates the mathematical conclusions drawn by Satsangi et al. There are slight differences in the tubulin molecule that can be brought about by (1) slight differences in sequences of the tubulin heterodimers or (2) post-translational modifications. We used computational biology and bioinformatics to study how these different tubulin molecules can act as different qubits; an odd prime number of which, can together act as a qudit. **C4**

**129 Alzheimer's Disease: Is finding the cure a way to test theories of consciousness?** Nancy Woolf <nancywoolf@yahoo.com> (Psychology, UCLA, Las Vegas, NV )

Alzheimer's disease (AD) is arguably a disorder of microtubules. Both tau-tangles and amyloid plaques--the classic neuropathological markers--can and do arise from disordered microtubules. Aging is the main culprit contributing to AD, and with it comes the inevitable unraveling of



normal microtubules consequent to dysdifferentiation, retrodifferentiation, and dedifferentiation - all fancy words to describe increasingly faulty de novo protein synthesis - genetic expression run amok, so to speak. It goes without saying that those proteins most tightly regulated during early development exhibit the most bizarre alterations during aging. The subunits of microtubules and the many attachment proteins are no exception. Not much can be done to address the downstream consequences of impaired microtubule function, not unless we attack to root cause by substituting genetic alternatives. Jack Tuszynski and I have developed a novel treatment strategy for AD that involves in silico engineering of tubulin subunit proteins that assemble to form slightly more stable microtubules. We expect the application of these gene constructs into the brain regions markedly affected by AD (like hippocampus and prefrontal cortex) to: (1) halt and reverse cellular degeneration due to disassembly of microtubules at a higher rate than assembly, (2) correct deficits in neurotransmission by ameliorating transport deficiencies of synaptic vesicles and their contents, (3) restore neuroplasticity by fixing microtubule function, and last but not least (4) DIRECTLY remediate problems with memory, cognition, and higher consciousness - the core essence of our intellectual function. If we can repair microtubule stability using genetic engineering, it will open the door to understanding exactly what causes AD - what is the underlying mechanism of the disorder. After the precise mechanism is known, many approaches to fixing the core problem leading to AD can be tested scientifically. Right now, many promising treatments (like transcranial stimulation, light therapy, and other non-invasive methods) are held back because there is no valid theory elucidating the root cause of AD. AD is truly a disease of the mind, and with it comes a cruel undoing of our humanity as our most precious memories dissolve before our eyes. By fully understanding the cause of AD, we gain not only an effective means to treat it, we also capture a glorious glimpse of that which is chiefly responsible for higher consciousness. It is no secret to this audience that some of us believe, microtubules-in their vastly complicated networks inside large neurons of our cerebral cortex-constitute not only a vast reservoir of stored information, but also an intriguing mechanism that brings that "mundane data collection" to life. To understand the essence, the liveliness, of the human mind is perhaps so profound, that it hardly seems like science. C4

## 2.13 Brain networks, synchrony and scale

**130 A Study Of Two Measures Of Integrated Information In Brain Networks** Suresh Jois , Nithin Nagaraj <dasneuro@gmail.com> (Bangalore, India)

In recent years, several Quantitative Measures of Brain Complexity (QMBC) have been proposed. QMBCs have been postulated in pursuit of answers to questions like ?how do some brain states like wakefulness differ from others like sleep, coma, epilepsy etc.?, ?why are certain brain regions more important for cognition and consciousness than other regions?? Several of these QMBCs are formulated on information theory, Granger causality and notions of complexity, independent of any underlying physical substrate and hence could be applied to study consciousness and other functions in animals or even artificial systems. QMBCs also have potential connections to deep learning algorithms and Artificial Intelligence (AI). Recently, one of us (Nagaraj) has proposed a novel measure of integrated information called Compression Complexity (Phi-C), with the aim of measuring brain complexity (and eventually consciousness). This work represents a novel application and convergence of the science of complexity with the neuroscience of consciousness. Phi-C compares favorably to Giulio Tononi et al's Integrated Information Theoretic measure (Phi). In our previous study (Virmani & Nagaraj 2016. arXiv: 1608.08450), computer simulations using Boolean networks have shown that Phi-C exhibits several desirable characteristics: (i) mathematically well bounded, (ii) negligible current state dependence unlike Tononi et al's Phi, (iii) integrated information measured as compression-complexity rather than as an information-theoretic quantity, (iv) faster to compute since number of atomic bipartitions scales linearly with the number of nodes of the network, thus avoiding combinatorial explosion, (v) Phi-C has similar hierarchy to Tononi et al's Phi for several multiple-node networks and (vi) Phi-C demonstrates a rich interplay between differentiation, integration and entropy of the nodes of a network. In this study, we extend our work on Phi-C using simulation studies of the behavior of Phi-C on networks representing typical connectivity motifs found in the brain. Particularly, we present the outcomes of these simu-



lations, together with comparisons to Tononi et al's Phi on similar networks. **P1**

**131 Normal Modes Calculation Of The Fractal Like Oscillator Networks For The Bio-inspired Computing, Brain Organization And Cognitive Behavior** Olga Katkova, A. Safin, M. Kapranov, E. Surovyatkina, J. Kurths <arnellemorte@gmail.com> (National Research University, Moscow, Russian Federation)

Studying of fractal like oscillator networks is important problem in different sciences such as physics, biology, medicine, etc. The protocol of writing energy transmission program inside a molecule for bio-inspired supramolecular engineering had been written [1] using its fractal properties. It had been seen that a new class of fractal reaction kinetics [2] wherein two or more district fractal structures are synthesized as parts of a singular cascade. Neural bond organization in a brain has fractal hierarchical topology. Moreover, organization of a mental space (thoughts, associations, images) also has the fractal nature. Therefore theoretical research of the fractal networks is interesting. We explored m-adic fractal networks of oscillators. It being assumed that oscillators are consists of non-linear oscillation system and self-oscillation system which compensate natural losses. That is why it is available to use Hamiltonian formalism for studying of networks dynamics of these oscillators. At the first step, the adjacency matrix of the network is built in accordance with networks topology, then Hamiltonian coefficients are written. At the second step, Hamiltonian is diagonalized for searching of the oscillations normal modes and forming equations of motion in the new normal coordinates which has linear components that do not related with each other. It is possible to find normal modes by searching of adjacency matrixes eigenvalues. We found that the structure of normal modes spectra of m-adic networks is devil's staircase fractal. After writing of equations in normal coordinates it could be explored different questions in theory of oscillations, particularly modes synchronization, autonomous multi-mode oscillations, degeneration of unstable modes, etc. The constructed theory of fractal networks studying let to solve a lot of important problems in sciences of consciousness. REFERENCES [1] S. Ghosh, M. Dutta, S. Sahu, et al. Nano Molecular-Platform: A Protocol to Write Energy Transmission Program Inside a Molecule for Bio-Inspired Supramolecular Engineering. Advanced Functional Materials, 2014, 24 (10), ? 1364-1371 [2] S. Ghosh, M. Dutta, K. Ray, et al. A simultaneous one pot synthesis of two fractal structures via swapping two fractal reaction kinetic states. Physical Chemistry Chemical Physics 2016, 18, P. 14772-14775. **C**

**132 Hierarchical Organization of Cortical Network** Nir Lahav <freenl@gmail.com> (Physics, Bar Ilan University, Petach Tikva, ISRAEL Israel)

In recent years numerous attempts to understand the human brain were undertaken from a network point of view. A network framework takes into account the relationships between the different parts of the system and enables to examine how global and complex functions might emerge from network topology. Previous work revealed that the human brain features 'small world' characteristics and that cortical hubs tend to interconnect among themselves. However, in order to fully understand the topological structure of the network and its relationship with consciousness, one needs to go beyond the local properties of a specific hub and examine global properties of the various structural layers that make up the network. To address this topic further, we applied an analysis known in statistical physics and network theory as k-shell decomposition analysis. The analysis was applied on a human cortical network, derived from MRDSI data of six participants. Such analysis enables us to portray a detailed account of cortical connectivity focusing on different neighborhoods of inter-connected layers across the cortex. Our findings reveal that the human cortex is highly connected and efficient, and unlike the internet network contains no isolated nodes. The cortical network is comprised of a nucleus alongside shells of increasing connectivity that formed one connected giant component, revealing the human brain's global functional organization. All these components were further categorized into three hierarchies in accordance with their connectivity profile, with each hierarchy reflecting different functional roles. Such a model may explain an efficient flow of information from the lowest hierarchy to the highest one, with each step enabling increased data integration. At the top, the highest hierarchy (the nucleus) serves as a global interconnected collective and demonstrates high correlation with consciousness related regions, suggesting that the nucleus might serve as a platform for consciousness to emerge. The

full article: <http://iopscience.iop.org/article/10.1088/1367-2630/18/8/083013/meta> C10

**133 Hierarchical Quantum Coherent Feedback could overcome Observer's Paradox** Nagma Markan , Bhakti Kapur; Priti Gupta; CM Markan; <nagmamarkan@gmail.com> (Electrical Engineering, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

An alternate yet interesting definition of observer is discussed in eastern literature (Spandh Shashtra) and is reiterated through the Sampling Theorem in signal processing. According to this definition any system operating at a higher frequency (subtler) can observe a system working at a lower frequency (coarser). By applying this ideology to the brain we can have a hierarchy of observers in the order of increasing frequency (similar to Anirban Bandyopadhyay's triplet of triplets). During meditational practices the practitioner takes his/her attention inside towards subtler (higher frequency) realms of existence where he/she is able to observe or experience a greater sense of reality. This method of taking attention inwards amounts to a lower frequency brain observing higher frequency regions in a bottom-up manner thus contradicting the definition of observer and creating a paradoxical situation that we term as the Observer Paradox (i.e. how during meditation the coarse brain is able to observe and experience the subtle levels when the sampling theorem only allows the subtler to observe the coarser). To understand how the brain accomplishes this, there is a need to understand how the brain builds a hierarchical pathway/bridge between lower and higher frequency levels using attention wherein certain higher order experiences in the form of lights and sounds vanguard this internal journey. In this paper we discuss how focused attention creates Quantum Coherent Feedback between hierarchically ordered frequency levels establishing a state of Harmonic Resonance between them. In this state, by the principle of interferometry, the information at the lower region is a dimensionally reduced version of the higher frequency information that is consciously experienced in the form of light and sound and might be the key to overcome the Observer Paradox. **PI**

**134 Topological Properties Of The Complex Network Organization And The Effect Of Synchronization: New Applications To The Theory Of Consciousness** Ansar Safin <arsafin@gmail.com> (Radiotechnics And Electronics, National Research University, Moscow, Russian Federation)

Synchronization, as an unique phenomenon of a network of mutually coupled nonlinear dynamical systems [1]. It plays a very important role in many different areas of science such as biology, physics, ecology, climatology, sociology, technology, etc. The discovery of the laws governing the topology and synchronization processes in complex networks is one of the greatest challenges of modern science [2]. All these complex networks are characterized by the many properties such as self-organization, nonidentity, influence of leadership, nonlinearity, complex type of coupling, nonisochronism, etc. Recently in [3], a new mathematical model for the brain functioning and mental space organization was proposed. This model is based on the ultrametric (tree-like topology) type of mental space organization (space of ideas). Cognitive systems in this model [3] are interpreted as transformers of information, and it is possible to develop the formalism of classical (unconscious) and quantum (conscious) mechanics on mental space. In particular, this model could describe the evolution of human ideas. In this work, we develop the generalization of the ultrametric point of view to the theory consciousness using the modern network theory [2] and the effect of synchronization of nonlinear oscillators [1]. In our model, we interpret and describe many psychological phenomena using the effect of synchronization, such as hypnosis, non-verbal thinking, spiritual experiences, etc. REFERENCES [1] A. Pikovsky, M. Rosenblum, J. Kurths. Synchronization. Cambridge University Press. Cambridge. UK. 2001. [2] A. Arenas, et al. Synchronization in complex networks. Physics Reports. 2008. 469. P. 93-153. [3] A. Khrennikov. Classical and quantum dynamics on p-adic trees of ideas. Biosystems. 2000. 56. P. 95-120. **C**

**135 Consciousness And Cognition: Extrapolations From Bacterial Studies For Understanding Neural Behavior And Meditational Practices** Tatavarty Neh Satsangi , Raj Kamal Bhatnagar; Tatavarty Guru Sant <nehsatsangi@gmail.com> (Zoology, Dayalbagh Educational Institute , Agra, UP India)

Extensive recent work has revealed that biologically simple organisms like bacteria are sentient

and display commensurate consciousness and cognition. Data from various laboratories established that bacteria practice diverse linguistic mechanisms to live evolved social life. For example, bacteria sense presence of food in vicinity and communicate to other bacteria; similarly they can detect threat to their life and modulate response accordingly. Bacteria are the oldest organisms living on the planet earth. They have been here for billions of years. They are single-cell microscopic organisms. Humans have amazing interactions with bacteria, human body has 10 times more bacterial cells in and on their bodies. In other words humans have 100 times more bacterial genes than human genes playing a vital role all through the life. Bacteria being microscopic in nature can talk to each other, and their mode of communication is through chemical signals known as Quorum sensing. Thus, this term would be stated as the phenomenon of stimuli and response correlated to population density. Communication is equivalent to living in social groups. This could be best explained through collective behavior of bacteria giving rise to multicellularity. Bacteria have been on earth for billions of years whereas humans existed since couple of hundred thousand years, assuming that bacteria have made the rule for multicellular organisms. By studying bacteria we can have the insight of multicellularity in human system. It has been reported that a bacterial colony imitates a biological neural network. The communication or linguistic skills include formation of chemo attractants, lubricants, hormone like signals and even electrical impulses. So far, about 50 different signals have been identified that are controlled by biochemical network in which biochemical alteration can create or breakdown network in bacterial colonies. This process is analogous dendritic connections in the brain that permits it to make informed decisions. Thus, the basic ingredients of neural network, sensory integration, modulation of behavior and magnitude of response have also been described in bacteria. In this paper we establish that the colony of bacteria can function as cybernetic system or like a massive brain when each individual collectively glean information from the environment and further can process information, learn from past experiences, can modify genomic organization or produce new genes to better survive with new challenges. This paper will also explore analogies of bacterial quorum sensing and group meditation to reach higher level of functionality or consciousness during community meditation practices. P1

## 2.14 Emotion

**136 Changing Body Feelings Changes Minds: Descending Modulation Of Fearful Face Recognition Using Bodily Maps Of Emotion** Wonmo Jung, Ye-Seul Lee; Younbyoung Chae <croquies@naver.com> (Kyunghye University, Seoul, SEOUL Korea, Republic Of)

**Objective:** In recent years, attempts have been made to understand how interoception affects affective and cognitive function in the perspective, ?interoceptive inference? which is a predictive model of interoceptive afferents. This idea also proposes that not only ascending sensation, but also descending inference on internal states shapes emotion. In this study, we are interested in whether descending modulation of interoceptive sensation using somatotopic information affects emotional recognition. **Methods:** Participants went through emotional recognition task followed by a synchronization task inside fMRI scanner. In the synchronization task, participants were required to imagine the feeling of bodily state, to be synchronized with given bodily state informed using a bodily sensation map. The synchronization tasks were grouped into two conditions, fear bodily sensation (FBS) and disgust bodily sensation (DBS). The FBS and DBS conditions used a parametric map of sensation felt during fear or disgust as a synchronization map. Under one of two synchronization conditions, participants were required to categorize five facial expressions which are linearly morphed faces between a fearful face and a disgusted face. Group level analyses were made on the behavioral categorization ratio and the brain activities to the emotional face under the two conditions. **Results:** Behavioral results showed that the categorization ratio of emotional faces was biased more to ?fearful face? in the FBS condition, which is a congruent condition, than the DBS condition. The brain response to fearful face in fear related brain regions (including amygdala and insula), compared to the intermediate emotional face, was manifested in the FBS condition but not in the DBS condition. Compared to DBS condition, brain response to fearful face of FBS condition was associated with increased activity in anterior cingulate cortex and middle temporal cortex. **Conclusions:** These findings indicate that anterior cingulate cortex and middle temporal cortex support an enhancement of fearful emotion recognition under the interoceptive inference of congruent bodily state. C

## 2.15 Sleep and waking

## 2.16 Brain stimulation techniques

**137 Transcranial Ultrasound, Mood, and Resting State Network Connectivity** John Allen <jallen@email.arizona.edu> (Psychology, University of Arizona, Tucson, AZ )

Transcranial ultrasound (TUS) has potential to noninvasively modulate human brain function, and thus may provide a valuable tool for examining emotion and consciousness in experimental and clinical contexts. We have previously reported that TUS targeting the right inferior frontal gyrus (rIFG) enhanced mood in healthy volunteers, but the mechanism of such effects are unclear. Resting network connectivity, assessed by fMRI, could elucidate how neural systems change following TUS. In our studies to date, we have targeted the right inferior frontal gyrus (rIFG), which has been associated with cognitive control of emotional processing and is part of a larger network associated with mood regulation. Targeting this area with TUS consistently produces an enhancement in mood lasting 30-60 minutes. Resting state fMRI recordings before TUS and 25 minutes later provide the ability to examine two key resting state networks: the cognitive control and the default mode network. These networks have been identified as altered in mood disorders. TUS altered network connectivity in directions opposite to that seen in mood disorders. Significant increases in connectivity were seen in cognitive control areas (dorsolateral prefrontal cortex, medial prefrontal cortex, rIFG), and decreased connectivity in the default mode network was observed. Moreover, decreased connectivity between rIFG and limbic systems (nucleus accumbens, cingulate gyrus) was observed. Altered connectivity between neural systems involved in cognitive control and emotional/salience networks might reflect better regulation of mood, while decreased connectivity in networks involved in internal processing may have led participants to engage less in repetitive internally-focused perseverative mentation. TUS targeting the rIFG thus enhances mood and modulates network level activity consistent in a manner to suggest its promise as a novel treatment for mood disorders. **PL4**

**138 Non-invasive brain stimulation devices to change thought and behavior** Marom Bikson <bikson@ccny.cuny.edu> (Biomedical Engineering, The City College of The City University of New York, New York, NY )

Non-invasive brain stimulation spans a range of technologies that apply energy to brain circuits with the intention to change thought and behavior. Applications span the treatment of brain diseases such as depression and chronic pain, to enhancing cognitive performance in healthy individuals. Brain stimulation devices such as intracranial Direct Current Stimulation (tDCS) are wearable and productized for home-based medical and consumer application. The technology is also tested by US government agencies to accelerate learning during training. Digital prescriptions can be download to individual devices and changes in performance monitored through the same wearables. This talk explores the emerging science of non-invasive brain stimulation, reviews rapid technological advances in this technology, as well as new legal and ethical concerns raised by devices intended to directly change the brain. **PL4**

**139 The Effects of Low Field Magnetic Stimulation on Mood and Brain Function** Michael Rohan <mrohan@mclean.harvard.edu> (McLean Hospital, Harvard Medical School, Boston, MA )

The brain is an electrochemical organ, and a variety of external electromagnetic fields can alter brain activity. Low Field Magnetic Stimulation is an experimental treatment for depression that uses induced electric fields with widely distributed cortical penetration. The fields in LFMS are delivered at a low strength and high frequency that are different from those of other brain stimulation techniques. In addition, the mood response associated with LFMS is rapid. These differences suggest a novel mechanism of interaction that may offer clues about the complex interaction of mood and brain function. Specifically, the electric fields used in LFMS in the brain that have strengths of less than 1 V/m and are delivered in discrete pulses at 1kHz. An additional differentiation of LFMS from other electromagnetic treatments, such as ECT or TMS, is that LFMS fields are remotely induced and distributed widely. LFMS was discovered serendip-

tously in 2001 in an MRI experiment that used an experimental electromagnetic pulse sequence that was set to non-standard timing. Some depressed subjects exiting the scan spontaneously reported improved mood, and a mood rating and control group indicated a significant effect. Isolation of the electromagnetic fields sequence led to the design of a tabletop sized device. This device subsequently demonstrated benefits in a double blind sham controlled treatment study of antidepressant effects in subjects suffering from either major or bipolar depression. Our recent study in a population with bipolar depression demonstrates effects lasting over a week from three daily treatments. Preliminary imaging studies in healthy subjects indicate that LFMS may cause a reduction in frontal neuronal activity, as observed with Near Infrared Spectroscopy. Local changes in gamma frequency EEG signals are evident within minutes of treatment, with reductions in medial prefrontal activity and increased activity in the posterior cingulate. Activity in some resting state networks observed with fMRI is reduced (default mode) while strengthened in others (salience). Together these findings suggest that LFMS may be changing local network activity in particular regions and connectivity among regions of the brain. The fields in LFMS are probably not strong enough to directly activate axons, and our current hypothesis is that they are interacting with synaptic efficiency in the prefrontal regions that regulate mood. It is not clear whether this interaction is excitatory, inhibitory, or varies by synapse type or dendritic morphology, and studies are underway to identify the structures that mediate this effect. What does the existence of a whole-brain network intervention that uses electric fields to change mood tell us about the link between the physical brain and consciousness? The observation that a manipulation of synaptic function can change affective state supports a biologically based system of mood control within the brain. This system may be more susceptible to modulation in those with depressive disorders. Because of the close interaction of mood with motivation and choice, a strong biological basis for mood would suggest a regional connection between aspects of consciousness and the biological brain. Could LFMS provide a probe into the link between the two? **PL4**

**140 TDCS Alters Cognitive State in a Way that May Be Similar to Mindfulness** Clark Vince <vpclark1764@gmail.com> (University of New Mexico, Albuquerque, NEW MEXICO )

Our laboratory and others have been studying the behavioral and cognitive effects of small electrical currents applied to the scalp, called transcranial direct current stimulation or tDCS. In a series of neuroimaging and stimulation studies, we have found that anodal tDCS applied over the right inferior frontal cortex doubles participants' ability to learn a difficult visual perceptual task relative to sham stimulation, with an average increase in  $d'$  (a signal detection measure) of about 1.2, considered a large effect size. This result has been replicated a total of 4 times in 3 different institutions, and is one of the largest effects of any manipulation on learning published so far. Other studies suggest that this result is related to effects on attention. Interestingly, when participants are asked to describe changes in their mental or emotional state with tDCS, almost no changes reported on average. However, in participants who have practiced mindfulness extensively, it is often described as feeling like a deep meditative state. Subsequent pilot studies suggest that this method might be useful for training mindfulness in novices, and may have other useful applications. **C18**

## 2.17 Specific brain areas

**141 Benefits of activation and developing healthy pineal gland at early age** Kundan Srivastava , Mrs. Shweta, Mrs. Neha Paliwal & Amp; Amp; Amp; Dr. V.S.L Srivastava <dr.vijaysri@gmail.com> (Medical, Private, Harda, Madhya Pradesh India)

Pineal gland anchor our soul to our body and makes bonding and communication. When pineal gland become unhealthy or inactive or calcified, this bonding and communication also disturb and affect the life in many ways. Connection and bonding to our soul which is part of body who is reservoir of energy, light and intelligence, can be proper only by healthy and active pineal gland. study reveals that bonding and connection is how much useful for a student and person. it will bring unbelievable changes in the life. increase creativity level of consciousness, energy and tap into unlimited resources of intelligence and also prevent from many health hazard. It was in practice in ancient India. **P1**

## 2.18 Neurobiological theories of consciousness

**142 Hypothesis: The Heart is Controlled by Cardiac Neurons that are Responsible for the Functioning of the Anatomical Structures of the Body by Performing Executive and Administrative Functions** Hari Cohly , Alakh Prashad Saini <hcohly2005@gmail.com> (Biology, Jackson State University, Jackson, MS )

The mind controls the body. The heart has neurons therefore, it controls the body by these neurons and these are efferent in nature . Further, the neurons are associated with the vagus nerve and physiologically the vagus nerve controls all the functions of the organs and five senses of the body and thus regulates the human frame. The current that regulates the heart is the current of reaction giving rise to cognition, motor, ejective and destructive actions. Lastly the mind generates current that is outward or motor in nature. HYPOTHESIS: In the human frame mind is the central force that connects the spirit to the body and the location of the mind is in the heart. The spirit provides sensory information and anatomical structures to the body while the mind in kinetic form generates subjective feelings via the motor activity. The heart essentially has one main heart chakra along the midline whose central location is on the xiphoid at the lower end of the sternum. The heart nervous system is close to the central chakra at the cardiac plexus which is controlling four hierarchical hubs of ganglion plexus(GP) characterized around orifices of the major blood vessels : Region 1 includes Superior left atrial GP, Superior right atrial GP, Posterior left atrial GP Region 2 Posterior right atrial GP Region 3 Posterior left atrial GP and Region 4 Posterior descending GP Regions 1-4 are associated with the following functions (i) intelligence, cognition, (ii) kama (desire), krodha (anger): MOTOR action, (iii) lobha (greed), moha (attachment associated with material world): ejective action, (iv) ahankaar (ego): DESTRUCTIVE action. According to our hypothesis stimulating the neurons in: Region 1; heart neurons control activities associated with SPIRITUAL(Surat) issues, SUMATI higher order thinking and COGNITION, wisdom, spiritual thoughts, anurag ; budhi chaturai, detachment, acts of courage and chivalry Region 2 neurons would be associated with activities that result in KUMATI, WEALTH (Dhan) issues, MOTOR activities, Bhog basna, attachment, ignorance, worldly attachment, activities that are pertaining to desires, anger management and sexual lust issues kaam (desire), krodh (anger) Region 3 neurons would be associated with activities that result in KUMATI and are associated with MIND (Maan) EJECTIVE functions like laziness, sleepiness, with highly subjective feelings, consequences of done actions on the five senses, lobh (greed), moha (lust), maya, indree, fear and shamefulness Region 4 neurons would be associated with activities that result in KUMATI and are associated with BODY (Taana) and DESTRUCTIVE functions, activities leading to commotion or chaos, ahankar (ego) Executive and administrative functions include all activities from region 1 -4. Theory of karmas or deeds states that any action is good if the doer does it in accord to the Supreme Creator and all other actions are bad. Good actions generate higher consciousness and all other actions are bad and contribute to lower consciousness. Good actions generates sumati and bad action generates kumati. Sumati is generated only by the spirit force which is attractive and signifies love. P2

**143 Quality of Representations, Perceptual Experience and Cognitive Access: A No-overflow Proposal** Peter Fazekas <fazekas.peter@gmail.com> (Centre for Philosophical Psych, University of Antwerp, Antwerpen, Belgium)

The problem of phenomenal consciousness -- the question of how our subjective experiences could be accounted for in terms of brain processes -- is often regarded as one of the top ten unsolved problems in science. A crucial aspect of this problem is to find the neural underpinnings of consciousness, i.e. the locus of the neural activity that correlates with having conscious experiences. One of the most pressing questions in recent literature in this regard is whether the neural basis of phenomenal consciousness is independent of the neural basis of cognitive access mechanisms. The two most influential positions theorists propose are on the opposite ends of the spectrum. On the one hand, a family of theories build cognitive access mechanisms right into the definition of consciousness by claiming that perceptual information processing is conscious if the information processed is available for a global workspace (or working memory) that integrates incoming information for further processing and for action. On the other hand, it is argued that while the



content of phenomenal consciousness is rich, global workspace is of limited capacity, and therefore phenomenal consciousness overflows cognitive access: one is conscious of much more than what one can report. My paper contributes to this debate by establishing a middle ground between these two extremes. I will acknowledge that the neural underpinnings of phenomenal consciousness might be independent of the neural machinery underlying cognitive access, nevertheless, I will deny the existence of rich perceptual experiences overflowing cognitive access. First, I will argue that the salience, specificity, and clarity of perceptual experiences correspond to the intensity, precision and temporal stability of the underlying perceptual representations. Second, I will describe attentional mechanisms that can modulate these characteristics of neural code, and via dynamically enhancing and diminishing perceptual representations alter conscious experiences of corresponding stimulus features. Third, I will provide reasons for thinking that perceptual experiences of briefly presented stimuli are not rich, since only certain features of them are consciously experienced with sufficient salience, specificity and clarity. Nevertheless, the attentional mechanisms in question are able to affect which features are experienced vividly, and which dim into the background. Fourth, I will argue that the same neural characteristics, i.e. intensity, precision and temporal stability, crucially determine the allocation of working memory resources. That is, I will argue that it is the same common cause that, on the one hand, gives rise to more vivid perceptual experiences while, on the other hand, results in better working memory encoding. This is why phenomenal consciousness and cognitive access cannot come apart. I will conclude the paper by reinterpreting the findings of some very recent experiments allegedly showing phenomenal overflow in accordance with this novel framework. C2

**144 Towards Solving the Hard Problem of Consciousness: The Varieties of Brain Resonances and the Conscious Experiences that they Support** Stephen Grossberg <steve@bu.edu> (Center for Adaptive Systems, Boston University, Boston, MA )

What happens in each of our brains when we consciously experience sights, sounds, feelings, and knowledge about them? The Hard Problem of Consciousness is the problem of explaining how this happens. To solve this problem, a theory of consciousness needs to link brain to mind by modeling how brain dynamics give rise to individual conscious experiences, specifically how the emergent properties of brain dynamics generate properties of individual experiences and of the psychological and neurobiological data that they generate. This talk summarizes evidence that Adaptive Resonance Theory, or ART, is accomplishing this goal. ART is a cognitive and neural theory of how advanced brains autonomously learn to attend, recognize, and predict objects and events in a changing world. ART has predicted that ?all conscious states are resonant states? as part of its specification of mechanistic links between processes of consciousness, learning, expectation, attention, resonance, and synchrony. It hereby provides functional and mechanistic explanations of data ranging from individual spikes and their synchronization to the dynamics of conscious perceptual, cognitive, and cognitive-emotional behaviors. ART has now reached sufficient maturity to begin classifying the brain resonances that support conscious experiences of seeing, hearing, feeling, and knowing. The talk will review various of these resonances, and their similarities and differences, including the different parts of our brain where they occur, and why; how they interact when we feel and know about what we see and hear; and psychological and neurobiological data from normal individuals and clinical patients about conscious and unconscious experiences that have not been explained by alternative theories. The talk will mention some resonances that do not become conscious, and why; and why not all brain dynamics are resonant, and therefore never conscious, in terms of the computationally complementary organization of cortical processing streams. Reference Grossberg, S. (2017). Towards solving the Hard Problem of Consciousness: The varieties of brain resonances and the conscious experiences that they support. *Neural Networks*, 87, 38-95. <http://www.sciencedirect.com/science/article/pii/S0893608016301800> This article is published Open Access. PL7

**145 Integrated Information in the Neonatal Electroencephalogram** Joseph Isler <jri2101@columbia.edu> (Pediatrics, Columbia University, New York, NY )

The integrated information theory of consciousness (IITC) is a step toward a fully-fledged

neurobiological theory of consciousness that has been developed by Giulio Tononi and colleagues. IITC is based on an information theoretic quantity ( $\phi$ ) initially developed for discrete Markovian processes. Recently, Barrett and Seth (B&S, PLOS Comp. Biol., 2011) adapted  $\phi$  for application to time series data, such as physiological recordings. In the Barrett and Seth framework,  $\phi$  quantifies the degree to which holistic information, in a network of interacting elements, increases the predictability of a particular network state given an earlier state separated in time by a particular temporal scale. In computational models, this temporal scale ( $\tau$ ) is often chosen to be one computational time step. For this empirical study,  $\tau$  is considered a free parameter and we explored integrated information over a wide range of time scales. We used an EEG dataset collected in the Nurture Science Program of Columbia University, a program that has shown that Family Nurture Intervention (FNI) which is designed to facilitate reciprocal maternal/infant connection and mutual attention, improves neurodevelopmental outcomes in babies born prematurely. Subjects were 134 infants born before 34 weeks gestational age who participated in a randomized control trial of FNI vs Standard Care (SC). Hour long EEG was recorded at multiple ages in each infant. During recordings, the state of consciousness was coded for each minute using behavioral criteria previously shown to be appropriate for preterm infants. States were scored as active or quiet sleep (infant analogues of REM and NREM sleep in adults), awake, indeterminate, or crying. Given the putative ability of  $\phi$  to quantify the degree of consciousness, we hypothesized that 1)  $\phi$  would be greater in waking than during sleep, and greater in active sleep than during quiet sleep, 2)  $\phi$  would increase with age, 3) developmental changes in  $\phi$  would be greater in FNI than SC. In agreement with the first hypothesis,  $\phi$  depended on conscious state in the direction proposed. In agreement with the second hypothesis, we found that  $\phi$  was highly correlated with age over a broad range of  $\tau$ . Finally, babies in the FNI group, compared with SC infants, had increased rates of development with age over a wide range of  $\tau$ , eg. between 25 and 225 ms.. This is consistent with other findings from the RCT that the behavioral intervention accelerates maturation. Babies provide a highly relevant population for studies of consciousness, both because they, like nonhuman species, are unable to provide verbal reports of their conscious state, and because they afford a means to investigate the ontogeny of consciousness. These results show that integrated information increases with age in early life and discriminates between conscious states, providing empirical support for IITC in human infants. **C10**

**146 What the brain's time and space can tell us about consciousness - Temporo-spatial theory of consciousness (TTC)** Georg Northoff <georg.northoff@theroyal.ca> (Neuroscience - Mind, Brain Ima, University of Ottawa, Ottawa, Canada)

Recent neuroscientific theories of consciousness emphasized the central role of integration and/or globalization of neural activity. However, despite the impressive progress, the exact neuronal mechanisms underlying for instance information integration remain unclear. Based on own and other data in healthy, neurological, and psychiatric subjects, I here present a novel theory of consciousness, a temporo-spatial theory of consciousness (TTC). The TTC highlights the spatial and temporal mechanism as central for consciousness. This concerns for instance the integration of different scales or ranges in both time and space as they can be measured in neuronal variability, scale-free activity, and others. I suggest different neuronal mechanisms like spatiotemporal nestedness, spatiotemporal alignment, spatiotemporal expansion, and spatiotemporal globalization that account for different features of consciousness like state/level, content, phenomenal features, and cognitive access/reporting. **PL7**

**147 Towards Measuring Consciousness By A Compression-Complexity Approach** Mohit Virmani, Nithin Nagaraj <mohitvirmani11@gmail.com> (Consciousness Studies Programme, National Institute of Advanced Studies, Rohtak, Bengaluru, India)

According to various scientific theories, different measures of consciousness are suggested in the literature - both on behavioural and neurophysiological basis. The idea that consciousness is the result of a balance between functional integration and differentiation in thalamocortical networks, or brain complexity, has gained significant attention recently. Integrated Information Theory (IIT) and its measure of complexity called Integrated Information -  $\Phi$  has received much popularity in



this regard due to its theoretically strong framework. But, IIT 3.0 suffers from several limitations such as current state dependency, computationally expensive and inability to be used with neurophysiological data. The inability of this measure to be computed for a network of number of nodes such as human brain is a fundamental problem which is also faced by two other complexity measures viz. neural complexity and causal density as well. On the other hand, Perturbational Complexity Index (PCI) is a clinical measure for distinguishing different levels of consciousness. PCI has been successful in differentiating the levels of consciousness in subjects during wakefulness, dreaming, non-rapid eye movement sleep, anesthesia induced patients, and coma patients. Although PCI has been positioned as theoretically sound by its authors, they do not explicitly and formally establish a link to integration theories. Inspired by the theoretical framework of IIT 3.0 and empirical measure PCI, we propose a compression-complexity measure of integrated information - PhiC. The proposition of Compression-Complexity is driven by observing the similarity between data compression performed by compression algorithms and information integration as performed by the human brain. The connection between data compression and integrated information proposed by Tononi is highlighted by the fact that the information encoded by the bits of a compressed file is more than the sum of its parts. Complexity measures based on lossless data compression algorithms such as Lempel-Ziv Complexity (LZ) and Effort-To-Compress (ETC) are known to outperform infotheoretic measures such as entropy for characterizing the complexity of short and noisy time series of chaotic dynamical systems. Our measure characterizes dynamical complexity (integrated information) of networks using LZ and ETC measures. PhiC is defined and computed as the maximally-aggregate differential normalized Lempel-Ziv (LZ) or normalized Effort-To-Compress (ETC) complexity for the time series data of each node of a network, generated by perturbing each possible atomic bipartition of an N-node network with a maximum entropy perturbation and a zero entropy perturbation. PhiC demonstrates following salient innovations: (i) mathematically well bounded, (ii) negligible current state dependence unlike Phi, (iii) integrated information measured as compression-complexity rather than as an infotheoretic quantity, and (iv) faster to compute since number of atomic bipartitions scales linearly with the number of nodes of the network, thus avoiding combinatorial explosion. Our computer simulations show that our measure has similar hierarchy to Phi for various multiple-node networks and it exhibits a rich interplay between differentiation, integration and entropy of the nodes of a network. PhiC is a potential heuristic measure to characterize the quantity of integrated information and hence a promising scientific measure for determining the quantity of consciousness in larger networks like human brain. C

## 2.19 Miscellaneous

**148 A Dawn of a New Non-conventional Regenerative Cardio-therapeutic Medicine** Saini Alakh , Gurpyari Kohly; Daya Jyoti Sistrunk; Alakh Saini; Hari Har Parshad Cohly <saini.alakh@gmail.com> (Sciences, Mahima Enterprises Technologies Inc., WALSALL, United Kingdom)

Stem cells hold promise as a therapy to regenerate damaged myocardium. Cardiac dysfunction is present worldwide and due to limited availability of tissue for cardiac transplantation, stem cells are the ultimate need of the hour to fulfill a large-scale unmet clinical needs and improve the quality of life for millions of people with cardiovascular disease (CVD). However, the methodology must be non invasive and non intrusive for large scale applicability. We propose the use of such technology by using very simple methodology of generating neuroepithelium cells and exosomes and myoepithelial cells and exosomes to repair in this setting which is currently in its infancy - much remains to be learned about the mechanisms by which stem cells repair and regenerate myocardium, and deliver at the targeted injury site of ischemia which is totally safe. This is a hypothetical construct so it needs to be tested as a pilot study under strict protocol procedures. This will be a very simple method of providing clinicians with powerful but simple tools to mend a broken heart. Methodology: In our proposal, we are suggesting the use of stem cells from the nasal passages and from urinary secretions mixed with ice and then consumed by the gastrointestinal tract using oral ingestion. Strategies have to be designed to increase the quantity of stem cells of cardiac patients by using 1) hypoxia, 2) feeding the patient with turmeric and applying strategies to make it nano available, 3) feeding the patient with spirulina to provide vitamins

belonging to the B complex and 4) exercising before feeding so as to increase the mitochondrial demand. The patient is then prepared for cardiac catheterization and injected with contrast dye to determine the extent of blockage and to use balloon angioplasty if the plaques have not been removed. Expected: What needs to delineate clearly is the optimization protocol to increase the number of stem cells. To accomplish this we need to do phase I/II study followed by Phase II/III study to determine the optimization protocol. We are seeking out pharmaceutical companies who would like to collaborate with this new and innovative approach. **P1**

**149 Mind Over Consciousness?** Scott Makeig <smakeig@ucsd.edu> (Swartz Center For Computationa, University of California San Diego (UCSD) Institute for Neural Computation (INC), San Diego, CA )

Which came first, mind or consciousness? Though this question appears to pose a 'chicken and egg' like conundrum, it is fundamental – and our personal attitude toward it shapes our thinking about and approach to studying cognition in all its aspects. I will discuss this issue and the uses of functional brain imaging (via any modality) to address questions, both practical and deep, connected to it – all both arising out of and living within a root question, "Who am I?" **PL6**

**150 Biofield Devices: An Emerging Paradigm In Diagnostics And Therapeutics** David Muehsam <davmumu@hotmail.com> (Bologna, Italy)

Advances in biophysics, biology, functional genomics, neuroscience, psychology, psychoneuroimmunology, and other fields suggest the existence of a subtle system of 'biofield' interactions that organize biological processes from the subatomic, atomic, molecular, cellular, and organismic to the interpersonal and cosmic levels. Biofield interactions may bring about regulation of biochemical, cellular, and neurological processes through means related to electromagnetism, quantum fields, and perhaps other means of modulating biological activity and information flow. The biofield paradigm, in contrast to a reductionist, chemistry-centered viewpoint, emphasizes the informational content of biological processes; biofield interactions are thought to operate in part via low-energy or 'subtle' processes such as weak, nonthermal electromagnetic fields (EMFs) or processes potentially related to consciousness and nonlocality. Biofield interactions may also operate through or be reflected in more well-understood informational processes found in electroencephalographic (EEG) and electrocardiographic (ECG) data. Recent advances have led to the development of a wide variety of therapeutic and diagnostic biofield devices, defined as physical instruments best understood from the viewpoint of a biofield paradigm. Here, we provide a broad overview of biofield devices, with emphasis on those devices for which solid, peer-reviewed evidence exists. A subset of these devices, such as EEG- and ECG-based heart rate variability, function via mechanisms that are well understood and are widely employed in clinical settings. Other devices, such as a gas discharge visualization and biophoton emission, appear to operate through incompletely understood mechanisms and have unclear clinical significance. Device modes of operation include EMF-light, EMF-heat, EMF-nonthermal, electrical current, vibration and sound, physical and mechanical, intentionality and nonlocality, gas and plasma, and other (mode of operation not well-understood). Methodological issues in device development and interfaces for future interdisciplinary research are discussed. Devices play prominent cultural and scientific roles in our society, and it is likely that device technologies will be one of the most influential access points for the furthering of biofield research and the dissemination of biofield concepts. This developing field of study presents new areas of research that have many important implications for both basic science and clinical medicine. **P2**

**151 Effect of Meditation on Autism Spectrum Disorder: Noninvasive Technology** Balwant Rai <raibalwant29@gmail.com> (JBR, COPENHAGEN, COPENHAGEN N Denmark)

Autism spectrum disorder (ASD) is a group of developmental disorders which affects the behavior and social communication of the child. There arises a required to explore the avenues of alternate therapy such as meditation and yoga in ASD. In our previous study, we found that salivary melatonin, serotonin and JBRsaliTech™ biomarkers levels were changed in individuals

with ASD. So, this study was planned to find the effects of meditation on ASD subjects by using salivary melatonin, serotonin and JBRsaliTech TM biomarkers. The 20 ASD children between the age group of 7-14 years were selected for analyzing the effect of mediation from JBR society. Social & behavioral assessment scale, salivary melatonin, serotonin and JBRsaliTech TM biomarkers were assessed during pre and post- test. There is a significant difference in the pre & post-test mean achievement scores due to mediation. Salivary melatonin, serotonin and JBRsaliTech TM biomarkers levels were significantly changed after mediation. Mediation therapy could be one of therapies for the management and treatment of ASD children C11

## 3.0 Cognitive Science and Psychology

### 3.01 Attention

**152 Brain Activation Patterns To Enhanced Bodily Attention Triggered By Acupuncture Stimulation** Younbyoung Chae <ybchae@khu.ac.kr> (Acupuncture and Meridian Scien, Kyung Hee University, Seoul, Korea, Republic of)

**Objectives:** Acupuncture is a therapeutic treatment that is defined as the insertion of needles into the body at specific points. From the perspective of neuroscience, acupuncture-induced sensation is not only coming from the bottom-up modulation of simple needling in the somatosensory receptor, but also from the reciprocal interaction with the top-down modulation of the brain. Enhanced body schema triggered by acupuncture stimulation can influence the homeostatic control system through a modulated salience network of the brain. We investigated commonalities and differences in brain responses to enhanced bodily attention around the acupuncture points with or without actual stimulation. **Methods:** Fourteen participants received acupuncture needles at both PC6 (median nerve) and HT7 (ulnar nerve) acupoints in the left hand. To enhance bodily attention to acupoints, participants were required to respond to the locations of stimulations at PC6 or HT7 in a two alternative-forced choice task. Two fMRI scans were taken in a block design: session 1 labeled with manual stimulation (actual stimulation with randomized acupoint stimulation) and session 2 labeled with electro-acupuncture (no physical stimulation; pseudo-stimulation). **Results:** In the conjunction analysis, both actual and pseudo-stimulation produced brain activations in the insula, anterior cingulate cortex, secondary somatosensory cortex, superior parietal cortex, and brain deactivations in the medial prefrontal cortex, posterior cingulate cortex, inferior parietal cortex, and the parahippocampus. In the contrast analysis, actual stimulation exhibited greater brain activations in posterior insula, posterior operculum and the caudal part of anterior cingulate cortex, compared to pseudo-stimulation. **Discussion:** Enhanced bodily attention triggered by acupuncture stimulation is able to activate the salience network and deactivate the default mode network - regardless of actual stimulation. These findings suggest that the component of enhanced attention to a certain part of the body plays an important role in the brain responses to acupuncture stimulation. C

**153 Composing for Therapy Using Bandyopadhyay's Triplet of Triplets** Alexander Jon Graur <graur@medicamus.com> (Medicamus Italiana Torino, Pavarolo, Italy)

Anirban Bandyopadhyay and his team establish the range of frequencies at which microtubules resonates. Using some of these frequencies as basic material for composition in Music Integrative Neurotherapy, TM, I obtained interesting results in therapy. In this presentation will be featured: the original Triplet of Triplets and other frequencies discovered by Bandyopadhyay; the musical composition techniques used for creating the therapy material: live examples of the results. A1

**154 Placebo Acupuncture Needle: A Powerful Placebo Through Consciousness** Yeseul Lee, Younbyoung Chae <jparadise.lys@gmail.com> (College of Korean Medicine, Seoul, Korea, Republic Of)

Acupuncture is a medical treatment by "inserting needles into the body at specifically defined points and manipulating them," consisting of multiple components including somatosensory

stimulation, treatment context, and attention to needle-based procedures. The placebo acupuncture needle was developed by excluding certain components of the acupuncture treatment, i.e. needle penetration. The question now arises on whether penetration is the only therapeutic component of acupuncture treatment, and whether placebo needle is suitable as a control in acupuncture studies. This study focuses on the cognitive components throughout the treatment process that might play a role in the therapeutic effects of acupuncture. The sensation of acupuncture treatment on the skin provides somatosensory response in the brain, and the patient pays attention on his/her own body throughout the acupuncture treatment. In addition, the context of acupuncture treatment involving touch implicates embodied healing mechanism. Taken together, the tactile stimulation, the enhanced doctor-patient relationship, as well as the attention toward the body and the expectations to the treatments all contribute to the effect of acupuncture needle, which is not fully eliminated by not penetrating the skin. Reversely, placebo analgesia by placebo needle is stronger compared to other types of placebos due to cognitive components. The powerful placebo effect of placebo needles needs to be considered in the experimental settings as well as clinical settings. **P2**

**155 Positive Influence of Prenatal Meditation and Spiritual Pursuits on Child's Mindfulness** Ritu Mishra , Rupali Misra; Rajesh Sinha; Sahab Prasad Misra; <mishra\_rituin@yahoo.com> (Noida, Uttar Pradesh India)

Different religious traditions encourage pregnant women to participate in religious and spiritual practices like meditation, satsang, chanting of a divine name or yoga. It is believed that repeated prenatal exposure to such stimuli has positive influence on child's mindfulness. For the purpose of this research, mindfulness is interpreted as "the self-regulation of attention so that it is maintained on immediate experience... [and] is characterized by curiosity, openness and acceptance" (Bishop et al 2004). A review of the three major Indian-Origin-World-Religions was done. According to Buddhist-text, Garbhavakrantisutra, new baby is the intermediate-being (antarabhava), a conscious entity. According to Vedic texts, consciousness enters fetus in the seventh month. Carakasamhita prescribes the pregnant woman to be surrounded by various pleasant sense objects and persons. RishiVyas recommends recitation of Mahabharata to pregnant women for creating indelible samskaras in the fetus. According to SantMat - the Jiva (soul) is the Ansha (emanation) of Supreme Being which gets attached to the fetus around the time of conception. Women are advised to be in sat-sangat (company of the pure) during pre-and-post-natal stage and regularly pray to the Supreme Being to bear children with supra-abilities. Many studies reiterate positive effect of prenatal spiritual and meditational practices on child temperament. Chan (2014) studied 64 pregnant Chinese woman and concludes positive effect of prenatal meditation on infant behavior and recommends prenatal meditation. DeCasper and Spence (1986) identified that prenatal auditory experience influenced postnatal auditory preference in children. Prenatal spiritual/religious activities condition the developing fetal nervous systems towards specific holy name, thereby, indirectly predisposing the child to the associated spiritual way-of-life (Roehlkepartain 2006) This research uses parental survey of children's mindfulness attributes, laboratory tests on children for attention regulation - AttentionNetworkTask and Go-NoGoTask. These findings were correlated with ERP measurements from five channel mass market dry electrode EEG device on a subset of children. Parental Study: A phenomenological study was conducted reviewing 30 distinct mother-child pairs where the mother was essentially adherent of an Eastern religious tradition and the child had not undergone any mindfulness training. Data is mainly recollection of her prenatal state of mind, environment, her religious and spiritual pursuits and her assessment of the child's health and attributes of mindfulness from birth to the present age (2-16 years). Laboratory tests: A typical measure of mindfulness - attention regulation was assessed through a laboratory task which involved conflict tasks to measure behavioural response to different conditions to stimuli designed to elicit competing response patterns e.g. Flanker's paradigm. Neurophysiological correlates through EEG: The laboratory tasks exhibit a specific and distinct event-related potential waveform which was extracted to measure the neurological dimension of mindfulness. Other researches (Bruce et al 2009, Handy et al 2001) have already established that neurophysiological measurements are more sensitive measurements of mindfulness as compared to behavioural indices. Based on preliminary data, we show a significant and consistent difference between children's

mindfulness attributes - attentional focus, curiosity, cognitive flexibility when the mother has engaged in spiritual and religious pursuits for considerable time during prenatal stage than when she has not. C13

### 3.02 Vision

#### 156 Tackling the Global Climate Change and Health Through Green Consciousness :

**A Position Paper** Siddharth Agarwal, MD , Vijai Kumar ; Ranjeet Kumar ; Sapna Agarwal <siddharthsatsangi@yahoo.com> (Medical, Saran Ashram Hospital and DEL, Agra, Uttar Pradesh India)

Damage to the climate is real and it's happening now. Human activity emits green house gases (CO<sub>2</sub>, CFC, ozone), particulate matter etc, causing global warming and climate change. It could pose a catastrophic threat to the planet and human health. Does cumulative Consciousness of the residents of a particular area have any effect on the climate change? We have tried to explore and answer this important global problem by a study on residents of an eco-village colony in Taj Trapezium Zone of Agra district. A particularly significant impact of meditational practices, over and above the measures to control climate changes, in evolving green consciousness as reflected by measurement of environmental pollutants and climatic conditions in and around the colony(-study group) in Taj Trapezium Zone (near Taj Mahal) and at distant places(control group) in the district of Agra, has been evaluated in this pilot project. It has been observed that concentration of emitted particulate matter is lower (significantly) at the TTZ area (study group), in comparison to other places in Agra. It may be due to low emissions of particulate matter as residents of this TTZ area consume less energy, prefer bicycles and perform Yoga and Higher Consciousness Spiritual Practices (meditational practices). Yoga and Meditation by the residents of TTZ area evolve a cumulative Consciousness Cloud, which in a direct measurement as performed experimentally, produce a local climatic pattern as desired (akin to Tiller's Intention Experiment on pH of water). It also helped the study group in controlling their materialistic desires and luxury life, hence reduced demand of energy consumption and low carbon emissions. Impact of thus evolved green consciousness is reflected in the terms of health protection and disease cure rates, the outcome of which were published in the Journal 'Psychology Research', USA (August 2016 ,vol.6,No.8) ,in the study on 217 hospitalized patients over 18 months, titled 'Esoteric Healing Touch-A Preliminary Report' (Vijai Kumar, D A Rao, P Agarwal, S Agarwal). The TTZ area colony(study group), which has residents population of approximately 3000, is like a model eco-village where 'Green' facility have been adopted via green transportation strategies, energy efficient lights, turned down thermostats, upgraded energy-efficient equipment,power generated from renewable sources like wind and solar. The green building principles have been incorporated by using day lighting, natural ventilation and green roofs. Planting of trees and vegetation have reduced heat island effect, thus acting as carbon sinks. The impact of corporate social responsibility and selfless community services is indispensable for evolution of green consciousness. Eliminating fossil fuel combustion and zero meat consumption in favor of more fruits and vegetables has contributed to an improved physical, mental health and increased spirituality. Climate change can harm the water supply, increase vector-borne diseases, respiratory disorders, mental health disorders, including post-traumatic stress disorder and depression connected to natural disasters and heat-related disorders. This study emphasize that the effects of climate change and risk to health can be minimized by evolving Green Consciousness. P1

#### 157 Hybrid Neural Networks For Understanding The Process Of Perception From

**Multi-modal Information** Sandeep Paul , Dhruv Bhandari <spaul@dei.ac.in> (Physics And Computer Science, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Humans interact with the environment via multi-modal sensor system. The information is processed in brain at individual sensory specific areas, however, fusion of different senses also exists and is commonly observed in auditory and visual neural pathways. Perception occurs by the integration of different senses, rather than due to individual sense. The McGurk effect is one such elucidating example of audio-visual integration process, where the perceived phoneme (audio sense)

is affected by the simultaneous observation of lip movement (visual sense). Thus, understanding the effect of interaction and the dynamics of multimodal sensory fusion on the human perception is of significance. In this paper, we propose a framework of hybrid deep learning neural network incorporating audio and visual integration. The paper also provides a mechanism for handling human first person experience along with the multi-modal sensory information. **P1**

### **158 Capacity Limitations Of Human Visual System Are Not Restricted To Conscious**

**Vision** Marjan Persuh , Bella Matias <mpersuh@bmcc.cuny.edu> (Borough of Manhattan Community College, City University of New York, Astoria, NY )

Visual working memory, a system for temporary storage and manipulation of visual information, is strictly limited in capacity. Similarly, humans' ability to track is limited to only a few individual items at a time. We hypothesized that there is a common source of these limitations. Our working hypothesis was that capacity limitations originate at the encoding stage and are a general property of the visual system. We tested our prediction using response priming, a paradigm that differs substantially from both working memory and object tracking paradigms. It requires fast motor responses and rapid processing of visual information. Evidence also suggests that response priming requires intact retinogeniculostriate pathway. We hypothesized that priming is limited by the representation of visual information at the encoding stage. We tested participants in two experiments; the first experiment presented bars of different orientations and second experiment used different shapes. Participants made speeded responses to targets displayed at the center of the display. Prior to target presentation, a prime was presented at one of the eight positions around the imaginary circle. We varied the number of items on the screen by presenting a single prime together with distractors. Priming effects were the strongest for a single prime, presented in isolation. As the number of distractors increased, priming effects become progressively weaker and with the set size of six, were eliminated altogether. These results suggest that the capacity of visual system to represent individual objects for priming is similar to restrictions previously demonstrated for working memory. Furthermore, because response priming is independent of visual awareness, our results indicate that capacity limitations of our visual systems are not restricted to conscious vision. **C18**

**159 Saccade Latencies Discrimination** Valentina Vencato , Laurent Madelain: Univ. Lille, CNRS, SCALab - Sciences Cognitives Et Sciences Affectives, Lille, France/Aix Marseille Universit?, CNRS, Institut De Neurosciences De La Timone, Marseille, France <vvale68@gmail.com> (Univ. Lille, CNRS, CHU Lille, UMR 9193 - SCALab - Sciences Cognitives et Science, Lille, FRANCE France)

Reaction Times are a very important component in decision processes. They have been widely used in investigating learning and it has been recently shown that reinforcement contingencies can be used to increase, decrease saccades reaction time (SRT) and manipulate the characteristics of their distribution (Vullings and Madelain, 2016). This means that latencies have to somehow being perceived in order to associate the feedback with previous actions. We first collected the baseline distribution of SRT in four subjects using a stepping visual target. Then we divided each individual baseline in four quartiles in order to define the limits with which subject were then required to classify their saccades latencies in a 4AFC task. A feedback on their performance was also given. Results indicate that, after intensive training, subjects could overall classify their SRT with up to 42% of correct responses, well above chance level (25%). Moreover, data showed that for each of the four latency classes the probabilities of correct responses were systematically higher ( $p < 0.01$ ) than for the incorrect ones. As these results could reflect the ability of the subjects to voluntarily control their SRT rather than to accurately perceive it, the SRT's distribution were manipulated using the overlap paradigm in a second experiment. Previous research showed that applying a temporal overlap between the fixation point disappearance and the target appearance, the saccadic eye movement latencies increase. Taking advantage of this effect, we used overlap's intervals of 0, 20, 40, 60, 80, 100, 120 and 140 milliseconds in the stepping visual target task, in the 4AFC task described above. In accordance to our previous study, one subject was able to classify his SRTs with up to 51% of correct responses well above chance level. Altogether these results are the first to indicate that human subjects are able to discriminate their own saccade latencies, albeit imperfectly. The precision and extent of this ability remains to be further probed. **C**



### 3.03 Other sensory modalities

**160 Doxastic Accuracy and the Adaptiveness of Delusions** Pablo Lopez-Silva <pablo.lopez.silva@gmail.com> (Facultad De Medicina, Escuela, Universidad De Valparaiso, Valparaiso, Chile)

Consciousness involves a number of sensorial and cognitive experiences. Among them, beliefs play a crucial role in the way humans adapt to reality. Beliefs are regarded as psychologically adaptive when they protect the subject from psychological threats. They are biologically adaptive when they help to increase a subject's chances of survival within the environment. In this context, delusions are commonly regarded as maladaptive misbeliefs. While it is accepted that some delusions can be psychologically adaptive, it is usually denied that they can be biologically adaptive. I argue that it is possible to characterize a certain type of psychotic delusions as biologically adaptive. After distinguishing between two types of delusions I claim that in trying to make sense of the biological adaptive benefits of psychotic delusions, one needs to understand such phenomena in the general perceptual and affective context in which some of them are adopted. During the period that precedes the adoption of some delusional beliefs patients gradually lose their behavioural and psychological connection with the environment and this disconnection decreases the subjects' chances of survival. However, in characterizing delusions, current dominant approaches fail to integrate this context into the aetiological picture of the phenomena missing the role that the adoption of some delusional beliefs might play in reorganizing the patients' disunified and overwhelming (inner and outer) experiential world. Thus, the adoption of delusional beliefs might contribute in some cases to the preservation of behavioural and psychological interaction with the environment as an attempt - however pathological - to render the patients' reality more predictable and approachable. Human cognitive systems would sacrifice doxastic accuracy in order to secure a minimally functional degree of interaction with the environment and therefore, certain psychotic delusions might be characterized as biologically adaptive under rarefied experiential circumstances. **C6**

**161 Auditory Vibrations and Frequencies: Sounds in Your Head** Erik Viirre <eviirre@ucsd.edu> (Neurosciences, UC San Diego; Neurosciences, Surgery and Cognitive, San Diego, CA )

Have you ever had a song "stuck in your head"? (Sorry I brought it up!). In this plenary session, the various internal sound experiences of humans and their relationship to consciousness will be described. They include: tinnitus (a sound sensation), the "Earworm" (the song stuck in your head), musical hallucinations (a different sort of music experience) and auditory hallucinations (experienced as "voices", often associated with schizophrenia, a disturbance of thinking). The brain itself can generate actual sound vibrations, called Otoacoustic Emissions (OAEs). All of these sound experiences have different origins and people can experience a combination of any or all of them. The experience of these sounds are distinct and their descriptions help make the diagnosis and have implications for consciousness. The sound detection organs directly feed into the sound experience pathways of the brain and it is the interaction between the two that results in tinnitus. Emotional responses to tinnitus vary and the emotions direct the approaches to dealing with it. The sound percept of tinnitus has a number of characteristic features, including the frequency of the tinnitus and some related subtleties. The connections of the hearing system and sound perception circuits is the platform on which tinnitus appears. Various neurophysiology approaches to the presence of tinnitus in humans have demonstrated metabolic and electrophysiologic markers of the sensation. Feedback methods using sound as an input can reduce the intensity of the sound and other approaches to the sound perception circuits and their activators can reduce the problem. Tinnitus is now believed to be one of the sensory denervation disorders, where damage to a sensing organ results in upstream changes in the perception circuits: Pain, vision, smell and motion sensations all have analogous disorders and in fact, some pharmacologic methods can be used for all of them. Earworms are extremely common. The sound sensation of the music seems to be in a different "place" compared to tinnitus and the two can be "heard" simultaneously. A few tricks (besides just waiting) will be described to get rid of one. The implications of the Earworm to conscious experience suggests a "multicameral" configuration of auditory consciousness. Musical Hallucinations are rare experiences of very elderly people, often in their 90's. It is a sensation of a "Song" or an "Opera", which may be recognizable, but is usually nonsensical or new, but is quite sophisticated. Occasionally a damaging lesion like a stroke or a tumor in the hearing cortex

is discovered, a rare finding in consciousness altering disorders. The “Voices” of Schizophrenia have had some exciting new evidence suggesting they are sub-vocalizations of the individual: activation of the vocal tract. An amazing self-analysis of the voices in a patient who also had tinnitus will be described where a consciousness looks at itself. How does the brain “know” what is normal? Tinnitus and other sound phantoms suggests that it doesn’t. The simplicity of sounds compared to other sensations make it a fruitful area of study and millions experience illusions of sound, making the problems relatable. **PL11**

### **3.04 Memory, learning and synaptic plasticity**

**162 Does Enhanced Focus of Attention Guide Perception Into The Goal Directed Action?** Rado Gorjup, N. Gorjup, MSc., GEO-PRO-TON, Ltd., ITR Institute For Transdisciplinary Research And Development <radogorjup@hotmail.com> (ITR Institute For Transdiscipl, GEO-PRO-TON, Ltd, Nova Gorica, SLOVENIA Slovenia)

Perceptual and motor systems were many times underestimated and regarded as merely peripheral input and output detectors, without consideration of their interaction with the environment and thusly, relevant contributors in crucial cognitive processing. However in the past decades different opinions about perceptual and sensorimotor mechanisms evolved from many of diverse cognitive science research fields. These opinions share the common conclusion about their crucial and all-important role in development and maintenance of successful self-regulation behavior and actions within the psychosocial environment. Because of a great expansion of information communication technologies and artificial intelligence assisted by behavior-based robotics, we live in the information society, where there is plenty of our behavior guided by different routines. These routines helps us efficiently interact with the environment without necessary solving the abstract problems by the strict use of internal representations. The integration of neuroscience and psychology in the last few decades revealed new insides about better understanding of human behavior. There is plenty of evidence that changing behavior is not that easy as it seemed at the beginning and that carrot and stick did not bring the effective and long lasting results. The same holds true for the humanistic attempt towards the client centered therapy through persuasion and empathy. In this paper, we present a new approach in computer based cognitive training (AVATAR method) and points out how processing efficiency and attentional functioning are crucial vehicles in bringing perception into effective and long lasting behavior change. Theoretical background for AVATAR cognitive training stands on Quantum Zeno Effect (QZE), Embodied Cognition Perspective, Signal Detection Theory, Processing Efficiency Theory, Attention Control Theory, Premotor Theory of Attention and Polyvagal Perspective. Our research so far together with experimental data (Gorjup, 2013, Gorjup et al, 2013; Gorjup & Gorjup, 2014a, 2014b; Gorjup et al, 2014, Gorjup & Gorjup, 2015, Gorjup & Gorjup, 2016) show that providing the sufficiently intense and precisely preprogrammed focus of attention at the target relevant location is achieved through sustained cognitive training. In this regard, the unique feature of the AVATAR cognitive training is its ability to guide the subject gradually into the state of a heightened expectation level. In addition, concentrating on a specific expectation of mental experience over a sufficient time at the target relevant location during AVATAR cognitive training routine produce attention density. In support of such contention, according to Quantum Zeno Effect (QZE) stronger expectation levels of possible mental thought or experience should produce higher mental density. In the recent experiment, we tested 102 subjects using the 25 minutes AVATAR cognitive training protocol. During the same experiment, we run the EEG/ERP Analysis of 24 randomly assigned subjects while measuring attentional performance effectiveness and processing efficiency (in preparation). The data analysis of AVATAR cognitive training show significant improvement of performance indices in just one training session. In conclusions, implications of unique effectiveness of AVATAR cognitive training program and Cognitive bias modification approaches are considered and results are further discussed in the light of Quantum Zeno Effect. **A1**

**163 A Method for Decoding and Encoding Deep Brain Neural Dynamics - A Theoretical Proposal** Toso Pankovski <toso.pankovski@brainexperiments.com> (BrainExperiments.com, Montreal, QUEBEC Canada)



Current science continues to struggle in acquiring and decoding neural activity patterns and dynamics from inside the deep brain. Recent technology advances in neurophotonics allow single-cell spatial monitoring with increased timescale precision, however making sense of the measured data in terms of correlation to the higher-level cognitive processes is still a challenge. The author of this presentation proposes an alternative invasive in vivo method for extracting and decoding deep brain neural dynamics. The method is based on neuroplasticity and it enforces neural conditioning that produces replication (duplication) of selected neural correlates. A neural network model featuring Hebbian learning is built and the results proved the concept. Applied in an inverse manner, the method could allow encoding and eliciting pre-selected neural activity in the subject's brain. This implies interesting plausible consequences, such as extracting and decoding neural dynamics from one brain and conveying the decoded data to another brain, where the same method would encode and inject it. Such a two-way communication simulation has not been performed yet (by using the artificial neural network model), so we cannot be sure about the possible outcome, although the results might be ready before the 2017 TSC Conference. The author of this method is a computer and informatics scientist and is hoping to collaborate with neuroscientists in order to perform a trial on an animal subject. If successful, the method will allow a direct window into the brain dynamics and may become an important tool in probing the consciousness phenomenon. Although invasive, it could still be used to establish some level of communication with subjects that have no other means of performing conscious conversation (example, patients in coma, animals or even more exotic subjects, such as an artificial intelligence subject). **P2**

### 3.05 Emotion

**164 Mood Swings, Gut Microbes and Food Traditions** Prem Saran Tirumalai <premtsaran@gmail.com> (Science, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Anthelme Brillat-Savarin, a gastronome, in 1826 wrote, (in *Physiologie du Gout, ou Meditations de Gastronomie Transcendante*), “Tell me what you eat and I will tell you what you are”. Similarly, Ludwig Andreas Feuerbach, a German philosopher and anthropologist wrote, “man is what he eats”, in his essay titled *Concerning Spiritualism and Materialism* in the year 1863. Science, at that time was naive to discuss and elaborate in support of this thought. While the western world may have had a few of the likes of Brillat-Savarin and Feuerbach to think in this direction, with no substance in science to substantiate it then, traditional food systems, by that time had already guided many civilizations of the eastern world on their food practice, based on this thinking. The human body harbors trillions of bacteria that inhabit all our surfaces, especially that of the intestines. The collection of these resident microbes is termed as the normal flora and the normal flora of the gut is termed as the Gut microbiota. Researchers have begun to study the influence of gut microbes on brain through hormones, immune molecules and metabolites, and a recent research has revealed that at least two types of gut bacteria produce the neurotransmitter (Gamma)-aminobutyric acid (GABA). Release of these neurotransmitters may alter their levels in the gut, and this may eventually allow them to communicate with neurons. It has also been demonstrated that gut microbes can induce the serotonin production, (yet another neurotransmitter) by the gut cells. If we were to read a human and describe him or her based on their psyche, then it should be borne in mind that undoubtedly, “man is what he eats”. Not far in the future, behavioral issues of humans could be treated by administering simple capsules containing advanced probiotic microbes, that will not only control the mood but will also assist in brain development. This is where the concepts of Hygiene pitch in. The word hygiene directly relates to contamination, which in turn relates to microbial growth in food. Entry of unwanted microbes into the human body through food may have a detrimental effect on the physical, physiological and cognitive evolution of all animals, including humans. Unwanted microbes referred to here needn't necessarily refer to the disease causing ones alone, but the ones that can otherwise influence the mind and cognitive evolution, as has been discussed. Hygiene therefore was and is crucial to strike a balance, maintain wholesome health, physical and mental. This compels us into thinking that the wisdom that gave birth to concepts such as the Satvik, ages before science could reveal the relevance, might be of a higher order. **C20**

**165 Are Scientific Creativity And Emotional State Enmeshed?** Siddhesh Zadey <siddhesh.zadey@students.iiserpune.ac.in> (IISER Pune, Pune, MAHARASHTRA India)

This study aims at understanding the relevance of emotional states in instances of scientific creativity. I attempt to explore the meaning of scientific creativity, come up with a set of emotional states correlated with the creative processes and assess if certain emotional states hike or hinder scientific creativity. Regarding research methodology, this study banks primarily on the phenomenological method. For this study, I reached out to the IISER community. I conducted open-ended, semistructured, interactive interviews, individually, with the participants, for data collection. The broad themes involved in these interviews were as follows: 1. Viewing creativity through participants' perspective. How do they define creativity in general? 2. Inspecting if doing science involves creativity, if so how? More importantly, how do they think of scientific creativity and in that light do they consider themselves scientifically creative? 3. Elaborating over the choice of scientific problem, the process of solving, an instance of illumination, and creative product. These factors are chosen based on the review of available literature. 4. Detailed description of various emotional states underwent by the person at different stages (mentioned in the point above) of the creative endeavor 5. Their perceptions of their general emotional states These interviews were recorded in the form of audios for the purpose of transcription. The data from transcription was then put to interpretative phenomenological analysis (IPA). In this analysis, the objective would be to hunt for some themes that are common across the interviewees, with the underlying assumption that these commonalities are vital for understanding the phenomenon under consideration. Viewing scientific creativity through the perspective of social science on the ground of phenomenology is novel and unique. Seeing scientific creativity in the light of emotions, to me, seems extremely crucial. Emotions are the "vital responses" making them very basic in nature while creativity occupies very "high throne" regarding cognitive abilities, awarding it certain elitism. The interaction between these two phenomena is quite interesting especially in the absence of any evidence supporting a causal link between emotions and creativity. Finding the underpinnings of this relation between the two is not only of scientific interest but could be of therapeutic use in case of "creative crisis." This study shows that scientific creativity and emotional states of a person are woven. However, their interaction is more complicated than the prior assumption of one being responsible for another. It seems to be a rather dynamic interaction involving more than two players. One of the major influence seems to be the environment, both intellectual and emotional. In this case, the environment seems to be composed of family, partner, friends & mentor. Also, a happy brain is not the only creative brain, is a major takeaway here. This is a crucial finding in the light of claims associating psychopathology with creativity. However tempting it might be I do not want to make a statement that one is derivative of another, but it seems difficult though that the two might be completely unrelated. **P1**

### 3.06 Language

**166 Three aspects of (un)conscious processing in language and its normal use.** Thomas Bever <tgb@email.arizona.edu> (Linguistics, Psychology, Cogni, University of Arizona, Tucson, AZ )

If language is a window on the mind, we can use it as a probe for the relations between conscious experience and unconscious computations and processes. Three kinds of results suggest that the phenomenological continuity of language as we hear and produce it is in fact an illusion. Rather, we create the continuity in sensori-motor/representational packets, defined partially by underlying syntactic computations, partly by attentional oscillation between different syntactic and semantic levels of representation, and partly by forward and backward interaction of surface phonetic and acoustic information. 1. Computations that determine grammaticality. The formal computations involved in describing what speakers know when they can discriminate grammatical sentences involve many steps and interaction with other cognitive systems, neurological processes and natural laws. While linguistic theory can articulate these complex computations, they are entirely inaccessible to speakers of the language. 2. Psycholinguistics is the study of how the computations are implemented or simulated during language learning, production and comprehension. Models of the acquisition process, sentence production and comprehension are also inaccessible to native speakers. However, experimental investigations of how those processes work, can show

that attention - that is, phenomenal awareness - oscillates between external focus on the physical signal and internal organizational activity of its meaning. During internal organizational activities, awareness of the external world can be briefly impaired or even cut off entirely. 3. Listeners (and speakers) believe that they pair the acoustics of the language signal simultaneously with the underlying syntactic and semantic representations. However, since normal conversation distorts and deletes much of the intended and perceived acoustic signal many parts of utterances are unrecognizable in isolation. Careful experimental analysis shows that in many cases, acoustic recognition of a portion of the speech signal depends on acoustic material that follows that portion: yet listeners believe that they recognized the earlier portion as it was presented - that is, their conscious experience is of a continuously flowing pairing of acoustic and representational structures, while we know that that the processing occurs in time-free packets. Classic and current experimental psycholinguistics focuses on what the behavioral, neurological, cognitive and linguistic determinants are of the processing packets that create the illusion of continuous consciousness of language experience. **PL2**

**167 Development of Consciousness and Language in an Infant; From Cry to Smile and Speech: A Spectral Analysis** Anjoo Bhatnagar , Phoolchand Bhatnagar; Devendra Kumar Chaturvedi <dranjoo@gmail.com> (Theology, Dayalbagh Educational Institute , Agra, Uttar Pradesh )

When a baby is born the first language of expression is a loud cry which declares that he or she is alive and conscious. Crying at birth is almost a unique feature of the human newborn and may be viewed as a distinct state of consciousness. Animals do not cry at birth. Certainly this language of the baby is very special. Till now baby's experience during birth is not usually considered. It is generally assumed that birth is a natural phenomenon and no definite cause is attributed to the cry at birth, it is considered as reflexive in nature. Has anybody wondered, why human life starts with a cry and not a smile? Is there just a physical reason for birth cry to expand the lungs and get the breath of life? Or is it a psychological reason that the baby is not happy with the environment outside mother's womb? But these reasons are present in animals also, they do not cry at birth? Then is it a more subtle deeper cause; a change in plane of consciousness and the baby being thus deprived of the spiritual bliss or pleasure which it might be experiencing while inside the mother's womb? For initial 3 months of life, cry is the only way of communication in an infant, at this age the reason for crying is implicated as colic, fussing or hunger, according to mother's perception other than that of disease. By around 3 months of age the infant starts smiling, cooing and giving response to external stimuli. Gradually babbling and then spoken speech in the form of words and sentences develop into expressive language by one to two years. Cry at later ages are context dependent, intentional and communicative of different physical and mental reasons. To understand this language of infant we present in this study for the first time a spectral analysis of serial cry and vocalization from birth up to 1 year of age. The cry signals are recorded starting at birth then at ages 1,2,3,6,9, months and 1 year. The data is analysed age wise and cause wise and Fast Fourier Transform and wavelet analysis ,done on MATLAB version 12. The results are presented in the paper. **C11**

**168 Language and Unconscious Mental Acts** Noam Chomsky <nchomsky3@gmail.com> (MIT, Boston, MA )

Concerns of the great figures who founded modern science provide some suggestions as to how problems of consciousness might be addressed, including the fate of the "hard problem" of 17th century science and the guiding concept of conceivability/intelligibility, and the development of chemistry in relation to physics. Further light on the topic is provided by rule-following in language, which is inaccessible to consciousness while interacting inextricably with whatever reaches awareness, typically fragments, and with externalized performance. **PL2**

**169 Dynamic Systems Theory Approach to Diachronic Studies of Lexical Concepts** Milana Dzhaber <to.kiritou@gmail.com> (Faculty of Foreign Languages a, Moscow State University, Moscow, Russian Federation)

These days interdisciplinary approach to scientific studies of concepts brings scientists to various investigations dealing with mental representations reconstruction in language and speech. Current paper dwells upon the application of the dynamic system theory to cognitive linguistics as exemplified in lexical concept ZAPAD in Russian language and WEST in English, which allows the description of the semantic change in the meaning of the studied lexical unit. The question arises to which extent it may be acceptable to apply the general functions of dynamic systems to semantic change in a lexical representation of a certain mental image. In order to make an in-depth study of the dynamic data, lexical concepts are presented as dynamic systems within a framework of comparative linguistic analysis in diachronic perspective. The discussed approach may contribute to the further investigations in the sphere of cognitive modelling. **P2**

**170 The First Words: The Origin of Meaning** Andrei Mertsalov <a.mertsalov@sdventures.com> (Philosophy Department, Lomonos, Moscow Center for Consciousness Studies, Moscow, Moscow, Russia Russian Federation)

One of the substantial problems concerning the origin of human speech is to explain how the first sounds of (proto)words could become meaningful elements of the incipient language. The standard attempt to solve it is to suppose that either our prehuman ancestors should be somehow acquainted with these sounds beforehand (as it is supposed in the imitation hypothesis) or that for some reasons these sounds should be repeated in the particular situation meaninglessly countless times over thousands of years until they are associated with that situation (or object, or act) and thus could be used to signify it (the supposition of the majority of the rest hypothesis). Both ways are doubtful. Consider the following situation. A Russian and a Chinese walk into a bar. The barman is Irish. None of them understand a word of a foreign language. How can they establish a verbal communication? Suppose Russian wants to have a beer so he asks: "Pival!" The barman cannot understand what Russian wants, but he understands that it is a customer in front of him who asked for something - maybe for a whiskey? So he pours Russian a whiskey. It's an ordinary situation of misunderstanding. But now consider Chinese. If he wants whiskey, how can he ask for it? Obviously, to get the same as Russian he should ask for the same as Russian and in the same way. So he repeats the sound "Pival!" and in response to the same order the barman gives him the same drink. Now everyone in the bar knows that to get whiskey you should say "Pival!" Thus this sound becomes a meaningful word. The main idea here, which was proposed first by Viktor Mertsalov (2008), is that it's not the speaker who ascribes a meaning to the word, but the hearer. The hearer demonstrates how he understands a sound in his reaction to it and through this reaction the meaning of this sound becomes known to everyone around him. It can be demonstrated that children find themselves in situations that are structurally identical to the described situation in the bar (where adult plays a role of "barman" and child - of "customer") at an early age when they just begin to acquire language and yet have no ability to ask how something is called. It can also be shown that our ancient prehuman ancestors (such as *Homo erectus*) faced the same situations as well and that to create a language for them was the only way to cope with such situations. The proposed approach satisfies the existing paleoanthropological data about the development of brain and cognitive capacities of early *Homo*. It is free from most standard problems of classical hypothesis of the origin of speech and learning of language, including interpretation problems (like the "Gavagai" problem). Finally, it could be helpful in drawing together pragmatics and semantics in the theory of meaning. **C11**

**171 Knowing Other Minds in English, Japanese and Chinese** Masaharu Mizumoto, Yang, Rui <mizumoto@jaist.ac.jp> (Nomi, ISHIKAWA Japan)

The Sapir-Whorf hypothesis has been once popular, but heavily criticized in the latter half of the 20th century, especially by analytic philosophers. In the 21st century, however, we see a reemergence of the work of the linguistic relativity of cognition, or even moral judgment. In this paper, we will focus on the linguistic relativity of knowledge of other minds, especially emotions. If you can say 'I am sad', then you can also say 'He is sad'. We tend to think this is true of any language. But the famous phenomena in Japanese, called person restriction, give exceptions to such a principle, especially concerning predicates about the internal states like emotions (note that, person

restriction is also observed in other languages, including even English). Thus, just by changing the grammatical subject of ‘watashi wa kanashii (I am sad)’ into ‘kare (he)’ is not enough to say that he is said, since the resultant sentence ‘kare wa kanashii’ does not seem right to use in everyday conversation. To be natural, it requires some morphemes of evidentiality, like ‘kare wa kanashi so-da (he seems sad)’. It is then easy to think that the Japanese has some linguistic theory of mind, according to which you can know your own mental state directly, but other minds only indirectly. If you take it seriously, then this is a form of Sapir-Whorf hypothesis, which has been unpopular until recently. Even today, it seems that most philosophers and linguists do not take this implication seriously. But this is clearly an empirical problem. So we conducted experiments to examine whether such linguistic difference really affects the knowledge of other minds, comparing speakers of Japanese, English, and Chinese. In order to test this hypothesis, we explicitly asked whether a person in a particular context knows the mind (emotion) of another person. If language directly affects our cognition of other minds, then for the Japanese other minds can only be known indirectly, so that we should have a lower knowledge attribution rate in Japanese than in other languages. In fact, we found a significant difference in knowledge attribution between the Japanese speakers and speakers of other languages, in some of the cases with a large effect size. We shall defend that this effect is indeed linguistic, rather than cultural-psychological, by appealing to the intra-linguistic difference of knowledge attribution rates between two Japanese knowledge verbs, ‘shitte-iru’ and ‘wakatte-iru’, which we call the argument from multiple predicates. **C11**

**172 Language, Consciousness and Embodied Cognition** Michael J Spivey <spivey@ucmerced.edu> (UC Merced, X, CA )

I will discuss the role embodied cognition plays in connecting consciousness to language, and language to consciousness. I will start with evidence for consciousness emerging from the recurrent connections that continuously share information between numerous brain areas (not just brain areas traditionally seen as cognitive, but also sensory and motor areas). The neural ‘language’ of how the human brain ‘talks’ to itself often results in actual human language produced in, and from, that brain. The discussion would then expand to similar continuous recurrent information flows between the brain and the rest of the body. I would suggest that it may not be just the activity of the brain that generates consciousness, but perhaps it is the activity of the entire body as well. If one accepts that non-neural tissue can exchange information (e.g., computational morphology) in a manner that similarly generates consciousness, then one is ready to truly go external and consider the possibility that the continuous recurrent exchange of information between an organism and its environment (which frequently involves linguistic exchange among humans) may be sufficient to generate a form of consciousness that spans across multiple organisms and objects. <http://ucmerced.academia.edu/MichaelSpivey> **PL2**

### 3.07 Mental imagery

### 3.08 Implicit and explicit processes

**173 Implicit Learning of a Task-Predicting Response Cue** Injae Hong , Min-Shik Kim <lesley.hij@gmail.com> (Department of Psychology, Yonsei University, Korea, Seoul, Korea, Republic Of)

It has been reported that the relative speed of a response in a probe detection task can be used as a predictive cue to facilitate attentional shift to the target location, namely a phenomenon “cueing by response” (Hwang & Kim, *Psychonomic Bulletin & Review*, 23(3), 803-808, 2016). However, it has not been studied whether a response can carry out the usage of executive function, especially in selecting and implementing task-sets. We investigated whether participants can implicitly learn the role of the response as a task-predictive cue. The experiment consisted of a training phase and a test phase, and participants were instructed to perform either a parity task (odd or even) or a magnitude task (greater or less than 5) on target stimuli in Arabic number. During the training phase, the visual cue of red circle or blue rectangle was presented simultaneously with the target number. Participants performed either the parity task or the magnitude task

based on the visual cue, and pressed either left or right key to report the answer. Throughout the entire experiment, the task to perform in the upcoming trial was determined by the response in the preceding trial. For example, if the left key was pressed in the  $n$ th trial, the task for the  $n + 1$ th trial was determined to be parity task. In the same way, if the right key was pressed in the  $n + 1$ th trial, the task for the  $n + 2$ th trial was determined to be magnitude task. The test phase was conducted to see if participants have learned the response-task contingency, by removing the visual cue from the display. Additional questionnaires were given at the end of the experiment to check if participants were consciously aware of the rule. As a result, participants were able to perform the response-contingent task more than a chance level in the test phase, even though no one reported to have noticed the contingency between the response and the task. This result implies that cueing by response is able to implicitly carry out the task-sets into use. Further, it provides an evidence on the idea that executive control can be brought about even without the conscious awareness. **P2**

**174 The Effect of Rating Scales on Reported Confidence in Implicit Learning** Elisabeth Norman, Mark C. Price; Mikael R. Hedne <elisabeth.norman@uib.no> (Psychology, University of Bergen, Bergen, Hordaland Norway)

In implicit learning, participants' metacognitive awareness of acquired knowledge is often used to indicate the extent to which knowledge is consciously available. For example, the relationship between confidence ratings and classification accuracy can be used to infer whether knowledge is conscious or unconscious (Norman and Price, 2015). If performance is above chance when participants claim to be guessing (i.e., the guessing criterion), and/or if performance is unrelated to accuracy (i.e., the zero-correlation criterion), this is taken to indicate that learning is implicit rather than explicit (Dienes and Berry, 1997). It has been demonstrated that the relationship between confidence and classification accuracy can be influenced by whether confidence is rated on a simple or complex scale. More specifically, it has been shown that a simple, binary scale is more sensitive to conscious knowledge than a continuous scale where response alternatives range from 50 to 100% (Tunney and Shanks, 2003). However, a more recent study comparing a broader set of subjective measures of awareness found no systematic differences between awareness scales that included a small versus large number of response alternatives (Wierzbichon et al., 2012). We report the results from a study ( $N=100$ ) in which participants took part in a simple AGL experiment and each person rated their subjective confidence in their classification responses on a simple 3-alternative or a continuous visual analog scale. Results will be reported at the conference and will be discussed in relationship to the criteria of consciousness referred to above, as well as to previous findings. **C19**

**175 Inspired By Distraction: The Problem Solving Function of Mind Wandering Depends On Who Use It and What Problem Encountered** Xiao-Lan Song, Ye Qun; Hu Hanyu <xlsong@zjnu.cn> (Jinhua, Zhejiang China)

Mind wandering is a ubiquitous experience during which the focus of attention is withdrawn from the external environment and instead directed spontaneously to information derived internally. And the function of these spontaneous activities is one of the most essential but unresolved problems. Here we explored the function of mind wandering in problem solving through two studies. In study 1 an incubation paradigm was used to assess whether performance on divergent thinking task (the unusual task, or UUT) can be facilitated by engaging in more mind wandering which was occurred during undemanding distraction task, and whether one's executive function can influence mind wandering's effects on creative thinking. Compared with the participants who had high working memory capacity, the participants with low working memory capacity benefited more from the undemanding distraction task. That is, engaging in an undemanding task and experience more mind wandering during distraction period made their performance better on previously encountered creative problems. In study 2 we explore mind wandering's function in complex problem solving. And an opposite result about the influence of one's executive function on the effect of mind wandering was found. The participants who had high but not low executive function scores benefited more from the undemanding task and more mind wandering occurred. These data suggests that mind wandering does has function for problem solving, but these effects

could be modulated by the type of problems and the characteristics of one's executive function. The possible mechanism under the relations of mind wandering, executive function, and the problem type was discussed. C

### 3.09 Unconscious/conscious processes

**176 The Consciousness of Who I Am: The Search of the Way and the Balance for the True Self** Laura Costa, Leandro Martins <laurabaeta@gmail.com> (Instituto Luz Diamante, Belo Horizonte, MINAS GERAIS Brazil)

The existential question, "Who am I?" disturbs thousands of people around the world nowadays. About 49,500 people, in the US alone, look for the answer to this question in search engines such as Google every month. This expressive number led Luz Diamante Institute, based in Belo Horizonte- Minas Gerais, Brazil, to ask new questions: do human beings lack awareness of who they are? And can this answer be found externally on a search engine? Or should it be found within each person? We believe that mankind is born pure, connected to a higher self, an intuition and it has unique gifts and virtues. There is a lack of spontaneity and excessive automatism in our present society. The modern man is connected to everything and everyone through devices that fit in the palm of a hand. On the other hand, mankind has lost an important kind of consciousness, which is the inner world. We have been conditioned to pay more attention to what's outside than to what's inside. As a result, so many people are getting sick. According to the World Health Organization (WHO): "33% of the world's population suffers from anxiety"- 90% of the world's population already suffers from stress"- 121 million people suffer from depression worldwide. These diseases do not only make people sick, but also destabilize the lives of those who are affected, and may even lead to death. WHO points out that the cases of death by suicide and other diseases associated with depression increased by 705% only in Brazil over the past 16 years. With this flow, the interest in self-knowledge techniques has increased and encouraged the releasing of books, films, and the spreading of various therapies such as meditation that is gaining more and more fans around the world and has already been a great search topic on Google with more than 135,000 hits every single month in the US. This search also extends to other techniques such as acupuncture, Reiki, and massotherapy. But beyond simple symptom relief, consciousness is a key tool to go beyond the comfort zone and the automatic and standardized way of thinking. Could we even change this scenario only through self-knowledge and consciousness? Maybe that would be the biggest first step that we should take. The point is to meet somewhere in the middle, living every moment with the wisdom that that is not only possible but also necessary to find the strength and courage to live and respond with more harmony to these special everyday questions. P2

**177 The Five Energy Bodies of a Human Being : "Pancha Koshas" In Tantra** Tapas Datta <tapasdatta@yahoo.com> (BANGALORE, KARNATAKA India)

In Indian spiritual literature, different combinations of vibrations in this universe have the capacity to come together and start behaving like one unit. In humans, five sets of frequencies of vibrations, known as the "pancha koshas", come together to constitute us, according to the ancient Tantra Shastras. This body of knowledge is crucial to understand the overall construct of human beings, and therefore how we function in the world using our combined interactive set of five energy bodies. For humans - body, intellect, emotions, personality, individuality, life-philosophy, goals, desires, traits, relational transactions, thoughts, behaviour, experiences, pain, pleasures, intuitions, destiny, opportunities, genes, etc. together create us. In all this, only the body is physical matter, everything else is abstract - in the form of energy and vibrations. But in quantum theory even matter is made up of packets of energy or quanta which behave as particles of matter. Therefore we are completely energy beings. All above human traits can be broadly characterized into five classifications of energies. According to Tantra-shastra, there are five fundamental elements of nature, known as "Tattvas" which are not the periodic table elements, but are constituted by the more abstract concept of a "conscious energy". Each Tattva carries a particular type of knowledge, and starting with the most fundamental tattva - Akasha, sequentially evolve from the finest to the grossest element at the time of Universe Creation as well as creation of every



human being. There are also three types of “Gunas” or energies - which constantly convert into each other - Sattva (pure potential), Rajas (kinetic) and Tamas (inert potential). The human being is a fractal of the universe so the creation processes are similar. Each of the five energy bodies or “Koshas” in humans, is made up of combination of Tattvas and Gunas. The five energy bodies or Koshas are - Annamaya Kosha ((physical body), Pranamaya Kosha (life energy and emotions), Manomaya (Conscious mind and thought), Vigyanamaya kosha (Subconscious mind), Anandamaya (Universal part or “Collective Unconscious” of Jung). The body, emotions and conscious mind - Annamaya, pranamaya, manomaya - are obvious to us in everyday life because we experience them. We cannot experience vighyanamaya and anandamaya, but they are formative for humans. The Subconscious is the storage for all tendencies and impressions, all long term memories etc. This presentation shows how the contents of our “active” subconscious, which is shaped at birth, shapes our Individuality, and becomes a formative source to drive our lives. A deeper study of such Individuality and Personalities, show how conflicts between Personalities we cultivate and our unique Individuality arise, and what mental issues and disorders they create. However, the contents of our Subconscious mind need not remain statically fixed during our lives, just as our genes are not hard-wired but are manipulated by our life-style as the science of Epi-genetics shows. Tantra practice is aimed at altering the patterns and impressions in the Subconscious mind, such that the human being can evolve to positively affect his life. **P1**

**178 Comparing Unconscious Visual Informations in the Working Memory** Shun Nakano , Masami Ishihara <nakano-shun@ed.tmu.ac.jp> (Humanity, Tokyo Metropolitan University, Hachioji-shi, Tokyo, Japan Japan)

Consciousness and working memory are commonly known as closely related. However, recent findings indicated that the visual working memory is capable of encoding, maintaining, and accessing unconscious items for explicit discrimination goals (Soto, Mantyla & Silvanto, 2011; Dutta et al., 2014). This implies that the visual information could access the working memory process without conscious experience. In that case particularly the effect of the access to the consciousness is still unclear in relation to the working memory process. The present study investigated whether a selective response to such an unconscious item is generated by a comparison of multiple unconscious visual informations which were presented at different timings in a trial sequence. Four circular masking stimuli were simultaneously presented four times in a trial sequence. A target stimulus composed of a gray circle was presented twice in one trial just before the second (T1) and the fourth masking stimuli presentation (T2). The spatial location of the target presentation was overlapped with one of the four masking stimuli locations. The luminance contrasts of these T1-T2 combinations were experimentally manipulated (Low-Low, Low-High, High-Low, or High-High). As a control condition, blank screens were inserted in a given trial instead of presenting T1 and T2. Participants were required to decide whether the locations of the targets were congruent or incongruent by pressing buttons [Two-alternative forced choice (2AFC) task]. The percentage of correct responses and the reaction times (RTs) were measured. Following the 2AFC task, visibilities of each target were measured by a four-points awareness scale that was a modified version of the perceptual awareness scale (Ramsey & Overgaard, 2004). Trials where the participants rated the presentation of a high-contrast target as “seen” and that of a low-contrast target as “unseen” were analyzed. The results indicated that the percentage of correct responses was above the chance level in all conditions. The percentage of the correct responses for the condition in which the T1 was consciously perceived was higher compared to the condition where the T1 was unconscious. RTs of the High-High combination were significantly faster than the other conditions. There was a significant difference between RTs of the control condition and those of the High-High combination with the faster RTs for the High-High compared to those for the control. These results imply that the visual working memory is capable of accessing, at least, two unconscious visual informations presented at different timings in a trial sequence. Furthermore the working memory is able to compare the spatial location of these unconscious visual items, while realizing the explicit selective response to them. The working memory process is not likely to be affected by the conscious access to sensory inputs. The present results are supporting the view that visual informations accessing the consciousness and visual information accessing the working memory are separated from each other. **C2**



**179 Now You See It, Now You Don't: Impact of Duration and Content on Conscious Awareness of a Preceding Visual Event** Bruce Stevenson , Cleghorn, J. & Quain, P. <bstevens@une.edu.au> (Psychology, University of New England, Armidale, NSW Australia)

Conscious awareness of a visual event can be manipulated through changing the visual information which follows that event and the relationship between this post-event information and that which preceded the event. Using a lexical masked priming task, the event in question was a prime-word (47ms) inserted between non-lexical forward (FM; 502ms) and backward (BM) masks, followed by the naming of a target-word. Two features of the BM were manipulated to determine the impact on subsequent prime awareness - duration (47, 105, & 398ms), and content relative to the FM (same ##### and different \$\$\$\$\$). The value of this task is that it provides evidence for both prime-target processing effects and arguably non-retrospective awareness judgments for the briefly presented prime-words within the one trial. How these are each impacted by the duration and content which follows can then be compared to provide insights concerning potential determinants of prime-word awareness. In this study 66 participants engaged in a computer-based task, each trial required the naming of the target-word, followed by a judgment as to whether a prime-word had been observed (awareness), and if there was awareness of a prime word to then identify that word. Response times (milliseconds) were recorded for target-word naming, while accuracy was recorded for target-word naming, prime-word awareness and prime-word identity. Three prime conditions were used - blank screen (no prime-word), prime-word unrelated to target, and related prime-word with a strong forward association with target (but weak backward association). The related primes were chosen to induce associative priming. The backward mask varied in duration and content, as described above. Associative priming effects for target-word naming times were found only for same-content conditions, and were consistent across the three levels of duration. Corresponding priming effects for naming accuracy were found across all naming conditions, with greater accuracy associated with related prime-words at shorter durations. In contrast there were no priming effects for awareness of the prime-word; while there was enhanced identity accuracy for the related primes regardless of mask content, diminishing to a smaller priming effect at the longest BM duration. Prime-words (unrelated and related combined) resulted in faster naming times at shorter durations for different-content, consistently getting faster with longer BM durations, while converging with same-content at the largest duration. In contrast, prime-word awareness was consistently greater for same-content and increasing with BM duration on these trials. Different-content only increased after the 105ms BM duration. This same pattern held for prime identity accuracy. Based on these findings various accounts are discussed to identify mechanisms which may operate early in the information processing stream to influence subsequent processing, and their impact on conscious awareness. C19

### 3.10 Sleep and dreaming

**180 Pokemon Go and Dreams: From Virtual to Augmented Reality in Gaming and Dreams** Jayne Gackenbach , Cody Trewin <gackenbachj@macewan.ca> (Psychology, Grant MacEwan University, Edmonton, Alberta Canada)

The list of types of technologically constructed realities is expanding, or more accurately available to the public. These include Virtual reality (VR) and augmented reality (AR). We have been examining VR in terms of 2D or 3D displays and its association with and impact upon nighttime dreams. While AR has been available, most notably Google glasses, last summer it burst onto the consciousness of the general public during the launch of the AR reality game, Pokemon Go. AR is when a virtual world, character, or element is viewed as overlaid upon ones view of the real world. In part the explosive popularity was due to a generation raised on Pokemon as a video game was an opportunity to socialize outside of the gaming environment while simultaneous being in the gaming environment. Our primary interest in this relatively new form of game play was, how does it affect reality assessments including in dreams? We decided to examine dreams of students enrolled at a western Canadian university. About 500 students answered our survey, but surprisingly very few had a Pokemon Go dreams to report. Yet almost half reported having played this game. Thus we selected a random group of individuals who had played it but did not report such a dream to compare to those who reported these Pokemon dreams. We asked all participants

about their video game and social media history, and details about their Pokemon Go play. We also administered two scales which explored reality judgements in gaming; Game Transfer Phenomena Scale (GTP) and Self Presence in Avatar use. Finally, we asked respondents to evaluate their own dreams. We found that there was no difference in the sex of the subjects in terms of Pokemon Go dream reports nor in video game and social media use history. However, those who reported these dream types did indicate more seriousness with which they took the game play. Interestingly in terms of Game Transfer Phenomena, those who reported Pokemon Go dreams were more likely to experience confusion from gaming to reality. Dreams were coded by a judge and were evaluated along several dimensions by the players. The judge's scales were concerned with reality confusion and explicit references to Pokemon Go in the dreams. Not surprisingly, when we compared dreams of people who reported both types of dreams, we found more Pokemon Go referents in the game dreams. Additionally, the Pokemon Go dreams were more likely to include some form of mixed realities than their recent dreams. We then turned to the players self-evaluations of these dreams. First there was no difference in terms of when the two dream types occurred. Those who had a game dream were more likely to say they played it the day before that dream. The Pokemon Go dreams were self-reported as less likely to be nightmares or bad dreams than for the same subject's recent dreams. They also enjoyed their Pokemon Go dreams more than their recent dreams and reported fewer negative emotions in their game dreams. **C3**

**181 Mindfulness Meditation and Cortical Arousal Indicated By Sleep Eeg: Potential Implications for Understanding Insomnia and its Treatment** Michael Goldstein , Willoughby B. Britton, Ph.D.; Jason C. Ong, Ph.D.; Arlene D. Turner, Ph.D.; David Sholtes, D.O.; James K. Wyatt, Ph.D.; Rachel Manber, Ph.D.; John J.B. Allen, Ph.D. <mgoldstein@email.arizona.edu> (Psychology, University of Arizona, Tucson, AZ )

While meditation training has been associated with subjective improvements in sleep in a number of studies, initial polysomnography and quantitative EEG analyses have found paradoxical increases in markers thought to reflect cortical arousal during sleep, primarily beta and gamma-band activity, proportional to the amount of meditation practice. Here, a detailed examination of the existing literature on sleep EEG in insomnia is presented, along with evidence from two studies, both randomized controlled trials, that further demonstrates that increases in high-frequency EEG activity (16-40Hz) during NREM sleep are associated with meditation training. The first is a mindfulness-based cognitive therapy (MBCT) trial for depression relapse prevention involving 49 participants randomized to either 8-week mindfulness training or waitlist control, with sleep EEG recordings at pre and post-intervention. The second is a comparison of two different mindfulness interventions, mindfulness-based stress reduction (MBSR) and mindfulness-based therapy for insomnia (MBTI), in which 38 participants with chronic insomnia were randomized and followed from baseline to six months post-intervention. Results suggest further support of subjective improvements in sleep associated with meditation training, and specifically for MBCT and MBTI, in the context of concomitant increases in cortical arousal. Possible implications for understanding mindfulness training, consciousness during wake and sleep, sleep-related indicators of arousal, and insomnia treatment are discussed. **C13**

### **3.11] Cognitive development**

**182 Consciousness, Multimodality and Linguistic Landscapes: Children as Social Actors** Olga Alexeyevna Bever <oab@email.arizona.edu> (Linguistics, University of Arizona, X, AZ )

This paper considers consciousness in Vygotsky's perspective: meaning making and activity involve a complex interplay of the mental and social processes through internalization and mediation. These include a system of signs, means, agents, and surroundings of the social and physical world. I examine in detail an observation of two children naturally interacting with a regulatory public sign, and modifying this sign by reconstructing its message. This case shows how the construction and reconstruction of the external representations is a complex process of internalization and mediation driven by the conscious analysis of the link between the individuals, the sign and the social environment. Following Vygotsky and Bakhtin, this paper addresses consciousness as

a dialogic process, a sequence of actions of reshaping social space through the multistage transformations of existing social reality. It shows how and why the children I observed transformed a particular regulatory sign to a sign with the opposite meaning, thus consciously reshaping and reconstructing several aspects, including: a) the children's own role from being readers to editors, the authors and meaning makers of their own message; b) reshaping the content of the sign and its meaning to an opposite one; c) negotiating conflicting discourses. This highlights the children's conscious engagement with the multimodal text and the environment as a dynamic, dialogic, multilayered, and multistage process, revealing their creativity and social enquiry. In this complex activity, language and non-linguistic semiotic devices serve as tools of internal and external negotiation and representation of the message. C5

**183 Differently Conscious - Exploring Consciousness Through Autism, A Travel Beyond the Border of a Neurotypical Consciousness** Andrea Pensotti, Federico De Rosa, Oreste De Rosa <andrea.pensotti@saluteuropa.org> (Saluteuropa, Giussano, Monza e Brianza Italy)

"Words say very little about our concept and feeling. There is an inner possibility of union of hearts and minds. The more we know and we love each other the less is need to speak because we live inside the same things. For me is amazing how you can coordinate your breath and your tongue and articulate so fast a meaningful sequence of words. But I can also do things that are amazing for you as paying attention simultaneously at three or four events, or to perceive in my inner your deeper thoughts and feeling." Federico suffers of a severe autism but through a computer he can slowly write and then open to everyone of us his inner world. What is consciousness from an autistic point of view? Thanks to this unique combination of tools, a pc and an autistic mind, we were able to start an unexpected travel to a different way of experiencing consciousness and we were able to overcome the borders of a neurotypical consciousness. In this new land we get suddenly confused, are we really the higher expression of consciousness? Is there a dimension where all our fragmented consciousnesses get in touch? And.. are we really aware about our cognitive possibilities? An autistic boy becomes nervous as soon as we speak without putting ourself in our word, he perceive a lack of intensity in our communication that he can't understand. In this land we discover a deeper way of communication, we discover a different way of living nature, of perceiving emotion, but we also bring our logic, our language and our way of describing things, .. it is a perfect integration of different cognitive systems that brings us to a more complete vision of consciousness. This is both an analytical report of a travel beyond the border of a neurotypical consciousness (wich brings us to innovative considerations related to our common theories of consciousness), both a real-time travel all together with Federico. C11

**184 Consciousness of Values and Righteous Behavior of School Students** Satgur Pyari, Arya Bhasin, Class IX, Radhasoami Educational, Institute, Dayalbagh, Agra; Rajneesh Bhasin, Managing Director, Borges India (Spanish MNC) <satgur.pyari.2003@gmail.com> (Dayalbagh Educational Institute, Agra, Utter Pradesh India)

India is a country with over a billion people and over 32% of its population is between 5 years and 19 Years in age; and hence, students are expected to be there in almost every part of the country. Generally, everywhere in India, as soon as students enter school, they are pushed into a rat race for eventually cracking entrance exams to make it to one professional college or another and high expectations are set on them. Throughout, from early years, there is a lot of emphasis on giving inputs to students to improve themselves in studies by adding additional coaching classes for subjects in which they may be weak or in which they need to excel. In many schools, a great deal of lip service is paid to moral values, but emphasis on moving ahead of the others to win in a competitive environment compels the students to succeed by hook or crook, thereby keeping moral values on back burner. In comparison to such a scenario, there is as much focus on Moral Teachings and Values as on Studies in the unique education system of Dayalbagh Educational Institute (DEI). DEI students are taught that in their journey towards development of a complete man, knowledge of subjects in the curriculum is just one aspect of education and the rest, rather most of it, concerns inculcation of morals and values. This implies that the product of the DEI sys-

tem of education ought to be different from those following the usual course curriculum, and this difference is likely to be discernible from school level itself because of the impact of cognition of values from early stages of education. In this context, the relationship between consciousness of the values emphasized in the school and the behavior of students appears to be a good topic to study. In this paper, we are reporting the results of a detailed Primary Research with students of Class IX and Class X from DEI Institutions, namely, Radhasoami Educational Institute and Prem Vidyalaya, and students of Class IX and Class X from other Institutes in Agra, India. A questionnaire developed to measure the relevant variables was tested for its reliability and validity, and was then administered on control and experimental groups. The results were subjected to statistical analysis and the findings have been discussed to assess the impact of moral values on righteous behavior of school students. **P1**

**185 Converting In-situ Contaminated Ground Water Molecules To Potable Water By Actuality Of Wave Function Collapse By Linking Human Cognitive Abilities With Quantum Consciousness** Hardas Swami , Gautam Mandal, Sanjay Potey <swamihardas@rediffmail.com> (Pune, India)

Amplified Collective Human Consciousness and Intention linked with Quantum Consciousness is used by Swami Hardas Life System (SHLS) to alter molecular and atomic structure of contaminated ground water, in-situ, without equipment for hundreds of square kilometers. Contaminations are reduced at the level of water table . By existing techniques, only water drawn out of the water table is processed by different techniques and only water drawn out is made potable. There is no known system whereby the chemical nature of ground water can be altered in-situ, that too for hundreds of square kilometers. Further different contaminations require different processes and there is no single process to reduce various kinds of contaminations. Universal Creative Energy and Consciousness (UCEC) is behind every creation. SHLS combines human cognitive abilities with UCEC . The combined energy is relayed to desired places through inter-connected Quantum Matrix . The impact of energy relays are multiplied by Special Multiplier Methods thus impacting vast areas covering hundreds of square kilometers. The Possibility of in-situ reduction of ground water contamination existing in the Infinite Quantum Possibilities is converted into desired physical reality by transmission of intention to the UCEC . This confirms actuality of theory of wave function collapse. Hence , unusable ground water is converted into healthy drinkable water stretching over hundreds of square kilometers and level of ground water is also increased within very short time. Contemporary Intention experiments with water have demonstrated only cosmetic changes in water molecules and not core contaminations like fluoride, iron, salinity, hardness. This is path breaking . Different methods are not applied by SHLS for different types of contaminations as at quantum level, everything is just bands of energy which are similar in nature. Since, alterations are made at basic, fundamental energy systems, it does not make much difference as to whether these energy systems later on constitute to become different types of contaminations. Iron level of ground water of entire Suliapada Block, India over 700 square kilometers was reduced within two weeks. Samples from 11 villages having more than 2 mg/l of concentration were reduced below 1mg/l. In 3 villages iron was reduced from 5.88 mg/l to 0.24 mg/l, 3.48 mg/l to 0.18 mg/l and 3.1 mg/l to 0.23mg/l. Iron is generally reduced by physically removing it. The disappearance of iron particles from ground water is itself stunning. Fluoride levels of 3 villages covering 30 square kilometers in Madhya Pradesh, India were reduced by 88% and in 4 locations in Yavatmal District by 50%. Salinity was reduced in 5 locations by 34% to 78%. Tests have been conducted by various government agencies of India. By no contemporary system can the chemical, molecular and atomic structure of matter can be changed over vast areas without equipment. These observations emphasise practical utility of concepts of Quantum Physics for human benefit and the extent to which cognitive abilities can be developed. **P1**

### **3.12 Artificial intelligence and robotics**

**186 Does a computer “see” like we see ? A Formal Comparison Of Human And Machine Vision** Aida Elamrani Raoult <aidaraoult@free.fr> (Institut Jean Nicod, ESPCI, Paris, France)

Recent progress in artificial intelligence have brought about autonomous cars, machines beating humans at the game of go, and even image recognition algorithms to outperform humans on classification tasks, e.g. assigning pertinent categories to a picture. These feats have been made possible through the development of a branch of machine learning called deep learning, a family of algorithms based on the concept of neural networks. Because this field takes its inspiration from neurobiology, and because its achievements race human intelligence, it is often mistakenly understood as an attempt at simulating or modelling the human brain. However, neuroscience depicts a more complex landscape of our cerebral processes. Because human vision is one of the most well studied area of neuroscience, and image recognition is a rather basic task, we choose this example to compare how deep learning algorithms may relate to brain processes. First, we concisely explain how a deep learning algorithm decomposes a picture in several abstract layers to identify the relevant information for classification. Then, we expose our current understanding of the visual system and build an algorithmic account of how it works. This formalization allows for a comparison between human and machines at an abstract level which reveals their respective strengths and weaknesses, hints at possible improvements for machines, and tightens the possible interpretations of our mental mechanics. C

**187 Sign Approach to Consciousness Modelling** Aleksandr Panov <pan@isa.ru> (Federal Research Center Compu, Russian Academy of Sciences, Moscow, Russian Federation)

Sign approach to consciousness modelling Cultural-historical theory of L.S. Vygotsky and activity theory of A.N. Leontiev propose constructive basis to model consciousness and cognitive functions such as introspection, goal setting and behavior planning. Based on these psychological theories we introduce original model of the world of activity actor. Because model of the world is the result of interaction between consciousness and self-consciousness of an actor it represents not only objects and processes of the real word but also relations of the actor to these entities and representation of own characteristics of the actor. The basic component of the world model is a sign as a representation of some entity. It has four components: a name, an image, a significance and a personal meaning. An image of the sign is some function of entity recognition on the one hand and an algorithm of reconstruction of the representation of the entity on the other hand. A significance of the sign is a set of abstract schemas of actions and activities that include the mediated entity as its part. And a personal meaning of the sign is a set of specified actions and situations where the mediated entity is included. The four-component model of the sign is supported by neurophysiological evidences e.g. global workspace theory, Edelman's theory of neural Darwinism and Ivanitsky's hypothesis of an perception circle. In our model each component of the sign excepting a name is modelled by special neurophysiologically inspired structure - causal matrix that represent a causal relations provided by a recognition function, an action schema or a current situation schema for an image, a significance and a personal meaning correspondingly. We propose a special learning procedure based on well-known hierarchical temporal in which causal matrices are formed. On the set of sign components we construct three types of causal networks (special types of semantic networks) which constitute a semiotic network - actor's model of the world. Relying on the proposed model we can describe self-organized processes in the semiotic network (generation of new sign and new relations between signs), account for several types of psychological world models (rational, mythological and common-sense) and build models of some cognitive functions (behavior planning, goal setting, coalition formation and introspection). Sign world model can act as a strategy level of cognitive architecture for robot control system. (1) Osipov, G. S., Panov, A. I., & Chudova, N. V. (2014). Behavior control as a function of consciousness. I. World model and goal setting. *Journal of Computer and Systems Sciences International*, 53(4), 517-529. <http://doi.org/10.1134/S1064230714040121> (2) Osipov, G. S., Panov, A. I., & Chudova, N. V. (2015). Behavior Control as a Function of Consciousness. II. Synthesis of a Behavior Plan. *Journal of Computer and Systems Sciences International*, 54(6), 882-896. <http://doi.org/10.1134/S106423071505010X> (3) Emel'yanov, S., Makarov, D., Panov, A. I., & Yakovlev, K. (2016). Multilayer cognitive architecture for UAV control. *Cognitive Systems Research*, 39, 58-72. <http://doi.org/10.1016/j.cogsys.2015.12.008> C21

### 3.13 Neural networks and connectionism

#### 188 Integrated Information Theory and the Emergence of Consciousness in the Split Brain

Matsui Tetsuo <matsui@phys.kindai.ac.jp> (Physics, Kindai University, Higashi-Osaka, Japan)

Studying the mechanism how consciousness emerges is one of the primary subjects in the science of consciousness. The integrated information theory proposed by Tononi seems to provide us with an objective and mathematically well-defined condition for the emergence of consciousness in a given system. The level of consciousness is to be measured by the integrated information,  $\Phi$ , which is defined as the information entropy of the system relative to the purely decoupled (unintegrated) system. In the present work, we study the following two points; (i) we argue that  $\Phi$  may have a sufficiently large value to sustain the consciousness in the particular region of the ordered state with large information entropy in the sense of statistical mechanics; (ii) we introduce a  $Z(2)$  gauge neural network as a model of the split brain, and calculate the region of sufficiently large  $\Phi$  to simulate the way how "consciousness of the right brain and that of the left brain are integrated into single consciousness?" as the strength and/or the number of connections of the corpus callosum are increased. In this neural-network model, both the neuron variables  $S_i$  and the synaptic strengths  $J_{ij}$  are taken as Ising variables (+1, -1). Its energy consists of the Hopfield term  $\sum_i S_i J_{ij} S_j$ , the double-process term  $\sum_i S_i J_{ij} J_{jk} S_k$ , and the Hebb reverberation term (triple-process term)  $\sum_i J_{ij} J_{jk} J_{ki}$ , and each of them has the local  $Z(2)$  gauge symmetry reflecting the Hopfield model. Monte Carlo simulation of the model exhibits that its phase structure in the  $\sum_i S_i$  -  $\sum_i J_{ij} S_j$  plane consists of the Higgs phase, the Coulomb phase and the confinement phase. Each phase is characterized by the ability of learning patterns and recalling them; the Coulomb phase has an ability of learning but not of recalling.  $\Phi$  is estimated by thermodynamic quantities such as the entropy and the specific heat in statistical mechanics, and the regions of consciousness, i.e., with the high value of  $\Phi$  locate near the phase transition curves and just inside of the ordered states, i.e., Higgs and Coulomb phases. This reminds us of the edge of chaos discussed by Kauffman for the necessary region for the life to maintain itself. For vanishing or small strength of corpus callosum, there appear two such regions reflecting the individual consciousness of the left and right brains, and as the strength is increased, these two regions merges to a single region, which is interpreted as an integration of consciousness. These results may be interpreted as an objective and mathematical description in the framework of conventional physics how the split brain integrates its consciousness due to the synaptic connections in the corpus callosum. **C10**

#### 189 Resting State Networks In The Conscious Mouse Brain: A Large-scale c-Fos Mapping Study

Ksenia Toropova, D.I. Sukhinin; E.V. Kononova; M.A. Roshchina; O.I. Ivashkina; K.V. Anokhin <xen.alexander@gmail.com> (Moscow State University, Centre, NRC Kurchatov Institute, Department of Neuroscience, Moscow, Moscow, Russia Russian Federation)

The brain activity of human subjects in a "resting" state is often interpreted in terms of background conscious processes. However, human neuroimaging lacks the cellular resolution required to relate such activity to the content of subjective experience. To overcome this limitation, we started a project on imaging neuronal resting state networks of a conscious mouse and relating their activity to animal's past experiences. At the first stage of the project we characterized resting-state activity of 104 mouse brain structures by means of large-scale c-Fos cellular mapping. We made an estimate of the expected level of activation for each of the analyzed brain areas based on amount of c-Fos positive cells in all the experimental animals. Based on the level of resting state activity the examined brain areas were divided into four groups: 59 brain areas were non-active, 14 - were low, 29 - medium, and 8 - were highly active. There was no direct relationship between anatomical attributes of examined areas and the level of their activity. We also analyzed individual variability of levels of activity for each group of brain areas and showed that resting state networks identified by c-Fos expression were stable and reproducible in all the animals. Next, we selected 38 areas (associative, sensory and motor neocortical areas, hippocampus, parahippocampal cortex, amygdala, basal nuclei, thalamus, olfactory areas and subcortical nuclei) to characterize the major components and analyze functional connectivity of the resting state



network. Based on the activity of selected brain areas and using Pearson correlation we plotted networks with correlation coefficients varying from 0.6 to 0.9 and compared these experimentally identified networks with model networks (random, scale free and small world) using clustering, global efficiency and degree distribution. The experimental resting state network had substantially higher clustering than model networks. Global efficiency of the resting state network was relatively low and was the same as global efficiency of a random network. At correlation coefficients, higher than 0.7 the resting state network broke down into separate subnetworks. The comparison of experimental network to the model networks and the analysis of its degree distribution suggests that the resting state network of the mouse brain is a scale free network with local clusters. In addition, we identified several major groups of functionally connected areas in the resting state network of awake mouse brain: a cluster of medial prefrontal cortex and other medial associative neocortical areas, a cluster of visual areas, a tightly connected cluster of sensorimotor areas and basal nuclei, and a fully isolated cluster of auditory areas. Importantly, activity of structures known for their relationship to fear and threat learning (such as hippocampus, amygdala, and pre-limbic cortex) was not correlated and did not comprise any functional group. This high variability in the activity of fear-related brain structures will be used at the next stage of the project to examine changes in the resting state network activity in relation to prior threat experience. Supported by RSF #16-15-00300. **C18**

**190 Multimodal Integration of Interoception and Exteroception in the Human Brain** Jiahe Zhang , Alexandra Touroutoglou; Jorge Sepulcre; Bradford C. Dickerson; Lisa Feldman Barrett <zhang.jiahe@husky.neu.edu> (Northeastern University, Brookline, MA )

The brain utilizes information from both the body and the environment to accurately assess moment-to-moment needs and issue appropriate actions. Although it is known that exteroceptive senses converge at several brain regions, it remains unclear how interoceptive sensation integrates with these sensory modalities. Using stepwise functional connectivity analysis (Sepulcre et al., 2012) on resting state data (n=150, 75 females, mean age 22.61), we computed the degree of connectivity from all voxels to the primary interoceptive cortex, i.e. dorsal posterior insula, across link steps, or edges. The first step map reveals a more local interoceptive network including mid to posterior insula, anterior to midcingulate, supplementary motor area (SMA), somatosensory and motor cortices, amygdala and thalamus. Similar to other sensory networks (visual, auditory and somatosensory), the interoceptive network binds first to multimodal processing regions (superior parietal lobule, parietal operculum, anterior insula, and dorsal anterior cingulate/SMA), and then to higher order processing regions (medial prefrontal cortex, dorsolateral prefrontal cortex, temporo-parietal junction and middle temporal gyrus). Extending beyond identifying a static and isolated interoceptive network, this work suggests that the interoceptive network is a feature of the functional connectome that relays interoceptive information to multimodal integration areas. This offers evidence that the brain combines interoceptive input with sensory inputs from exteroceptive modalities to form a coherent perceptual experience. **P2**

### 3.14 Cognitive architectures

**191 Pattern Processing and the Making of Subjective Experience - A Merged Computational/non-computational Schema** Ron Bar Lev <bar.lev.ron@gmail.com> (Tel Aviv, Israel)

Considering phenomenality as a surrogate for the non-computable, in the context of an iconic representational model. Consciousness necessitating a smeared patterned representation, taken to a limit. A system model that does not solely rely on correlations to mediate semantics, in which 'diffusing' patterns into a tending-to-isotropic and locally non-differentiable core supports the decoupling of phenomenally imbued perception from motor action. **C10**

**192 Integrating noninvasive photobiomodulation - and neuromodulation - techniques to remediate cognitive and behavioral symptoms in neurodegenerative and neuropsychiatric disorders.** Marvin Berman <marvinberman@quietmindfdn.org> (Quietmind Foundation, Elkins Park, PA )

Quietmind Foundation studies the development and deployment of integrated neuropsychophysiological assessment and directed energy applications in clinical care and “human performance optimization.” The presentation will include a historical perspective on the application of coherent and non-coherent light as a therapeutic modality in traditional medicine and more recently as an integral component in the evolution of precision medicine and health promotion. The research literature on impact of near infrared phototherapeutic applications will be reviewed from early NASA studies on healing in zero gravity to applications for treatment of neurodegenerative and neuro “psychiatric” conditions. We will also outline an applied clinical research model for delivering integrated, directed energy treatment guided by real-time, normative data from heart rate variability and Quantitative EEG. **PL4**

**193 The Existence Framework - A Theory of Consciousness Based Upon a Spiritual Cosmology That Integrates a Cognitive Architecture with a Theory of Physics Explaining the Formation of Space-time** Richard Blum <richblum@animationonline.com> (Animation Online, Myrtle Beach, SC )

There are six prevailing theories of consciousness, each one emphasizing an unique approach. Is it possible that consciousness is multifaceted, and that each approach attempts to explain one aspect of consciousness? Would a complete solution require incorporating all approaches? The approaches: Physics - Orch-OR: Quantum mechanical events generate consciousness. Philosophy - Panpsychism: Consciousness is universal and primordial. Mathematics - PHI: Consciousness is expressed as an equation describing a system's complexity. Cognitive Models - Global Workspace: Mental operations generate conscious. Neuroscience - Interacting neural networks generate consciousness. Spirituality - Consciousness creates the universe. The Existence Framework offers a theory of consciousness that integrates concepts from all approaches, including spirituality. Meditation reveals subjective aspects of the mind which cannot be obtained from objective study. Spirituality reveals a state of pure consciousness, void of all mental activity; only awareness prevails. A state of pure awareness, coupled with the viewpoint that consciousness creates the universe, suggests that consciousness must lie beyond energy, matter, and even time and space. Spiritual cosmology reveals that consciousness emerges from a transcendent, non-dual state of infinite existence. Contrast between infinite existence and absolute non-existence creates consciousness. The almost nil emerging consciousness must evolve from unconsciousness to consciousness. The evolution of consciousness drives the physical and biological evolutions. As life-forms become more complex, consciousness increases just as PHI Theory indicates. Like Orch-OR, the Existence Framework suggests that consciousness is generated within the brain by events occurring on a most fundamental level. However, quantum mechanics is not sufficiently fundamental; whatever generates consciousness must be more fundamental than time and space. The framework proposes that Existence is most fundamental. Nothing can exist without existence. The framework explains the emergence of time and space from existence; the resulting nature of space-time is in accord with general relativity. The framework proposes that consciousness emerges in the human brain as a result of this underlying physics optimizing a key function of the mind, the creation of the sense of self. The framework defines consciousness as awareness of existence, in particular one's self-existence, and the existence of objects comprising one's experience. The framework includes a cognitive model based upon spiritual explanations. Similar to Global Workspace, the operations forming consciousness span across disparate aspects of the mind. The mind (software) is comprised of a hierarchical, vast array of independent, intricately connected network of processors. Networks compete for dominance, each moment the dominant network defines who one is, creating a sense of self. The brain (hardware) optimizes algorithms comprising the mind (software). A most important optimization, contrast between existence and non-existence (similar to the universe's creation) occurs within the brain each moment; the sense of self is optimized by oscillations between existence and non-existence. Consciousness emerges when a dominant neural network (self) reaches a complexity threshold; the network's oscillating brainwaves (electromagnetic energy) focus on one central neuronal group forming a space-time void through which existence emerges. Continual existence/non-existence oscillations spread through the dominant network generating awareness of self-existence-consciousness. **C27**



**194 Do Honeybees Really Think? Concepts, Cognition and Animal Minds** Henry Shevlin <henry.shevlin@gmail.com> (Philosophy, Baruch College, New York, NY )

The ability to engage in thought has been claimed by some philosophers to be a uniquely human capability, and is commonly associated with capacities for conceptualization and abstraction. However, animal behavior work has suggested that some simpler creatures, including honeybees, are capable of learning to perform tasks seemingly involving abstract concepts such as sameness, difference, and relative size (Giurfa et al., 2001). Philosophical arguments have also been advanced for the claim that bees possess concepts (Carruthers, 2009). In this talk, I begin with a brief review of recent empirical evidence for concept possession in simple animals. I claim that this data supports the claim that non-human animals can engage in a kind of abstraction and (with some qualifications) conceptualization of perceptual information. However, I go on to argue that this should not lead us to assume that they are capable of fully fledged thought, at least insofar as this is understood in terms of a capacity for logical reasoning in the sense of Fodor (1975). Instead, apparent cases of deductive reasoning in animals can be largely explained in terms of protocognitive mechanisms, such as implementing procedures for identifying matching and non-matching sensory information. This proposal is supported by evidence from developmental psychology showing that 2.5 year old human infants are capable of making similar abstractions to those performed by many non-human animals, but in tasks where matching procedures alone would be ineffective fail to make even simple abstract inferences (Mody & Carey, 2015). This in turn suggests that the performance of infants and many animals does not rely on abstract logical thought, but on simpler mechanisms that fall short of deductive inference. I conclude with the suggestion that, while humans may be unique in their capacity to engage in flexible deductive inference, we should be open to the possibility that there exist in infants and animals a variety of forms of 'proto-cognition'. A simple distinction between creatures that think and those that do not may therefore be less illuminating than the hypothesis that different animals think in different ways. C

### 3.15 Ethology

#### 03.16 Self-consciousness and metacognition

**195 Intuitive Feelings for Insightful Vs. Noninsightful Solutions to Magic Tricks** Mikael Ringstad Hedne , Elisabeth Norman; Janet Metcalfe <post@mikael-hedne.no> (University of Bergen, Bergen, Norway)

This presentation will focus on theoretical and methodological issues in experimental research that makes use of magic tricks to compare intuitive (metacognitive) feelings in insight vs. non-insight problem solving. The basic setup involves showing participants a series of to-be-solved problems that are video recordings of magic tricks (Danek et al., 2013). Participants rate their intuitive feelings both during and after each solution attempt. More specifically, they rate their felt closeness to the correct solution at regular intervals during problem solving (i.e., warmth ratings), and their subjective confidence in the actual solution after each problem solving attempt (i.e., confidence ratings). In conjunction with each solution attempt, they report whether or not the solution was characterised by an insight experience. Accuracy, intuitive feelings, and the confidence-accuracy relationship are then assessed separately for insightful versus noninsightful solutions. Using this basic paradigm, we (Hedne, Norman, and Metcalfe, 2016) have previously found differences between the two types of solution in terms of the relationship between intuitive feelings and solution accuracy. However, even though we found differences in rated confidence in the solution, we found no differences in metacognitive ratings of warmth conducted during problem solving. This is contrary to the classic finding of Metcalfe and Wiebe (1987), in which problem solving of anagrams was associated with more incremental warmth ratings than solving of pre-defined "insight" puzzles. We argue that this difference across experiments/paradigms can at least partly be due to methodological characteristics of problem solving studies using magic tricks, and present an experiment using a modified procedure. The procedure of the current experiment (N=50) is the first to compare warmth ratings for insight vs. noninsight solutions to magic tricks using a measurement procedure comparable to that of Metcalfe and Wiebe. As in the

classic study, we now instructed our participants to not provide a solution and proceed to the next trial until they were fully confident in their solution. Second, and as a consequence of this, the number of potential repetitions of any given magic trick was increased substantially compared to previous studies in which each trick was only presented 3 times (Danek et al., 2013; Hedne et al., 2016). Since the validity of self-reported insight in the context of magic tricks has already been established (Danek et al., 2013), it can be argued that any differences in warmth ratings between the two types of trials would now reflect genuine differences in the subjective experience leading up to insightful vs. noninsightful solutions. Results will be reported at the conference, and will be discussed in relationship to previous findings which have attempted to disambiguate whether insight is the result of a gradual or discontinuous process. We address theoretical implications for the understanding of intuitive feelings in insightful vs. noninsightful problem solving, with a particular emphasis on the role of consciousness. **C19**

**196 Role of Consciousness and Mindfulness in Intuitive and Cognitive Decision Making of Stock Market Investors** Rupali Misra , Sumita Srivastava; D. K. Banwet; Abhishek Nigam <rupali.misra@gmail.com> (Department of Management, Dayalbagh Educational Institute , Agra, Utter Pradesh India)

Conventional wisdom relies on analysis, cognition and judgement to be rational approach. Cognitive style organizes mental thinking pattern and systemizes operational and tactical strategies in a complex sequential decision making process (Messick 1978, Lofstrom 2005). It has been typified as slow, deliberative, and computational. When assessments cannot be performed analytically, when evaluations require intense pattern recognition, or when time constrains estimation, like in a complex multi-objective dynamic decision environment, working associatively, intuitively and tacitly is the more advantageous thinking style (Wilson 2002; Wittemen et al. 2009). Science relies upon a specific thinking process (logic) while faith relies upon specific thoughts (dogma). This paper is based on dual processing style where decision-maker combines both the above mentioned styles - analytical and intuitive - in a synchronized iterative fashion. A stock market investor works under dynamic business environment with pro-active and reactive actions, ill-defined goals and tasks, uncertain and ambiguous data, time constraint (Klein and Klinger (1991), apart from interplay of his own emotions (Matzler et al., 2007) and heuristic driven biases. He operates under the stricter constrictions of bounded rationality and therefore relies on his intuitive ability along with cognitive capability to take high quality decisions relatively quickly. In this study, we conceptualize antecedents of intuitive and cognitive decision making as spiritual-consciousness, self-consciousness and mindfulness. Consciousness - Consciousness encompasses both awareness and attention such that attention continually pulls figures out of the ground of awareness, holding them focally for varying lengths of time (Brown and Ryan 2003). Greater awareness supports holistic processing of information and an intuitive or instinctive behavior to make quick or accurate decisions, often with imperfect data sets (Khumalo 2009). Attentional focus improves the ability to interrupt autonomous responses and suppress interfering information thereby improving cognition (Moore and Malinowski, 2009). Mindfulness - Mindfulness meditation develops attentional performance and conscious perception by screening out irrelevant information through sustained and selective attention. Meditation enhances executive functions (Zeidan et al. 2010) and working memory capacity improving the efficacy of decision making. Mindfulness induces a set of integrated physiological changes termed as relaxation response, stress reduction, and an increase in attention (Lazar et al. 2000). This improves attentional focus or the ability to interrupt automated response (Greenberg et al. 2012). A composite questionnaire with ConsciousnessQuotientInventory CQ-iv.2013 (Brazdau 2013) for assessing spiritual-consciousness and self-consciousness, FreiburgMindfulnessInventory for mindfulness, PID (Betsch 2004, 2008) for preference for intuition or deliberation and a self-developed scale for decision efficacy was administered on a sample of 222 stock market investors. Preliminary findings imply significant positive correlation between intuitive ability, cognitive capability of investor and his spiritual consciousness (0.406, 0.253), self-consciousness (0.554, 0.337) and mindfulness (0.205, 0.370) respectively. Statistical investigation reveal significant interesting insight on the role of mindfulness and consciousness in shaping intuitive ability and cognitive capability of stock market investors, in particular, and

decision makers, in general. The present research attempts to provide a unified scientific description behind the theory of decision making by integrating cognitive science and financial decision making under the broad category of behavioural finance. **P1**

**197 Exploring Mindfulness and Loving-Kindness Meditation as a Potential Health Promotion Tool** Neeti Rana <neeti@gbu.ac.in> (Humanities and Social Sciences, Gautam Buddha University, Greater Noida, Uttar Pradesh India)

Extensive research on mindfulness-based interventions (MBIs) such as mindfulness-based stress reduction (MBSR), mindfulness-based cognitive therapy (MBCT), has been documented on one hand and on the other hand on loving-kindness meditation (LKM). The literature review has shown that a majority of studies have either been conducted on clinical trials, medical students, pre-medical students, or health care professionals. The follow-ups are reported on small samples with limited generalizations. The primary purpose of this study was to further explore and analyze the combined effect of mindfulness and loving-kindness meditation (LKM) on the well-being of young healthy individuals (i.e., non-clinical sample). In the present study, a 24 days meditation course (45 minutes session per week) was conducted spread over eight months. The participants were 269 university students, age 18-25 years, 25% females, and 75% males. The participants voluntarily enrolled in the course as a response to the flyers describing meditation as a potential health tool. The goal of the course was to teach students self-care practices they could use in day to day life, for a positive mental health and well-being. The subjects practised Buddhist meditation like Anapanasati (Mindfulness of Breathing), Metta Bhavana (Loving Kindness) and experienced a self-reinforcing degree of internal change along the continuum of mental states toward the healthy pole. The paper will discuss pre-post and follow-up data on self-report measures and meditation as a potential health promotion tool. The process of re-perceiving as a meta-mechanism, rotation in consciousness, self-regulation and self-management, values clarification and self-esteem are also addressed. **P1**

### 3.17 Temporal consciousness

### 3.18 Intelligence and creativity

**198 Searching for Innovation Metaphors** Mills Andrea <bravebrain@me.com> (League City,)

PREMISE A deliberate and systematic use of business and technological metaphors allowing to re-contextualize domain-specific knowledge, IP and technologies across industry verticals, can create the potential for breakthrough innovations. In order to do so, it is crucial to recognize intersections among fields - by applying non-linear sense-making processes to combine diverse IP and technologies from various sources - and cluster them in a meaningful way, as pieces of a complex but cohesive mosaic. CHALLENGE Existing search engines are typically useful to access current knowledge, within the boundaries of the domain of origin of the search itself. When we deal with "solution in search of problems" and vice versa, we need to be able to laterally explore the whole spectrum of possible meanings, inside and outside the field of origin of the technological solution. For example, imagine searching for something that can be functionally used to hold and drink liquids, but it's neither a glass, nor a bottle. Searching by functionality is key. Another challenge is to search across domains, for solutions that can operate at certain performance thresholds, within an acceptable interval of confidence that may vary between challenges. It's crucial to keep options open for solutions that, if properly optimized in order to reach a desired level of performance, can be a viable match for the identified unmet need. PROPOSED SOLUTION: A METAPHORICAL SEARCH ENGINE FOR INNOVATION A solution can be found in using statistical natural-language processing techniques similar to those used by Google and other search engines, but applying methods able to map the relationships between words or concepts across different contexts. While a regular search engine typically returns terms with a high degree of conceptual proximity to the origin-term, a metaphorical search engine looks for words that are further away but still share a linking conceptual structure. The metaphorical search engine's performance depends on identifying meaningful connections. The results can be filled with ambiguity and need to

allow multiple meanings in different contexts. The metaphorical search engine needs to be able to correlate contents and concepts contained in figures of speech, novel juxtapositions and stretched concepts taken out of context. The optimization of the lateral search and matching algorithms is a delicate synthesis of literal results across a broad, multidisciplinary silos of expert knowledge and “conceptual leap triggers” that should provide hints to the users for making uncorrelated connections between concepts that have never (or rarely) been linked to each other, in context.

**KEY PERFORMANCE INDICATORS**

1. The number of “solutions in search of problems” able to address each unmet need
2. The number of “lateral” applications that could be envisioned, for a given solution
3. The ratio between total number of viable matches (solutions to unmet needs) and total number of assets scanned (this ratio is calculated for each tech scouting source)
4. Scouting/ matching efficiency measured as the amount of time and economic resources needed to identify potential solutions that are good enough to enter a formal due diligence

**P26**

### 3.19 Cognitive theories of consciousness

**199 Body of Ownership and Body of Agency Appeared From Bayesian and Inverse Bayesian Inference** Yukio Pegio Gunji , Mai Minorura; Kei Kojima; Kazuto Sasai <pegioyukio@gmail.com> (Waseda University, Shinjuku, TOKYO Japan)

While sense of ownership (SoO) and sense of agency (SoA) has been investigated in the cognitive experiments, the dynamic relation between them and its underlying mechanism is still unknown. The model to explain SoA was proposed in the form of the comparator model, and it was so classical that it lacked the notion of readiness potential and post-diction. Although the comparator model was seriously criticized recently, we think that it can be revived if it could be implemented with readiness potential (RD) and intentional consciousness (IC) and could be totally reconstructed. We here propose a new “Duplicated Comparator Model (DCM)” equipped with distinction between RD and IC. The RD unconsciously infers the bodily motion in advance, and the IC interprets the control afterward. These two inference and interpretation loops are overlapped in the place of estimating matching of prediction and post-diction. In DCM, the RD part is implemented by Bayesian inference, and the IC part is implemented by inverse Bayesian inference (Gunji et al., 2017). Since Bayesian inference replaces a probability of hypothesis,  $P(h)$  (i.e. output) by a probability of the hypothesis under an experienced condition,  $P(h|d)$ , the probability space is contracted into smaller one, and optimal solution that is an optimal controllable body can be immediately achieved by Bayesian inference. We call such an optimal controllable body, Body of Agency (BoA). Since Inverse Bayesian inference can replace likelihood of the hypothesis,  $P(d|h)$  by a probability of data (i.e. input) empirically obtained,  $P(d)$ , the probability space is expanded and modified, and redundant bodies can be constructed in a body image. We call such a redundant body, Body of Ownership (BoO). We here show that BoO and BoA are dynamically changed and are equilibrated with each other. Usually they are correlated with each other. Under a specific condition, the one can be super-stable and the other is not. If only BoO is super-stable, a subject lacks SoA and he feels that he is controlled by others. That is a feeling characteristic to schizophrenia. If only BoA is super-stable, a subject lacks SoO and he feels that there is no other like himself in a universe. That is a feeling characteristic to Autistic spectrum disorder. It reveals that DCM can explain not only usual disposition in SoA and SoO but feeling characteristic to schizophrenic and/or ADS. Gunji YP, Shinohara S, Haruna T, Basios V (2017) Inverse Bayesian inference as a key of consciousness featuring a macroscopic quantum logic structure. *BioSystems* 152, 44-63. C

**200 Congenital Or Acquired? The Problem Of Knowledge Acquisition On The Intersection Of Sciences** Aleksei Melkikh <melkikh2008@rambler.ru> (Institute of Physics and Techn, Ural Federal University, Yekaterinburg, Sverdlovskaya Reg. Russian Federation)

The problem of knowledge acquisition is currently unresolved, despite the large number of hypotheses. This is a problem both for understanding the mechanisms of human thought, and for the study of animal behavior and the creation of artificial systems, which are decision-makers. To solve the problem, we must explicitly take into account the process of recognition of the environ-

ment by the organism. The model of recognition and decision making of intelligent system was built, on the basis of which it is shown that the acquisition of new knowledge leads to a contradiction. As a result, all behavior of humans and animals is controlled by innate programs. Generalizations, new concepts creation, abstraction, and other properties of human intelligence are the result of higher order logic in which the results of these operations exist before their execution. As a result, mathematics is not invented by human in the process of interaction with the outside world but discovered. Mathematical laws correctly reflect the world because the innate information (which is the part of biological evolution) is also a part of the evolution of the universe as a whole. The material basis of such innate programs are quantum nonlocal effects of biologically important molecules (see, eg, Melkikh and Khrennikov, 2015). References Melkikh AV, Khrennikov A (2015) Nontrivial quantum and quantum-like effects in biosystems: unsolved questions and paradoxes. *Progress in Biophysics and Molecular Biology*. 119. issue 2, 137-161. **P2**

### 3.20 Miscellaneous

**201 Mind over Music Perception** Elaine Chew <elaine.chew@qmul.ac.uk> (Centre For Digital Music, Queen Mary University of London, London, United Kingdom)

The mind---that of the listener, the performer, and the composer---can directly influence music perception. I shall describe how this can be done, and illustrate the process using mathematical and computational models. Much of music perception and cognition is concerned with making sense of the phenomenon we call music, with the generating of some logic that makes the sensory input cohere in a meaningful way. This coherence is what we call music structure. Perceived structure can differ from person to person, between listeners, and amongst listener, performer, and composer. In our previous work, we showed that differences in perceived structure arise due to the AEIO factors of attention, expectation, information, and ontological commitment. Here, I shall examine how the composer and performer influence attention, expectation, and what constitutes a thing through notational choice and prosodic decisions, respectively. The particular examples consider the composer's use of note duration, and the performer's use of extreme timing (such as tipping points) and intensity variation, to ascribe prominence and influence perceived structure. Finally, I shall introduce the theory of duality in the modeling of music perception. Whereas most models of music perception and cognition are formulated in such a way as to compute a perceived structure from music information, duality turns this convention on its head to model the perceiver's mind instead. This method has been trialled in the modeling of attention to different music features to explain divergent music structure analyses. Here, I shall use the duality approach to show how we can infer parameters of memory and chunking that alter tonal perception. Biography Elaine Chew ([www.eecs.qmul.ac.uk/~eniale](http://www.eecs.qmul.ac.uk/~eniale)) is Professor of Digital Media at Queen Mary University of London's School of Electronic Engineering and Computer Science, where she is affiliated with the Centre for Digital Music. Her research centers on mathematical modeling of musical prosody, structure, cognition, and interaction. She was previously Associate Professor at the University of Southern California's Viterbi School of Engineering and Thornton School of Music, where she founded the Music Computation and Cognition research laboratory. Her work has received recognition through the NSF CAREER/PECASE awards, and fellowships at the Radcliffe Institute for Advanced Study at Harvard. She earned Ph.D. and S.M. degrees in Operations Research from MIT, and a B.A.S. in Mathematical and Computational Sciences (honors) and in Music Performance (distinction) from Stanford. She holds Fellowship and Licentiate diplomas in piano performance from Trinity College London. As a pianist, she has performed internationally as soloist and chamber musician, and she frequently collaborates with composers to commission, create, present, and record new music. Her work has been featured on Los Angeles Philharmonic's Inside the Music series, and in an exhibit on Beautiful Science at the Huntington Library in California. She is on the advisory/editorial boards of the Computer Music Journal, Journal of New Music Research, the Journal of Music and Mathematics, Music Theory Spectrum, and ACM Computers in Entertainment. **PL6**

**202 On Contemplative Psychology** Han De Wit <hanfdewit@kpnplanet.nl> (Theoretical Psychology, Emeritus Professor, Oegstgeest, ZUID HOLLAND Netherlands)

Contemplative psychology is a psychology that forms an intrinsic part of the contemplative traditions of most world religions. The term 'contemplative psychology' therefore does not refer to academic psychological theory about contemplation, religion or religious behavior. It refers to the psychological insights and research methods that are - often implicitly - present in the vision and practice of religions. This paper reviews the nature of this first person empirical psychology in relation to the third person psychology of standard western psychology. C

## 4.0 Physical and Biological Sciences

### 4.01 Quantum physics, collapse and the measurement problem

**203 Vibrational frequencies of biomaterials follow  $e^2 + \phi^2 = \pi^2$ , is this the key to biological integration of information?** Anirban Bandyopadhyay <anirban.bandyo@gmail.com> (Advanced Scanning Probe Micros, National Institute for Materials Science, Tsukuba, Ibaraki Japan)

It has been shown recently that (Ghosh et al 2014, Information) the resonance frequencies group as triplet and triplet sets group as a triplet, a triplet of triplet of octave resonance band is a key to the integration of biological materials constituting a scale-free resonance behavior. We have discovered that magnetic resonance frequencies occur often at the ratio of  $\phi$ , and electromagnetic resonance frequencies occur at the ratio of  $\pi$ , together, they make the relationship  $e^2 + \phi^2 = \pi^2$ . This is a very important discovery because it argues that the resonance frequencies do not occur randomly, they are governed by the geometric laws of the universe. Advancing further, we checked ionic, quasi-particle resonances and do they follow the geometric laws? We found that this geometric rule is valid in particle physics, gravity, and every single complex clocking system that we could ever imagine. Possibly, integrated time crystals that follows the pattern of primes eventually become conscious, if the geometric laws are followed nicely. **PL11**

**204 On Observer Effect and Uncertainty Principle in Quantum Systems** V Guru Charan , Prem Sewak Sudhish <vgurucharan2@gmail.com> (Dayalbagh Educational Institute , Agra, India)

In this paper, a hypothesis has been presented to explain the observer effect and uncertainty principle in Quantum Physics and an effort has been made to integrate first-person phenomenology with the existing framework of Quantum Physics. One of the biggest mysteries concerning Physics today is the observer's role in Quantum Physics. Strange phenomena like Quantum Zeno effect confirm the major role an observer plays in the time evolution of a quantum system. In this effect, an unstable particle under continuous observation does not decay. This highlights the role of an observer in influencing the stability of the system. The process of observation is known to be a destructive phenomenon. We propose that the process of observation encompasses a spectrum of processes from mere measurement to complete control and manipulation of the system. According to the tradition of the Saints in eastern philosophy, there is a hierarchy of consciousness starting from low-grade material consciousness to the apex level pure spiritual consciousness. It is hypothesized that uncertainty is maximum at material level consciousness. And pure spiritual consciousness is accompanied with complete certainty. So, uncertainty is possibly a result of the spiritual nature of the observer that is not manifest. An observer with more spiritually manifested nature may experience lesser uncertainty with better control over the system, which may progressively increase as one ascends on the scale of spiritual hierarchy. The observers (including humans) with higher consciousness can observe and influence systems (including humans) of lower consciousness. Therefore, observation in Quantum Physics is not a passive phenomenon, rather it heavily relies on the observer. An observer with higher spirit awakening might experience complete certainty as a result of his complete control (which may be termed absolute free will) over the system under observation. Whereas, an observer with a lower grade of spiritual awakening may experi-



ence a high level of uncertainty with almost no control (or no free will) over the system. It may possibly be concluded that the first person experience of a meditator is worthy of consideration, as according to the proposed hypothesis, the practitioner with a higher level of spiritual awakening will be experiencing lesser uncertainty and will have a better handle over his experience. Statistical analysis may help in testing this hypothesis. It may even be possible to quantify the degree of control with the help of some simple experiments. **C25**

**205 Biophotonic Activities and Transmission in Relation to the Human High Intelligence and Consciousness** Jiapei Dai <jdai@mail.scuec.edu.cn> (Wuhan Institute for Neuroscien, South-Central University for Nationalities, Wuhan, HUBEI China)

Human beings hold high intelligence and present unique characteristics of consciousness; however, it is still unclear which brain properties might explain the underlying mechanisms. Recently, biophotonic activities and transmission have been suggested to play an important role in the realization of high nervous functions and are involved in the quantum brain. We have demonstrated that glutamate-induced biophotonic activities and transmission in the brain present a spectral redshift from animals (in order of bullfrog, mouse, chicken, pig, and monkey) to humans, even up to a near-infrared wavelength (~865 nm) in the human brain. In addition, we found that glutamate-induced biophotonic activities and transmission in the mouse brains are involved in the maintenance of subconsciousness or partly unconsciousness, whereas the altered state of consciousness is due to up or down-regulation of glutamate-induced biophotonic activities by other neurotransmitters such as acetylcholine, dopamine, norepinephrine, 5-HT and GABA. Such distinctive regulation of biophotonic activities by neurotransmitters could also be modulated by traditional general anesthetic and sedatives. These brain properties may be a key basis for explaining the high intelligence, and the origin and altered state of consciousness both in animals and human beings. **PL11**

**206 Are we quantum computers, or merely clever robots?** Matthew Fisher <mpaf@itp.ucsb.edu> (Physics, UC Santa Barbara, Santa Barbara, CA)

Of course quantum information processing is not possible in the warm wet brain. There is, however, one "loophole" - offered by nuclear spins - that must be closed before acknowledging that we are merely clever robots. Putative neural quantum processing with nuclear spins seemingly requires fulfillment of many unrealizable conditions: for example, a common biological element with a very isolated nuclear spin to serve as a qubit, a mechanism for quantum entangling qubits, a mechanism for quantum memory storage and processing, a quantum to biochemical transduction that modulates neuron firing rates, among others. My strategy, guided by these requirements, is one of reverse engineering seeking to identify the bio-chemical substrate and mechanisms hosting such putative quantum processing. Remarkably, a specific neural qubit and a unique collection of ions, molecules and enzymes is identified, illuminating an apparently single path towards nuclear spin quantum processing in the brain. **PL3**

**207 Gravity in the quantum lab** Ivette Fuentes <ivy7.fuentes@gmail.com> (School of Mathematical Science, University of Nottingham, Nottingham, United Kingdom)

Quantum experiments are reaching relativistic regimes. Quantum communication protocols have been demonstrated at long lengths scales and experiments are underway to distribute entanglement between Earth and Satellite-based links. At these regimes the Global Positioning System requires relativistic corrections. Therefore, it is necessary to understand how does motion and gravity will affect long-range quantum experiments. Interestingly, relativistic effects can also be observed at small lengths scales. Some effects have been demonstrated in superconducting circuits involving boundary conditions moving at relativistic speeds and quantum clocks have been used to measure time dilation in table-top experiments. In this talk I will present a formalism for the study of gravitational effects on quantum technologies. This formalism is also applicable in the development of new quantum technologies that can be used to deepen our understanding of physics in the overlap of quantum theory and relativity. Examples include accelerometers, gravitational wave detectors and spacetime probes underpinned by quantum field theory in curved spacetime. **PL5**



**208 The Possibility of Quantum Walks on a Microtubule Surface** Saatviki Gupta , Nandita Gupta, PhD; Arun Kumar Gupta, PhD <saatviki@gmail.com> (Physics, Dayalbagh Educational Institute , Delhi, India)

This paper examines the possibility of information processing taking place on the surface of microtubules (MTs) through random Quantum Walks which could provide a possible explanation for quantum computations happening at that scale, even in an inhospitable biological environment. It was hypothesized by Schrodinger that as the scale of a system goes down, quantum effects start to appear. When looking at a system from the point-of-view of a new computing paradigm, the term “scale” now no longer refers to the actual physical size of the system (it may be, a molecule, enzyme etc.) but the size of the “sampling space” of the computational process. Of the many computational concepts that are used as the basis for algorithms, the Random Walk is commonly used to model classical algorithms and is based on an extremely simple premise. According to the basic principle, a starting point is selected on an indirect graph followed by selecting a neighboring point or node at random and moving to it. This process is repeated until a termination condition is fulfilled. The final random sequence of nodes travelled on the graph is then called the Random Walk. This algorithm is very versatile and has been used to explain excitation energy transfer in light harvesting complexes in biological processes such as photosynthesis. According to the explanation, the electronic excitation performs a Random Walk among the hundreds of molecules in the antenna complexes till it either decays to its ground state or is trapped by a reaction center. The classical laws of probability are applied to analyze the chance of a certain path being chosen and some final node being reached. An analogous version of this algorithm exists called a Quantum Walk in which the classical probability law is modified such that now a probability amplitude is assigned to each possible path in the Random Walk. Now, it is assumed that both possible paths are taken simultaneously until one of the wave functions collapses. Based on this idea it is proposed that electrical excitations travelling within MTs may transfer between tubulin dimers following a Quantum Walk algorithm. The output of a given walk could be channeled through surface MAPs into the next MT and continue as a new Quantum Walk through it and so on. Additionally, according to previous reports on photosynthetic complexes, electronic coherence is possible even in biological environments and this supports the possibility of Quantum Walks on MTs. Such a concept may lead to an emergent phenomena which grows from the scale of an excitonic pulse on to tubulin dimers, MTs and finally can be macroscopically observed at the scale of a neuron or a network of neurons while allowing an extremely high density of logical operations per-unit-area. **P1**

**209 Quenched Disorder Of The Self-organizing Universe: Randomness Of Galilei, Gaussian Distribution Errors, And Taoism** Ju Hyoun Lee , Boyoung Cha; School Of Medicine, The Johns Hopkins University, Maryland, USA <ju.lee@mail.com> (Agricultural And Life Science, Seoul National University, Seoul, Korea, Republic Of)

The universe is a self-organizing system, whose interactions linearly and non-linearly occur. One nature of self-organizing complexity of the universe is limited randomness or quenched disorder that allows for structural stability. Under this conceptual frame, we attempt to find the common ground with the perspectives of ancient astronomers, and with the examples of today's satellite or physical model systems in modern science, and with Taoism of Eastern philosophy. The perspectives of ancient astronomers on the observations conceptually had much in common with quantum theory. Before the advent of quantum theory, Galileo Galilei discussed that all the observations are subject to errors, due to the observers. In 1632, G. Galilei further noticed that the errors in astronomical observations are random but not totally random. He found that the randomness of errors tended to be symmetrical. This theory was later established as the Gaussian error distribution. In modern science, this normal distribution is now widely applied to climate models and satellite observational error distribution and estimation of their uncertainties, as well as data assimilation studies. We will present how the stochastic approach in physics resolves the satellite measurement errors and improves systematic stability. We will demonstrate that such a randomness can accommodate a non-linear system, and describe the self-organization of the

randomness mathematically. In addition, we will present the scale-discrepancy between satellite observations from the space and field measurements at a local stations, in order to discuss the scale-dependency of self-organizing universe. Taoism also suggested the similar concept that can describe the autopoietic nature and randomness of the universe. It is named 'leaving the nature as it is', as opposed to artificial frame, societal regulation, direction or intentional aim. Without any aim, any deliberate effort, any human intervention or any prejudice, they attempted to reach the intrinsic and primordial nature in mind. C

**210 Applying Mathematical Theories of Consciousness to Quantum Wavefunction Collapse** Kelvin McQueen <klvnmqcn@gmail.com> (Philosophy, Chapman University, Anaheim, CA )

Modern quantum physics faces the measurement problem: after a measurement, the basic formalism (i.e. the wavefunction evolving according to the Schroedinger equation) corresponds to a superposition of all possible outcomes, but we observe just one of these outcomes. The orthodox Von Neumann approach postulates that measurement causes the superposition of outcomes to randomly collapse to a single outcome. This approach is inadequate as "measurement" is not well defined. A large number of approaches have since been put forth (e.g. many worlds theory, dynamical collapse theory, Bohmian mechanics, etc.). All such theories face difficulties, and there is a lively discussion in the foundations of physics literature as to whether those difficulties can be resolved. An alternative view postulates that consciousness, as opposed to "measurement", is the cause of collapse. This view has met with much less acceptance than the previously mentioned approaches and is often exaggerated and ridiculed. Reasons for rejection include: (i) "consciousness" is as poorly defined as "measurement"; (ii) descriptions of fundamental physics should be observer invariant; (iii) the view is committed to mind-body dualism, a thesis refuted by philosophers of mind; and (iv) the measurement problem is not solved by this view, the problem is instead hidden beneath the potentially insoluble mind-body problem. Here it is argued that recent developments in theoretical neuroscience, in particular, the advent of mathematical theories of consciousness, undercut these objections. Giulio Tononi's Integrated Information Theory (IIT) of consciousness will be used as an illustration. IIT defines the amount of consciousness in a given physical system in terms of the amount of integrated information ( $\phi$ ) in that system. IIT also individuates the specific experiences had by a physical system in terms of a property of that system known as its maximally irreducible conceptual structure (MICS). I will consider the possibility of a theory on which collapse is caused by  $\phi$  and another on which collapse is caused by MICS. The feasibility and philosophical implications of these theories will be evaluated. C14

**211 It's About Time: Experiments in Consciousness and Retrocausation** Daniel Sheehan <dssheehan@sandiego.edu> (UCSD, San Diego, CA)

Over the last 20 years two familiar phenomena have emerged as major physical explicanda: time and consciousness. Both are so obvious as to be presumed known, yet as physics seeks more fundamental theories, as well as convergence with other fields, it has become increasingly clear that neither is adequately understood -- or even defined. Quantum mechanics, which is strongly shaped by its puzzles and paradoxes, (e.g., Einstein's bubble, Schrodinger's cat, EPR, Wheeler's delayed choice, quantum eraser, interaction free measurements), has never shaken its close association with the conscious observer and is increasingly burdened by thorny issues regarding time [1]. If simplicity is a primary measure for beauty (or truth), then "retrocausation" is a lovely concept because it elegantly resolves most of the paradoxes encumbering the field [2]. Likewise, some of the deepest mysteries surrounding human consciousness also involve the nature of time. In particular, precognition (the anomalous but statistically significant foreknowledge of future events) has strong laboratory support but lacks a convincing physical mechanism. It is suspected that some version of quantum retrocausation might hold the key [3,4]. (Retrocausation is the proposition that the future can affect the present in a manner analogous to how the past affects the present via causation.) This talk will explore the current status of retrocausation vis-a-vis consciousness, drawing on the experiments by Libet, Bem, Radin, Mossbridge, Bierman and others. It is hoped that each will illuminate the other and also shed light on quantum foundations. (1) H.D. Zeh, *The Physical Basis of the Direction of Time*, 5th Ed., (Springer, 2007). (2) J.G.

Cramer, *The Quantum Handshake: Entanglement, Nonlocality and Transactions*, (Springer, 2016). (3) *Frontiers of Time: Retrocausation -- Experiment and Theory*, AIP Conference Volume 863, D.P. Sheehan (Ed.), (AIP Press, Melville, NY, 2006). (4) *Quantum Retrocausation: Theory and Experiment*, AIP Conference Volume 1408, D.P. Sheehan (Ed.), (American Institute of Physics, Melville, NY, 2011). **PL8**

**212 Engineering The Electromagnetic Entanglement Building Solidity In The Universe** Jimmy Vigo <jvigo@elp.rr.com> (Research and Development, The HVB Research Foundation, El Paso, TX )

In the abstract #247 of the 2016 Center for Consciousness Studies Conference in Tucson, Arizona, it was hypothesized that the solidity of the universe moves in Spacetime forward into the future through periodic cycles of mounted-dismounted-remounted (teletransportation). The process resembles the energy traveling on the domino effect and a storm (vortex) or an eddy revolving over the rushing waters of the river. The process is controlled by attenuation of the amount of localized and delocalized energy (scrambling duality, solid versus wave) over an ether or matrix fabric of the universe. This Heartbeat of the Universe has a unique momentum and frequency of vibration represented by harmonic tones and overtones analogous to the energy levels of the electron (atomic orbitals) in the Atomic Harmonic Oscillator. The universe is like the toy 'Slinky' going downstairs, the spontaneous free-falling of a spring down a ladder upon an initial push, where the steps or rungs are energy levels of a hypothetical non-dual waveparticle of Time named Timeon. In the energy levels of Timeon, the past (or the cause) happens at a higher energy level than the future (the effect), so that moving forward into the future is a negative process of energy loss, in opposition to positive entropy, the universal tendency for increasing disorder. The universe is solid when Slinky is totally closed at a step (zero velocity) (point A), and it is not solid when traveling to a lower step (point B). Upon arrival at point B, the universe returns to solid, more disordered, when Slinky completely closes (for a very short time) and reaches zero velocity. This was modeled by the transportation from point A to point B of an electron occupying an atomic f orbital. The 8-petal daisy flower shape of the energy distribution passes through a harmonic and symmetrical series of energy re-distributions not proper to build solidity. The 3D shape was represented in 2D by the polar roses  $r(?) = \sin(100-140)$ , in which the solidity of the universe fades into total delocalization, discontinuity, divergence, decoherence, non-locality or oblivion at the asymmetrical central point  $\sin(120)$ . The model is a gene-like set of instructions representing teletransportation. The entanglement of electromagnetism creating solidity is simulated through the singlet (degenerate states  $dxz, dyz$ ) and triplet ( $dxy, dz^2, dx^2 - y^2$ ) ferromagnetic split of the 5d-orbitals of organo-copper crystals under the influence of an external electromagnetic field provided by a Superconducting Quantum Interference Device (SQUID) instrument. The 4D of Spacetime is modeled from the Square-Pyramidal geometry of energy localization, continuity, convergence, coherence, or locality of the triplet (Space) and singlet (Time) splitting. The discontinuity between the points A and B is correlated with a magnetic coupling constant  $J$  in ferromagnets of copper, amino and perylene complexes. This model applies the concepts of Magnetic Susceptibility, the Van Vleck equation, the Curie Law, the Curie-Weiss law, the Heisenberg-Dirac-Van Vleck Hamiltonian, the Temperature-Dependent and Independent Paramagnetism, and the Bleaney-Bowers equation. The synergistic entanglement represents the macro electromagnetic stage in which Human Consciousness is aware of Reality. **C**

## 4.02 Quantum field approaches

**213 Intuitive Consciousness And The Logic Of Single Field Physics: A Conscious Synergy Of Worldviews And Theories.** C. Sperry Andrews 4th , James E. Beichler <sperry.andrews@connectioninstitute.org> (Human Connection Institute, BERKELEY, CALIFORNIA )

Many scientists have come to believe that any true unification model in physics must include a concept of consciousness as well as a model for the mind that interprets the external physical/material world. And, that number is growing. This particular physical model does just that. In fact it goes much further. Since Beichler's single field theory (SFT) includes a physical model

of the neural net and explains how Mind and Consciousness can emerge from the physics of living organisms, it assimilates more intuitive models such as Andrews' 0-D point Void which witnesses and co-creates higher-dimensional Riemannian geometrical realities as well as other more generalized physical models of consciousness to form a truly synergistic model of reality. In other words, physical reality and the consciousness that perceives and interprets that reality both come from the same source, they are co-created at the very beginning of the universe. A singular discrete 0-D point/twist Void emerged within the absolute spaceless-timeless Void of nothingness that preceded everything and through a logical sequence of events produced everything that now exists as our universe. This synergistic model goes well beyond the notion of Mind and Consciousness as mere perceivers and interpreters of the external material/physical world. It clearly demonstrates that the precursors to our experience of Consciousness are fundamental elements and active participants in creating the physical world that we perceive and scientifically interpret through the application of physics. **C27**

## 214 Essential Differences, Symmetry, Noether's Theory and The Mind Body Problem

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Noether's theorem relates conservation laws to symmetries of space, time and internal symmetries. "Because of the central role of conservation laws, Noether's theorem may be one of the most strategic programs of deductive reasoning in all of physics. In some sense it surely takes us along the way towards the foundation of physics" (Neuenschwander). The theorem furnishes profound connections between the fundamental constituents of reality and symmetry by combining the calculus of variations and QM with Lie groups. More importantly for our purpose the unification program based on this theorem attributes the differences between elementary constituents of matter to the action of 'broken symmetry' mechanisms prior to which the differences were indiscernible. (For Leibniz symmetry is a way in which indiscernible differences illuminate discernible ones). Electrons and neutrinos seem very different as do photons and Z particles but electroweak unification (conveniently captured by SU(2)) shows that they are related because the present differences between them resulted from prior symmetry breaking. By the same token the relationship between fermions and bosons and a possible 'theory of everything' depends on the prospects of supersymmetry and its mysterious connections to the exceptional finite Lie group E8. If consciousness is physical we need to explain why it appears to be so different than standard elementary physical constituents. Unlike approaches that attempt to explain this difference by explaining away our anti-physicalist intuitions conceptually/psychologically, I will assume that consciousness is composed of some strange state of matter and ask whether symmetry principles in general and Noether's theorem in particular can help us get a handle on that difference. Failure to do so would strengthen the conclusion that even if consciousness is a fundamentally 'broadly physical' constituent of reality, it is still different than similar fundamental constituents. I will begin with a few words on the importance of symmetry principles to physics, mathematics and the brain and the 'unreasonable efficiency of mathematics in physics' but also the importance of symmetry to Husserl's Eidetic phenomenological reduction: "...form of imaginative variation by which you attempt to reduce phenomenon into its necessary essences. This is done by theoretically changing different elements (while mentally observing whether or not the phenomenon changes) of a practical object to learn which characteristics are necessary for it to be it without being something else?" I will try to apply Noether's theorem to: a) Categorical Russellian monism in which the bearer of the microphysical properties can be physical, phenomenal, or any combination of the two that does not influence the physical behavior of the system. Here Noether's theorem may provide us with novel conserved quantities, perhaps even the associated 'particle' mediating the interaction between the physical and the phenomenal. b) Is symmetry breaking immune to Chalmers' Structure and Dynamics Argument? c) Time-dependent spatial topology exhibiting novel continuous symmetry with timelike curves (CTC) and temporally non-orientable manifolds as examples of hidden temporal symmetries with philosophically relevant conserved quantities. d) Restoration of hidden temporal symmetry and the 'physics of consciousness'. Chronos, Kiros and Projective Geometry. **C15**

**215 In Search of a Source of Proto Consciousness** Mani L. Bhaumik, PhD <bhaumik@physics.ucla.edu> (Physics and Astronomy, University of California at Los Angeles, CA)

The Penrose-Hameroff theory of the epistemology of consciousness is gaining increasing acceptance by the scientific community. According to this theory, a conscious moment arises when the universal proto consciousness is harnessed by way of reduction of global quantum coherence in the brain that builds up starting in the microtubule and indispensably aided by quantum entanglement. What is missing in this efficacious paradigm is apparently a source of proto consciousness. A search for such a universal proto consciousness naturally leads to the ultimate source of everything, which is the quantum vacuum and the Quantum Field Theory (QFT) that deals with it. The stunning scientific discoveries of the twentieth century, supported by QFT, reveal that the quantum elds, which are the primary ingredient of everything in this universe is present in each element of space-time of this immensely vast universe. The most intriguing question is what keeps the immutability of the elds intact throughout the universe for all times. Does it not suggest the existence of some sort of self-referral scheme that is responsible for maintaining the delity of the quantum elds? Self-referral is an inherent feature of the self-interacting dynamics of the non-Abelian quantum elds. For example, the non-Abelian gluon eld strongly responds to its own presence. The self-interaction aspect of the quantum elds would be much more pronounced at fundamentally shorter distances, where gradually increasing unication of the elds is expected to occur. The robust self-interacting feature of the anticipated uni ed eld near Planck's dimensions could possibly be imparted to ambient dimensions by means of quantum entanglement. The attributes of self-interaction, self-coupling, self-organization or self-referral is also the hallmark of proto consciousness. As Penrose proposes, our brains contrive to harness an as yet undiscovered element embedded in primary reality that is responsible for evoking our awareness. Could it be plausible to identify this unknown feature to be the robust self-referral that is apparently associated with the quantum elds for keeping their immutability for all times in spite of their ubiquitous utuations with in nite dynamism? **C14**

**216 Quantum Medicine in Clinical Practice Could Regenerate Heart Cells** Flavio Burgarella , Patrizio Tressoldi\* Dipartimento Di Psicologia Generale, Universita' Di Padova, Italy <flavio.burgarella@gmail.com> (Burgarella Quantum Healing, Banzano, BG Italy)

While in classical physics we work in the "space-time dimension", according to the principle of causality, human biophysical fields respond to the laws of resonance and takes place in a dimension that could be called "attention" and the principle of causality is replaced with the principle of consistency. In this case the effects are manifested when the related information signals have the same frequency or are integer multiples of the reciprocal frequency, so as to create a resonance or a harmony. Burgarella Quantum Healing (BQH) works as a morfic field in which the principles of Quantum Medicine can be put in clinical practice by encouraging the patient's healing process. Through reconnecting to Universal Consciousness, it generates a profound form of knowledge that "activates the individual's energy system" and "coherence" in all organs and human body systems. Through consistency it will generate phenomena of "resonance" between the energy fields that convey information and influence each other. A case-study with heart attack post effects will be shown to prove the potentialities of the BQH. The patient had a heart attack in 1998, followed by a coronary artery bypass surgery. He showed a residual scar (Q waves in electrocardiographic leads D2 D3 aVF) which effects were visible to a color Doppler echocardiography in 2011 showing an hypo - akinesia of the myocardial inferior wall and an hypokinesia of the interventricular basal septum. In November 2015, the patient completed a cycle of 5 weekly sessions of BQH aimed at regenerating his cardiac cells, followed by a two daily sessions of Therapeutic Meditation for two months at his house. The echocardiographic examination on 01/09/2016 did not show alterations in segmental kinetics and a normal wall thickening replacing previous alterations of contractility. It should be noted that the disease was stabilized for a long time and the patient followed a drug therapy regularly with beta blocker, nitroderivatives, statin and aspirin. **C16**

**217 What if Free Will is Not An Illusion and Can Be Reconciled With the Known Laws of Physics?** Michael Elliott <melliott007@gmail.com> (I, Quantum, Hermosa Beach, CA )

The physicist Freeman Dyson once said: “mind is already inherent in every electron, and the processes of human consciousness differ only in degree but not in kind from the processes of choice between quantum states which we call “chance” when they are made by electrons.” In this paper, we assume Dyson was correct in his conjecture and explore the consequences. We start by supposing that a 1st person perspective exists in fundamental particles, like the electron, and that a duality exists between this and the 3rd person quantum mechanical description - two equivalent but different perspectives. For example, when electrons are fired through a Stern-Gerlach apparatus quantum mechanics says we will find the electron spin ‘up’ a certain percentage of the time, and spin ‘down’ the rest with nothing in between possible. From the electron’s perspective, it is forced to make a choice, with quantum probabilities manifesting as preferences for ‘up’ vs ‘down’. In this way, the laws of quantum mechanics are followed precisely, the electron freely makes a choice in accordance with its preferences and the dual views agree. However, much is missing from the electron’s experience when contrasted with human consciousness: the electron has choice forced upon it - we fired it through the Stern-Gerlach apparatus - it cannot choose to not make a choice, it has no means to retain memories, nor self-awareness, no mind’s eye, etc. Furthermore, electrons are interacting with the environment and being forced to make choices at a maddening rate of billions of times per second. With quantum entanglement things begin to change, however. Quantum entanglement is the only process within physics by which two or more fundamental particles can become ‘one system’ of particles in a meaningful way. And, in practice, billion of particles have been entangled with no theoretical upper bound. We use recent theorems of quantum mechanics that show how sustained quantum entanglement in biological systems is possible despite fast decoherence rates. As entanglement grows more extensive we show how memory emerges in the entangled system and how choice become possible without collapsing the system. At a certain point entanglement becomes so extensive that the system’s wave function interacts with itself forming a nonlinear Schrodinger equation, which has known solutions, e.g. Davydov solitons. Such a nonlinearity may allow NP-complete problems to be solved in polynomial time. This crisscross entanglement topology is conceptually like the system regulating its own magnetic field ala’ the Stern-Gerlach apparatus. From the 1st person perspective this feels like the ‘mind’s eye’ and allows the system to choose what choices to make - and whether to make a choice or not. This gives rise to free will. We show that all of this is consistent with the latest experimental results from Biology and Neuroscience. Our results paint a compelling picture of the evolution of life as a phenomenon of growing quantum entanglement in which more advanced conscious phenomena, like memory, self-awareness, a mind’s eye, and free will emerge with, and dual to, growing quantum entanglement. C24

**218 The Double Helix of Dna and Transferring for Information and Energy by Torsion Field in Quantum Beings** Xingliu Jiang , San-sheng Wang <jiangxl@buaa.edu.cn> (Physics, Beihang University, Beijing, China)

Many scientists have long been aware that our earth is immersed in an extremely dense sea of energy, which permeates every nook and cranny of the universe. Recently it was realized that this huge reservoir could be an available source of valuable dense energy[1]. Our universe is holographic and vortex universe due to the factors of quantum teleportation and quantum entanglement[2]. The transferring of information and energy between cell and cell could be created by torsion wave produced by fundamental particle spin and double helix of DNA. The advanced study into the human torsion biofield is moving us from seeing ourself as physical beings to seeing ourself as bio-energetic and bio-informational beings. It is believed that everything in the universe is built from quantum building blocks. In biological macroscopic world, where the warm, wet matter of the body, we cannot feel and detect the signature of the quantum realm. This beliefs is especially true in biology, but frontier scientists across the board, from physics, biology, mathematics, medicine philosophy and other disciplines, say not so. The human beings may indeed be quantum beings. Experimental results of torsion field have shown that all matter harnesses torsion waves to sustain its existence. An atom is actually a vortex of quantum vacuum zero point energy, where the negatively charged electron clouds are pressing in towards the positive-charged nucleus via the Biefeld-Brown effect. C26



**219 How can Consciousness Arise within the Laws of Physics?** Roger Penrose <rouse@maths.ox.ac.uk> (University of Oxford, Oxford, London United Kingdom)

It is a common viewpoint that consciousness arises as some kind of side-effect of complicated computations being carried out within the brain, and that the details of the actual physical process taking place have little relevance. However, there are good reasons to believe that, although many computational processes are indeed involved in brain activity (such as in the cerebellum), these are not what are responsible for the phenomenon of consciousness. Arguments from mathematical logic clearly demonstrate that concepts such as 'meaning' and 'understanding' cannot be encapsulated by the mere following of computational rules. As a consequence, conscious experience cannot be the result of purely computational physical actions, and must therefore arise from physical processes that are not of a computational character. The proposal of Orch-OR (orchestrated objective reduction), developed in conjunction with Stuart Hameroff, posits that the key non-computational physical action is that which occurs when a quantum state objectively reduces (or 'collapses'). This requires, not only a deeper understanding of quantum processes than current theory allows, but also a very high level of quantum coherence taking place in the brain - clearly a very remarkable achievement for a 'warm and wet' structure such as a human brain. Nevertheless, we argue that this must be possible and that neuronal microtubules are likely to be the major structures able to preserve such quantum coherence at the necessary level. **Key Words:** Orch-OR, orchestrated objective reduction, quantum coherence **PL1**

**220 Paradigm Shift in Detection Methodology of Mental Intention** Robert Plotke , Robert Jay Plotke <bobplotke@sbcglobal.net> (Simi Valley, CALIFORNIA )

There is substantial statistical researched evidence and patent art [US 2013/0036078 A9; US 8,423,297 B2; US RE44,097 E; US 6,324,558 B1; US 6,763,364 B1; US 6,762,605 B2] that demonstrates the ability to detect the influence of mental intention on a physical device, using a randomly-generated signal with the processing of a random digital number output by various methods. The basic concept is that mental intention increases the orderliness/coherence of a randomly produced signal. The field of mental intention that influences a physical device is ever moving forward to create greater fidelity of and validity for the thought field effect. To fulfill the goal of greater fidelity, a paradigm shift in the detection and measurement of mental influence should to be considered. The first change in methodology is to generate a random signal that is, by its nature, highly responsive to active human entrainment (ordering influence). This human ability to actively create order from randomness is a pivotal concept to this coherence concept. The second change in methodology is a data processing technique that detects the amount mental intention changes the random signal source's natural coherence. The third change in methodology that leads to practical application is a processing technique that provides coherence information in streaming real time. A streaming data processing technique lends itself to threshold and pattern controls for the potential purpose of mentally controlling switching, communication, feedback and mechanical movement. These signal source and processing methods have been developed and are operational as a human non-contact approach. Preliminary research, with six subjects participating in at least three five minute trials, has demonstrated that this paradigm shift in methodology can discriminate and be influenced by mental intention, 25% up-to 100% greater than the non-intention ambient threshold state. Presently research continues to increase the number of study participants with the intention to detect a specific human frequency of intention, determine if there is a residual mental intention effect with the device, and determine if there are signal patterns that can be only produced by mental intention. **P2**

**221 Microtubules as Subcellular Memristors: Modeling and Measuring Electrostatic and Conductive Properties of Microtubules** Jack A. Tuszynski <jack@ualberta.ca> (Physics, University of Alberta, Edmonton AB,, Edmonton Canada)

Microtubules (MTs) are cylindrical protein filaments that play crucial roles in eukaryotic cell functions. They are particularly important in both axons and dendrites of neurons, hence their prominence in biophysical models of consciousness. I will provide an overview of the many interesting biophysical and biochemical properties of microtubules, especially their electrostatic



and conductive behavior. The building block of microtubules, the heterodimer of alpha and beta tubulin has been well characterized crystallographically, which allowed us to build atomic-level models of tubulin and microtubules. These models reveal complex electrostatic properties of microtubules, molecular mechanics, structural stability, hydrogen-bond interactions as well as conductive properties in ionic solutions. Here, we report on the recent experimental results of the effects MTs, and tubulin dimers have on ionic solution's AC conductance. Using a microelectrode system we have measured the AC conductivity and capacitance in a number of tubulin and microtubule solutions between 1 kHz and 1 MHz range of electric field frequencies. MTs in a low ionic solution increase solution conductance by 6% at 100 kHz, and this effect increases as the concentration of MTs increases. We model the possibility that this effect is due to ions being able to use MTs as a low-resistance cable as predicted in earlier publications. Conversely, tubulin dimers decrease solution conductance by 5% at 100 kHz under similar conditions indicating that a transformation from depolymerized to polymerized tubulin corresponds to an insulator-conductor transition with major implications for cell division and the function of neurons. We model these effects as being due to tubulin attracting counter-ion charges and lowering their mobility when depolymerized and directing their flows when polymerized. MTs show the ability to modulate the buffer solution's conductance and capacitance and act as low resistance pathways for ions. This has significant implications for biological information processing, especially in neurons, and for intracellular electrical communication in general. A particular effect observed in our experiments shows that microtubules function as memristors. Memristors represent the fourth element of the electrical circuits complementing resistors, capacitors and inductors. Hallmarks of memristive behavior include pinched and frequency-dependent I-V hysteresis loops and most importantly, a functional dependence of the magnetic flux passing through an ideal memristor on its electrical charge. In this talk I will provide both theoretical and experimental evidence that microtubules act according to the definition of a memristor. Their biophysical properties lead to pinched hysteretic I-V dependence as well as a classic dependence of magnetic flux on charge. Based on the information about the structure of microtubules I will give an estimate of microtubule memristance and discuss its significance for neuroscience and nanotechnology. **PL9**

### 4.03 Space, time and the nature of reality

**222 The Key to Science of Consciousness Lies in the Mathematical Abstractions of Zero and Infinity** Shobha Bhasin , Sant Saran; Sukhdev Roy <shobha.bhasin@gmail.com> (Management, Rutgers University, Newark, NJ )

It is widely accepted that consciousness is the ground of being and is the basis of our subjective experiences. It is difficult to accurately express subjective experiences in any language. Eastern experiential accounts of pure consciousness describe it to be highly abstract, immortal, eternal, infinite, extremely blissful and beautiful, incomprehensible through mind and ineffable. Hence, descriptions in scriptures are heavily symbolic using metaphors from observable physical reality and hence prone to constraints of interpretation. It is no wonder that highly abstract fields of arts, music, painting, sculpture or poetry and the highly abstract physical mathematical theory of quantum mechanics are also open to multitude of interpretations. In developing a science of consciousness, it is important to identify powerful scientific metaphors to facilitate greater scientific understanding of experiential states of consciousness. In this paper, we propose that the highest abstraction in science through mathematics and quantum physics, enables identification of important features of consciousness and intuition. The defining characteristics of consciousness, namely, immortal, eternal and infinite, imply consciousness to transcend space, time and cause and have a transcendental existence. To bridge the physical with the transcendental, it is important to identify, the interfaces as stillness: between time and eternity; emptiness: between space and infinity; and silence: between cause and immortality. An attempt to understand consciousness through the mind, i.e., theoretically consciousness as extreme mathematical abstraction, invariably requires zero and infinity. The mathematical fabric of reality becomes evident at the largest and the smallest scales. Extending the recent expositions of Penrose, Tegmark and Srivastava et al. (Intl. J. Gen. Syst. 45, 41-54, 2016), consciousness needs to be represented by infinite degrees of functional freedom, an infinite-qudit quantum system and its dynamics by quantum mechanics of information states represented by

vectors in hierarchic infinite dimensional Hilbert spaces to provide phenomenal subtler features of consciousness and enable a virtual coherent spatio-temporal structure, independent of the anatomical structure that supersedes and operates the brain's intrinsic activity. At the extreme limit, infinitesimally small particles below the Planck scale, will become subtler, possess infinite potential and hence, become omnipresent and omniscient. The worldview of eastern philosophy was strongly based on zero (nothingness) and infinity (everything-ness). In the Isha Upanishad of the Yajurveda (1000-600 BC), a famous incantation appears, i.e., "From fullness comes fullness, and removing fullness from fullness, what remains is also fullness". Infinity was a human attempt to make the transcendental all-inclusive. With consciousness, we become aware of limitless possibilities and nothingness that existed before it and aim to merge into that void of eternity. It is argued that since mathematics is the language of science and great advancements in our understanding of nature have been possible through interpretation of abstract mathematics, it is important that extreme abstractions in terms of zero and infinity should not be limited to the confines of the physical domain, when they point to the metaphysical or the transcendental domain and provide a window at the very limits of human thought, for an understanding of consciousness. **P1**

**223 The Uninterrupted Arising of Reality, Panexperientialism, and the Schrodinger equation** Juan Carlos Villacres Bolaros <jvillacresb@gmail.com> (Physics, Universidad Regional Amazonica Ikiam, Tena, Tena Ecuador)

In this work some arguments are presented that suggest that indirect realism is not suitable for analyse Schrodinger equation, that reality - including space and time - is arising and perishing, and that there is a state in which entities cannot be the relata of asymmetric relations of being a necessary condition. In order to give coherence and embrace these results some basis for a panexperientialist view is proposed. This view is used to arrive to the Hamilton-Jacobi equation, and to justify conceptually and formally the Schrodinger equation. Also, a different method from the so called canonical for transitioning from classical equations to their quantum version is conceptually supported and used to obtain the Klein-Gordon equation. **C5**

## 4.04 Cosmology and integrative models

**224 Demystifying The String Theory: The Spinning Top Hypothesis of Strings Arrangement** Ansh Agarwal , Dr. Siddharth Agarwal <anshagarwaldei@yahoo.in> (Technical College, Dayalbagh Educational Institute , Dayalbagh, Agra, Agra, U.P. India)

If we throw a top while pulling on its string, the top spins. The mathematical solution to how a top spins along with its nutation and precession movements, is an important physical example of studying motions of large celestial bodies on one hand and quantum spin behavior of sub atomic particles on the other, thus making it an ideal integrable model for string theory postulates. We can study different types of states transforms during quantum angular momentum of the spinning top model, a view supported by Dirac equation. The work by Sieberg and Witten on  $N=4$  gauge theories in 3 dimensions and Nahm's equations in the study of moduli space also supports this unification. Toda lattices and monopoles spectral curves have also been mapped. The analogy of GC top with SUSY gauge theory can be extrapolated for massive worldsheet matter with a lattice of string on a CY manifold. Observing the paths of Lagrange Tops body frames reveal one-to-one correspondence to the frames of elastic curves. Our challenging problem is to understand non-perturbative behavior of field theories and string theories, and we have tried to explain it by understanding duality of  $N=2$  SUSY gauge theories and holomorphic functions. We consider the close relation between duality (gauge-gravity) of  $N=2$  SUSY gauge theories and integrable model of spinning top related to quantum moduli space of vacua of  $N=2$  SUSY. The maximal no. of supersymmetry generators possible is 32. Theories with 32 supersymmetries automatically have a Graviton (massless with spin 2). In this model of spinning top hypothesis of strings arrangement, we can see the links between consciousness and the spiraling energy inherent in the multi dimensions fabric of the cosmos as being elaborated on by modern science (Micro-Psi and string theory). **C15**

**225 Consciousness, Cosmology and Fundamental Physics: A New Copernican Revolution** Lorna Green <lornagreen@windstream.net> (El Rito, NEW MEXICO )

Consciousness has appeared as a term and a problem, in modern science. Most scientists believe

it can be accommodated, and explained, by existing scientific principles. But I say it cannot, and that it points completely beyond present day science, to a whole new view of the Universe, where consciousness, and not matter, or matter/energy, is the true basis of the Universe, and the right fundamental term, for science, for every other discipline as well, and for civilization itself. Consciousness is to modern science exactly what the paradoxes around Light were for classical physics, all our ideas about Reality, must change. In a nutshell: The mind/body problem, the ?hard problem? of consciousness, and the near death experience, are so hard, they cannot be explained by any scientific principles, and therefore call all such principles into question. And so I propose ?a new Copernican Revolution? among our fundamental terms: Consciousness, and not matter, is ?first and fundamental? in the Universe, it is there from the ?Beginning,? everything has it, and all of the true causalities, the explanatory principles are in it, they belong to consciousness, and not matter. What then is matter? All matter, physical reality, is an expression of consciousness. Every the least little bit of matter contains consciousness, and is in fact an expression of consciousness. This idea alone will change our world forever. And I go on to spell out what it means, for the four great aspects of the Real: The Universe, a major rewrite of modern science, both Physics and the Life Sciences, at their most basic concepts---explanation, the forces, mathematics, the dark energy of space, unified field theory, the quantum world, and so on; the Earth, a continuum of many forms of consciousness, of which our own is one, living conscious spiritual beings like Ourselves; Ourselves, seen through the lens of reincarnation, and the truth of human identity, beyond Freud or Jung, we are not just the victims of genes, drives, and childhood, but eternal immortal evolving spiritual beings, who incarnate, who take on a series of Earthly lifetimes, in which to develop abilities, and achieve certain goals, and then depart for other realms of the physical, or purely spiritual universes. And reincarnation gives us a breathtaking glimpse into the kinds of causality that come with consciousness, we come here with reasons for being here, and intent, plan and purpose are everywhere. And finally, Spirit, this new Universe picture opens directly into the basic term of every religion, Spirit, as simply Infinite Consciousness. And so, for the first time in their long bitter antagonistic history, science and religion now share a common base. And so, this new concept for science is a new metaphysical base for civilization itself. Present civilization is based on the destruction of the planet, and we cannot continue as we are. The more we realize our likeness with all other beings, all of us, divine and sacred incarnations of Spirit, the harder it will be to do them all in. **C27**

**226 Falsification Experiments for Cosmological Theories From The Science of Consciousness** Ronald Gruber, MD , Richard A BlockDept. Of Psychology; Montana State University; Ryan P. Smith, Department Of Physics; California State University East Bay; <ronaldpgruber@gmail.com> (Clinical Assoc. Professor, Stanford University Medical Center; UCSF, Stanford, CA )

The science of consciousness moves forward with the help of new experiments from the physical sciences. We explored the reverse situation. Physical science such as cosmology may actually move forward because of experiments from the science of consciousness and neurological sciences. Because the brain-as-observer is justifiably a part of quantum mechanics (QM) and therefore an obligatory part of many cosmological theories we identified falsifications experiments from the neurological sciences and the science of consciousness that are applicable to cosmology. We examined six different cosmological theories. Temporal Naturalism in the Cosmological Natural Selection theory claims that the flow of time (FOT), including motion, is real. However, a review of neurological evidence suggests otherwise. We provide two new falsifications tests. One test involves discrete stimulation of the recently discovered consciousness center, the claustrum, to remove the illusory FOT during normal visual observation. The results are expected to contradict Temporal Naturalism but not other cosmological theories. The other test involves the use of Harle's Information Gathering & Utility System (IGUS) for an observer. It consists of a virtual reality apparatus with a split screen that allows observation of past (right screen) and present (left screen) simultaneously. It is expected to remove the illusory experience of the FOT in which 1) objects appear to move into the past and 2) the observer believes he/she persists as "same." The latter falsification test is applicable to theories involving an expanding or evolving universe, and expected to be supportive. Conversely, it is expected to falsify the Temporal Naturalism theory. **C24**

**227 Conscious Cosmos** Brian Keating <bkeating@ucsd.edu> (Physics, UC San Diego, San Diego, CA)

Human minds represent a remarkable transformation; from stardust to consciousness in a relatively short span of cosmic time. Recent observations provide conspicuous, albeit circumstantial, evidence suggesting an inflationary origin of the universe. If confirmed, the inflationary paradigm has far-reaching consequences - paramount among them the seeming inexorability of an infinite number of universes within the so-called 'Multiverse'. The Multiverse hypothesis, bolstered by progress in String Theory, has intriguing implications for our understanding of quantum mechanics, and therefore consciousness as well. Concomitant with these developments has come criticism regarding the effects of String Theory and the Multiverse on the scientific method. How can we test the Multiverse hypothesis? If it can not be tested, as some have asserted, what would be the effect on the nearly half-millennium old practice of science itself? If the ultimate origin of the universe remains forever hidden behind a veil of ignorance, will a complete understanding of consciousness, too, fail to yield to even the most sophisticated experimental tools and observations? **PL5**

**228 A Universal Model Integrating Matter, Mind, Consciousness Resolves The Hard Problem and Cosmic Conundrum** Avtar Singh <avsingh@alum.mit.edu> (Massachusetts Institute of Technology (MIT), CUPERTINO, CA)

This paper presents a scientific approach to address the following questions: What powers the biological or so-called brain-produced consciousness, and how does consciousness causally affect brain processes? What is a potential physical theory of consciousness, and do we have free will? Did consciousness evolve or has it been present in the universe all along? Can consciousness persist after bodily death? It demonstrates the power of a wholesome consciousness-integrated science to reveal the ultimate universal reality or existence and physical basis for moral and aesthetic values including purpose, free-willed goals, and intentions. The approach of the scientific research is three-fold. First is to complete the picture of reality via integrating consciousness into a physical model and explain the observed empirical universe behavior resolving the current paradoxes, singularities, and inconsistencies of the mainstream scientific theories. Second is to develop a framework for an integrated model of matter, mind, and consciousness founded on the wholesome reality. And lastly, demonstrate the origins of moral and aesthetic values, and how can mental and cognitive functions be optimized via contemplative practices to cultivate awareness, purpose and meaning. A successful agreement between the predictions and empirical observations of the universe demonstrates the validity and credibility of the proposed approach. The predictions are further testable and falsifiable via future empirical observations. Consciousness is shown to be the eternal fundamental state of existence depicted as the Zero Point State. The brain-mind processes and qualia (emotions, thoughts, intentions etc.) are shown to be a subset of the relativistic states of consciousness or the universal mind. The free-willed and goal-oriented behavior is shown to be an orderly physical/cosmic trend governed by the universal laws and not an accident or a brain generated imperative. **C25**

## **4.05 Emergence, nonlinear dynamics and complexity**

### **4.06 Hierarchies, scale-invariance and 1/f systems**

**229 Understanding Subjective Experience Through Its Associated Experimental Correlates** CM Markan, Nagma Markan; Bhakti Kapur; Priti Gupta; <cm.markan@gmail.com> (Physics and Computer Science, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Subjective inner experiences (experiential-phenomenology) when studied in association to its experimental correlates have been suggested to be an ideal paradigm in exploring underlying mechanism in brain that construct such a 'qualia'. Spectral studies of spontaneous brain activity appear to be of (1/f) nature indicating self-symmetry and scale free processing in the brain. Interestingly, while perceived sensation experienced as a first person appears to be directly related to stimulus intensity its associated frequency correlates reflect (f/1) characteristics. What consti-

tutes a subjective experience that does not seem to share the same apparatus that delivers natural response of the brain? We study this dichotomy, on a platform considering brain as a dynamical system that oscillates at multiple frequencies, modelled as a cascade of hierarchically tuned filters driven by white noise. The model recreates the two contrasting responses and also provides some novel insights which bring out some interesting contrasts. C5

**230 Interpreting The Readiness Potential** Andrew Westcombe <awestcombe@gmail.com> (Blaxland, NSW Australia)

Benjamin Libet's Readiness Potential studies have attracted widespread attention since their initial publication more than 30 years ago. Though they have been widely criticised on various grounds, these studies are nonetheless routinely cited as demonstrating that conscious decisions to act are preceded by measurable unconscious processes by about 350ms. This calls into question our conscious access to our own volitions, which in turn suggests that the lay belief in conscious volition is to some extent illusory. Instead of consciously initiating an action, it seems that we unconsciously decide to act, and our consciousness merely reports on this event shortly afterwards. This paper argues that the data that Libet published is susceptible to various interpretations, and that the orthodox interpretation sketched above has been adopted because of its close congruence with the precepts of modern neuroscience. But more recent replications of the Readiness Potential studies, far from confirming the orthodox interpretation, strongly suggest that a different interpretation is more appropriate. C9

## 4.07 Logic and computational theory

**231 The Study of Consciousness on a Real Quantum Computer: Algorithmic Models to Elucidate the Role of Quantum Mechanics and Microtubules Over Free Will, Consciousness and Empathy.** Luis Javier Camargo Perez , Munoz-Jimenez D <camargo@cifro.org> (Center of Frontier Research and Philosophy, Tlalpan, CDMX Mexico)

Most recent hypothesis about consciousness involves strong foundations on quantum mechanics and its significant interaction with classical neurophysiology. Besides the technical debate on these bases, the evidence supporting a fundamental role of quantum effects on a human or even at cellular level has remained elusive due to the complexity to control and measure quantum phenomena on such scale is currently insurmountable. As the quantum computing became available, we aimed to study these theories by modeling them into a quantum algorithm capable of being executed on a real operational quantum computer (IBM 5-Qubit) providing the framework to cast different predictions and assumptions of each one of these based on measurable results. We propose a basic repertoire of algorithms and its preliminary results as archetypical models for the study of these theories and their possible role in the conscious phenomena. Methodology: Abstract formulations of the core assumptions of these theories were modeled as quantum algorithms understood as a sequence of quantum operators simplified and constrained to fit the topology and limitations of the real quantum processor. Algorithms were written in IBM Quantum Assembly Language 2.0 (QASM 2.0) which compiles into an executable quantum circuit. The algorithms were debugged and tested on the classical simulator and executed on the real IBM 5-Qubit Quantum Computer. In aims of simplicity, and to increase the readability of the QASM 2.0 algorithms, we developed an open-source javascript library to provide a high-level coding tool for quantum algorithms. Along with algorithms constrained to the real 5-qubit computer, an extended set were devised for their execution on an unconstrained ideal quantum computer or simulated while new topologies became available in the future. Microtubule Orch OR: Previous works have modeled quantum effects on microtubules into a Quantum Hopfield Network (Srivastava, 2015). We developed and implemented different variations of these networks as quantum algorithms capable of being executed on quantum computers. Testing these implementations with different hyperparameters and inputs allow to cast theoretical assumptions or address concerns such as the warm, wet and noisy environment as the qubit dephasing and decoherence can be easily simulated to some extent on the quantum computer. Bell Phenomena in Social Empathy: After the hypothesis previously formulated by our team, in which emotional empathy and arousal on social settings

where individuals are exposed together to a common light stimuli (such as a cinema) could be enhanced by the coherent photons observed simultaneously by two observers resulting in a coherent state between them, we modelled an algorithm to track the entanglement propagation among different observers and to disguise the possibility of qubit teleportation between them. Time Symmetric Consciousness-Free Will: Modeling another hypothesis previously proposed by our team, in which consciousness and free will are interpreted as time symmetric analog processes, we developed a time reversible algorithm in which a conscious and free-willed agent is abstracted into a single quantum gate which interacts with the environment and other quantum gates aiming to characterize their time symmetric properties. **C14**

**232 Digital Consciousness and Platonic Computation** Simon Duan <simon.x.duan@live.com> (Metacomputics Labs, London, United Kingdom)  
Modelling of the universe as a processing output of a computation is a new approach being considered increasingly seriously by scientists, philosophers and technology leaders. Suppose the universe can be modelled as a computer simulation, the following questions need to be resolved before the idea can be developed into a new scientific theory; Where is the computer? Where does it come from? What is it made of? How is it built? What are its properties? Who is the programmer? Metacomputics is proposed as the systematic study of the origin, construction, fundamental structure, composition, nature, properties, dynamics and applications of the Metacomputation System that constructs and operates the universes as its processing output. In metacomputics model, Consciousness is the most fundamental and irreducible existence and is defined as the abstract power to conceive, to perceive, and to be self-aware. Metacomputation System is made by, of, with, from Consciousness. According to Laozi's "Dao gives birth to One, One gives birth to Two, Two give birth to Three, Three give birth to everything", the Metacomputation System is proposed to be a Platonic computer derived from a 3-tier hierarchy construct using Ying and Yang and it consists of 3 faculties - data, program and processor. Metacomputics framework serves as a bridge between the state of non-duality and apparent perceived diversity. It facilitates an intellectual understanding of the mechanism of creation of apparent material Universe through a simulation process. Through the convergence of computation theories and metaphysics the proposed model clarifies a range of important concepts and phenomena that cannot be explained by existing accepted theories, these include consciousness, mind, time, space, identity, language, experience, perception, thought, feeling, emotion, sensation and action. Key Words: consciousness, mind, time, space, identity, language, experience, perception, thought, feeling, emotion, sensation and action. **C21**

**233 MISSING ABSTRACT** Hartmut Neven <neven@google.com> (Visual Search, Google, Venice Beach, CA)  
The Google Quantum AI team is getting close to manufacturing quantum processors that for certain computational tasks can outperform the fastest classical supercomputer by a very large margin. I will review how such near-term quantum processors can be applied to machine learning and what computational advantages we can expect. Insights from these efforts lead to new but still speculative proposals with respect to the questions: i) Do quantum resources play a functional role in higher brain function? ii) Is it possible to endow an artificial intelligence with the ability to experience emotional states and does this have observable consequences? In this context, we explore the merits of the admittedly tentative notion that relaxing into a stable state is correlated with a positive emotion while evolving into an unstable state is correlated with a negative emotion. **PL1**

## 4.o8 Quantum brain biology

**234 Purview of Scientific Data: 'Garbage In/ Garbage Out'** Sarah Knox <sknox@hsc.wvu.edu> (Epidemiology, West Virginia University, Morgantown, WEST VIRGINIA )

As gene and molecular technology improve, the accuracy with which we can measure molecular events has increased exponentially. The thesis of this talk is that no matter how accurately we measure, if we are excluding a large number of relevant data points, our interpretations will be



biased and misleading. If we limit all our attention to describing the molecular genetics of the elephant's toenails, and limit our results to these data, we are unlikely to draw accurate conclusions about the nature of the composite elephant. One of the primary problems in current consciousness research is that neuroscientists, who believe that materialism accurately reflects the nature of reality, dominate the definition of what constitutes 'scientific' data. Although quantum theory effectively exposed the inaccuracy of the materialist assumption almost 100 years ago, demonstrating that at a subatomic level, matter and energy are essentially indistinguishable, biomedical research remains anchored in Newtonian physics. The fact that we can measure the part of the brain that is activated during certain types of cognitive processes (e.g. using blood flow, fMRI, evoked potentials, etc.), describe the neurotransmitters, neurohormones and neuroanatomical substrates associated with emotion, and know how impulses are transmitted between neurons has not brought us any closer to understanding what a thought is. It is not possible to examine any or even all of these neurophysiological parameters together and be able to predict with any accuracy, what the subject of our experiment was thinking. Orch-Or brings us a step closer by defining an objective collapse of the wave function associated with conscious awareness, but does not really tell us whether this process constitutes the origin of consciousness or is a transducer associated with still another source. The majority of biomedical scientists are materialists and materialism states that consciousness must originate in the biology of the brain. However, since materialism is demonstrably an inaccurate reflection of reality, we have a situation where belief, not data are driving science. This is remarkably similar to religion. The hypothesis that there might be another conscious source of consciousness opens the possibility of a Universal Consciousness, an idea unacceptable to mainstream scientists. Since there is general agreement on this point, one would assume that there is also abundant evidence to support it. Indeed, there is abundant data to support the concept of evolution from simple to more complex organisms and data that explain some of the genetics and environmental factors that influenced evolution. However, to my knowledge there are no data whatsoever that conclusively support a theory of randomness vs. design. The fact that most scientists adhere to the former belief and most religious people to the latter, does not change the fact that neither has been successfully proven using scientific data. Thus, one of the most fundamental assumptions of current scientific endeavor is founded on conjecture. This talk proposes a dialogue about the scientific paradigms upon which we base our assumptions. **C24**

**235 Quantum Information Storage and Processing in Biological Molecules** Runjhun Saran Narayan, Apurva Narayan <rsaran.narayan@gmail.com> (Waterloo Institute Of Nanotech, University of Waterloo, Waterloo, ONTARIO Canada)

Biological molecules are capable of preserving information and evolving it with time. In some cases, the information processing speed of the systems involving biological molecules is exceptional, compared to that achieved in artificial computational systems. The paradigm that proposes to process information reliably at an extremely fast speed has its roots in "Quantum Mechanics," which is a field of physics that determines laws for very tiny sub-atomic particles such as protons, neutrons, electrons, and others. Anything in this universe is composed of these sub-atomic particles and so is our human body and its constituents. In this work, we analyze the underlying quantum phenomenon in certain biological molecules such as DNA and microtubules, which allow us to store, process, and communicate information quantum mechanically in this classical world at normal temperatures which is unique. **C24**

## 4.09 Biophysics and coherence

**236 Brains are Made of Memristors** Leon Chua <chua@eecs.berkeley.edu> (Biosystems & Computati, University of California, Berkeley, CA)

Memristors are 2-terminal electrical circuit elements characterized by pinched hysteresis loops in the voltage versus current plane, when driven by a sinusoidal voltage or current source of any amplitude or frequency. In this talk we will show that synapses are non-volatile, locally-passive memristors, while axons are made of volatile, locally-active memristors. In particular, the potassium and sodium ion channels that were erroneously identified by Hodgkin and Huxley



as time-varying conductances in their celebrated nerve membrane circuit model are in fact time-invariant memristors. The main result of this talk is our discovery that microtubules are also memristors because they too exhibit a pinched hysteresis loop when driven by any sinusoidal voltage or current signal. **PL9**

**237 A Unitary Mechanism of Anesthesia?: Altering Collective Oscillations in Microtubules** Travis Craddock <traddock@nova.edu> (Psychology and Neuroscience, Nova Southeastern University, Ft. Lauderdale, Florida )

General anesthetics (GAs) remain one of the greatest serendipitous pharmacological discoveries known, however despite over a century of research the unitary mechanism by which they act to cause reversible loss of consciousness and memory remains a mystery. While the primary sites of anesthetic action have generally been accepted as membrane bound receptors, anesthetic actions at these sites has been shown to be varied and inconsistent, leading to a fruitless mechanistic description in terms of a unitary action of anesthesia. However, an often-overlooked site of action is the microtubule cytoskeleton. Proteomic and genomic evidence for functional anesthetic effects has pointed toward cytoskeletal microtubules inside neurons as a common, likely site of anesthetic action. As post-translational modifications of microtubules (i.e. phosphorylation, detyrosination, glutamylation etc.) can generate a code that participates in memory formation, disruption of microtubules by anesthetics can lead to memory loss and even unconsciousness. Yet, the mystery of anesthesia is not simply determining the site of action. Rather the mystery stems from the puzzling structure-activity relationship of GAs, as effective agents can span a 35-fold range in molecular volume from a single atom (xenon) to 56-atom steroids, with numerous structures and configurations in between. What is known is that GAs are lipid-soluble and highly polarizable, and that their potency, regardless of structure, is approximately proportional to lipid solubility in a relationship known as the Meyer-Overton rule. This rule holds for GA activity in many species from paramecia to humans - and even plants. As anesthetic agents are inherently un-reactive, and work primarily via relatively weak dispersion forces, they alter induced van der Waals dispersion forces on structural collective modes in proteins. Here we discuss results of the effect of anesthetic, non-anesthetic, and convulsant molecules on dispersion forces in the microtubule constituent protein tubulin. As this mechanism has direct bearing on the link between anesthetic induced amnesia and unconsciousness, as well as its effect on neurodegenerative disease with compromised cytoskeletons, it has the potential to provide new insights on the site and mechanism of anesthetic action, and may also lead to the design and development of novel anesthetics free of potentially harmful side effects. **PL3**

**238 Consciousness and its Manifestation: A Phenomenon of Tuned Resonance between THE SOURCE and the Microtubules in all Life Forms** Soami Krishnananda <sdayak@gmail.com> (Department Of Physics &, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Life in any form and the evolution of its worldline in the space-time has a symbiotic relation with its immediate surroundings in which it is contained and the Cosmos that contains both the life and its surroundings. The pattern of evolution of all life forms indicates that there is continuous interaction between the three through their wavelike signature with an objective to nurture life and to harmonize it with the surroundings and the cosmos. Consciousness experience is a phenomenon of tuned resonance between the cells, body and the cosmos [1] in the altered space time. It has been reported that this experience manifests in the individuals through microtubules[2]. These microtubules are observed to be resonant from kHz to THz frequency spectrum with strong resonance in the GHz range [3]. Resonance is a phenomenon where a damped system like microtubule is subjected to frequencies of the system, this results in enhanced energy storage or dissipation depending on the electrical nature of the system. Microtubules are highly polar bio-molecules with variable permittivity. This paper attempts to understand the resonant behavior of microtubules and their dynamic instability in the GHz range by studying the permittivity of the microtubules. In this paper we analyse the out-of-equilibrium growth and shortening of microtubules through time dependent experimental studies of relative permittivity of microtubules at 17 GHz using whispering gallery mode dielectric resonators. Results show rescue (polymerization)

phase in the first 7 minutes where maximum value of the real part of the permittivity is 945.8 and then we observe a catastrophe (depolymerization) phase upto 20 minutes. Thereafter, saturation phase is observed where real part of permittivity saturates at 330. During the saturation phase dielectric losses succumb to zero value. Here we also introduce microwave broadband dielectric imaging of microtubules through synthetic focusing approach. Imaging technique presented here detects the presence of strong scatterers and spatially localizes these points in the sample. Imaging results at different time show the signature of dynamic instabilities of microtubules. Since dynamic instability responds sensitively with every normal and abnormal processes of a cell. These instabilities generate harmonic resonance with the body and the body with the cosmos and the cosmos with the source. [1] Pereira, Contzen. "Quantum resonance & consciousness." (2015). [2] Hameroff, Stuart. "Consciousness, neurobiology and quantum mechanics: The case for a connection." *The emerging physics of consciousness*. Springer Berlin Heidelberg, 2006. 193-253. [3] Sahu, Satyajit, et al. "Live visualizations of single isolated tubulin protein self-assembly via tunneling current: effect of electromagnetic pumping during spontaneous growth of microtubule." *Scientific reports* 4 (2014): 7303. C27

## 4.10 Origin and nature of life

**239 Transmission And Nature Of Intuitive Consciousness Signal Between Two Person Who Were In Close Relationship Previously And Now Living Apart At Distances.** Hans Agarwal , Prashant Kumar Agarwal; Ami Agarwal; Paridhi Agarwal <agarwalhans.999@gmail.com> (Agra, Utter Pradesh India)

It has been found many times that when a person living in one country remembers a person living in other country both of whom were in close relationship & living together previously then the intuitive consciousness of the other person starts working & he also starts remembering the first person referred as close relationship intuitive consciousness ( CRIC ) in future. Our theory is based on how an INTUITIVE CONSCIOUSNESS SIGNAL (ICS) is transmitted between the two persons when we apply the theory of Stuart Hameroff (1996) of "Orch OR" to our theory of ICS transmission and nature. P1

**240 The Origin of Life and Consciousness** Bruce Damer , David Deamer <bdamer@digitalspace.com> (Biota Institute/UC Santa Cruz, Boulder Creek, CA )

New scientific insights into the origin of life as it might have occurred on the Earth around four billion years ago can shed light on the emergence and nature of consciousness. The process of "booting up" life from prebiotic chemistry can be reduced to three fundamental drivers: 1) a cycling probability engine that pulls improbable events toward realization; 2) a connectome which links systems together at multiple scales and; 3) a sensorium which manifests a pattern of the external environment but also casts patterns outward into the universe. In the next decade, these three remarkable drivers will be demonstrated in the laboratory through efforts to "grow" the first progenotes, the boot-up system for life. Throughout Earth's history, these three drivers working in combination scaled up nonlinearly and resulted in a system so large that science is only now beginning to measure it in a coarse-grained, limited manner. The story of the emergence and nature of consciousness may be seen through the lens of these three drivers and the "field" they continuously create. Taken to its logical limit, this inquiry may arrive at the remarkable conclusion that a trained human mind is the appropriate and possibly the only scientific instrument capable of interacting with and mapping this field. The next phase of research into consciousness might therefore center on techniques of mind wrapped in a novel interpretive language. In this way, an understanding of life and its origins and evolution, exploration of consciousness using mind to interact with the larger "field", and the wisdom of a hundred human generations of spiritual practice might all be unified into a single enterprise. PL13

## 4.11 Consciousness and evolution

**241 Toward Models Of Biofield Physiology - A Proposed Spiritual Axis Of The Body-mind** Tiffany Barsotti , Tiffany Barsotti; Paul J Mills <tiffany@healandthrive.com> (CA Institute

for Human Science, Encinitas, CA )

Mapping the Biofield, or subtle energy body, and its relationship to the physical body is a frontier science pursuit. This presentation discusses a theoretical model involving well-known biological systems and the biofield. The Reticular Activating System (RAS)-Vagus Nerve-Alta Major Chakra Axis is proposed as a nexus of bodymind/spirit consciousness. A unification of activity at these points may be a mechanism of transference of information from the Biofield to the biophysical. This 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 existence. Neuroscience frames the reticular formation, which contains the 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, communicates information bi-directionally between 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. Two of the main circuit centers (chakras) within this energy body, the heart and base chakras, respond to the signaling of the 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 human beings develop 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 the energy body. This shift occurs only after activation of the alta major chakra, which is 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 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. The RAS-Vagus Nerve-Alta Major Chakra Axis speaks to the anatomy of the spirit in the self. **P2**

#### **242 A Coding/Memory (C/M) Model to Explain Cell-level Evolution of the Brain's Role in Consciousness** James Beran <jimberan@earthlink.net> (Montara, CA )

Researchers have proposed various explanations of the brain's role in consciousness; prominent examples include Orch OR theory (Hameroff et al., 2014), integrated information theory (Tononi et al., 2016), and global workspace theory (Baars et al., 2013). Although some of these approaches have inspired extensive literature, we have not found persuasive cell-level explanations of how the brain's role arose under any of these approaches. For example, Feinberg et al., 2013, attempted to provide an evolutionary account, but their central hypothesis was that consciousness emerged "from progressively more complex and integrated patterns of isomorphic organization" in brain neurohierarchy; although Feinberg et al. found genes relevant to their hypothesis, they apparently did not consider genetic effects at the cell level. One could reasonably argue, however, that a scientific explanation of how the brain's role arose must include an evolutionary account at the cell level, the level at which genes are expressed as proteins that in turn have physiological effects. Our work therefore offers a new type of model that explains the brain's role and can also be closely tied to evolution at the cell level. We call models of this new type "coding/memory models", or "C/M models" for short. C/M models are characterized by two related operations--(1) neural coding at sufficiently high information rates to support each change in conscious experience (CE), and (2) in response to the resulting CE-sufficient neural coding, memory of

conscious experience (CE memory). To illustrate the usefulness of C/M models, we offer a more detailed working hypothesis of how C/M operations arose on the cell level. Subcellular multiplexing mechanisms are central to our hypothesis: Multiplexing mechanisms evolved that initiate multiplex-coded sequences of axon action potentials (see, e.g., Walker et al., 2011; Baker et al., 2013; and Gire et al., 2013); such sequences can activate different neural groups in sequence, with certain activation sequences being repeated due to a form of short-term memory (“repeat-based memory”); and, at sufficiently high information rates, a repeated activation sequence provides memory of conscious experience, i.e. repeat-based CE memory. To help evaluate this working hypothesis, we update and extend our previous work on subcellular mechanisms (Beran, 2013; Beran, 2016), focusing now on cytoskeleton-related mutations affecting the axon initial segment (AIS); the AIS is a subcellular structure that initiates axon action potentials and is positioned to provide multiplex-coded sequences of action potentials. If extended to the molecular level, this approach could reveal genes and/or proteins whose mutations led to evolution of the brain’s role in consciousness. Further, we examine how repeat-based CE memory could convert (or transduce) neural codes into changes in conscious experience. We also examine how evolution could have led from repeat-based CE memory to more advanced forms of CE memory, e.g. episodic memory as found in humans. **C12**

### **243 Can Consciousness Influence Our Epigenetics and Can Epigenetics Influence Our Consciousness?** Ingrid Fredriksson <ingrid-f@telia.com> (Arjang, Sweden)

Epigenetics is a mechanism for regulating gene activity independent of DNA sequence that determines which genes are turned on or off: in a particular cell type, in a different disease states or in response to a physiological or even psychological stimulus. There is a microbiota-gut-brain axis communication in health and disease. (Under healthy conditions, the predominance of symbiotic bacteria, an intact intestinal barrier, a healthy innate immunity controlling pathobiont overgrowth inside the intestinal barrier). The molecules that constitute epigenomes have no resemblance of DNA. While DNA is a double spiral, similar to a twisted rope ladder, the epigenome is a system of chemical markers that sits on the DNA. What is its purpose? In the same manner that a conductor leads an orchestra, the epigenome decides how the genetic information of DNA shall be expressed. The molecule markers either engage or disengage the genes depending upon the cell’s needs and environmental factors, such as diet, stress and poisons. Of late, the discoveries surrounding the epigenome have caused a revolution in the field of biology now being able to prove a connection between the epigenome and certain illnesses, including aging. **C12**

### **244 Multi-consciousness and Health - From Scientific Challenge to the Applied Science of Multi-consciousness** Nebojsa Graca , Gojakovic Ana Lucija <excellencebygraca@gmail.com> (Belgrade, Yugoslavia)

In this article, the authors present most topical absolute novel knowledge from the domain of applied science of multi-consciousness based on the intensive knowledge - a portfolio of results obtained during several decades of researching the consciousness, as a global area of research, as well as the impact of multi-versional and multi-dimensional nature of consciousness on nature, mechanisms and functions of health, as the essential foundation of human existence, and the most important drive of scientific, artistic, technological and comprehensive cultural development of the human being of today. The originality of the article is also shown through an absolutely novel approach to health, absolutely novel multi-systemic analysis of the health condition, absolutely novel method of professional work with the aim of achieving health, as well as an absolutely novel essence (totality) of maintenance and intensive enhancement of health condition. Also, the article is original because it presents the unique, absolutely novel knowledge from the domain of applied science of multi-consciousness which includes the empirically proven impact concerning four fundamental forces of nature (gravitational, electromagnetic, weak nuclear and strong nuclear) on the relevant “centres of health” which exist in a human being, along with the impact of the calibration of four fundamental forces of nature on the nature, mechanisms and functions of multi-consciousness, i.e. the impact of the “Goldilocks Effect” on all components of the multi-consciousness as the basic form of multi-dimensional and multi-versional reality of human being. **P2**

**245 Did Consciousness First Evolve In The Amniotes?** Bjorn Grinde <bjgr@fhi.no>  
(Division Of Mental And Physical, Norwegian Institute of Public Health, Oslo, Norway)

I present evidence that point to the initiating events in the evolution of consciousness occurring in connection with the adaptation of vertebrates to a life on land; that is, some 300 million years ago in the early amniotes (the common ancestors of reptiles, birds, and mammals). The main evolutionary advantage was a more sophisticated strategy for making decisions, brought on by an increased need for behavioral flexibility and adaptability in the terrestrial environment. The processing units of neural systems evolved to direct animals either toward what is beneficial for the genes, or away from what is detrimental. The amniote strategy presumably depended on the use of respectively positive and negative feelings as a common currency to evaluate these two options. Feelings require the capacity to feel, which suggests a form of awareness. This may have been the clue to the instigation of consciousness. It seems unlikely that a similar strategy is present in other phyla, as these diverged from vertebrates at a stage without advanced neural systems. Thus, non-vertebrate consciousness would seem to require convergent evolution of a trait that is somewhat peculiar and not necessarily advantageous in other life-forms. The model is substantiated by behavioral, physiological, and neurological evidence. C

**246 Consciousness and Epigenetics: Accelerating Human Potential and Evolution** Mickra Hamilton, Daniel L. Stickler, MD <drhamilton@apeironcenter.com> (Apeiron Center for Human Potential, Asheville, NC)

Increasing knowledge regarding quantum mechanics and the nature of the universe provide the alchemical equation to merge art, science and technology within the fabric of consciousness. The powerful outcome of this merger is exponential expansion of our ability to create life consciously from the field of limitless potential. As we understand that we create our entire experience through the electro-magnetic reality of our thoughts, we can harness the power to create differently. The rapid advancement of research in genetics and the ability to influence genetics through epigenetic interventions provide a previously unrealized opportunity to become the architects and conscious change agents of our evolution. The foundation for expanding consciousness and rapidly accelerating human evolution involves optimizing human potential by addressing all aspects of human health; body, mind and consciousness. The body, brain and the nervous system are amplifiers of consciousness that clearly reflect our current state of health creation. In this event, the participant will understand how the unique human DNA blueprint can provide opportunities or create obstacles to the expansion of consciousness. They will experience how genetics and epigenetic lifestyle modifications facilitate the expansion of consciousness by preparing the body to produce psychophysiological outcomes that beneficially create the experience of thriving health and happiness. Additionally, participants will be introduced to evidence based technologies and modalities that assist us to evolve to a limitless knowing of our true capacity. As the "human bio-spherical system" moves into breath, heart, and brain coherence, a whole systems integration is possible and consciousness expands to a new awareness of its true nature. C12

**247 Conscientiogram: A Post-Modern Method to Evaluate Consciousness** Jeffrey Bryan Lloyd <jblooyd@gmail.com> (Foz Do Iguacu, PR Brazil)

The Conscientiogram, based on the consciential paradigm, is a method proposed (Vieira, 1996) to evaluate the manifestation of consciousness with the aim to stimulate the development of self-knowledge and personal evolution. The method is based on a taxonomic approach that classifies attributes of personality manifestation into different sections. The classified attributes are explored through questions that compose the protocol of an evaluation sheet. The resulting multifaceted evaluation of the consciousness allows identification of a personality's strongtraits, weaktraits and absenttraits and analysis of individual competencies as well as distortions, incoherences, and personal impediments. This subsequently facilitates identification of areas which could most benefit from intraconsciential modification. References: Vieira, W (1996), Conscientiogram; www.conscious.org.br C8

**248 The Blind Mindmaker: Explaining Consciousness Without Magic or Misrepresentation** Colin Morrison <csdml@hotmail.co.uk> (Cupar, Fife United Kingdom)

Your consciousness is a very-highly-organised part or product of a biological organism that appears designed for some function. Every other example of complex design-like organisation in a biological organism is explained by science as a product of positive natural selection. So we should definitely expect the same to be true of our consciousness. In other words, we should expect disorganised consciousnesses to exist that affected the brain activity of our distant ancestors in a way that was variable and dependent upon the sort of experience that those consciousnesses were having at the time. And we should expect random mutations to have accidentally resulted in a creature in whom that influence acted beneficially, allowing that creature's descendants to outbreed their competitors. The rich information-content and sensory-image-like representations that human consciousness now contains should be expected to have arisen as a by-product of selection pressures caused by the existence of various ways in which the benefits of that influence could be maximised. THE BLIND MINDMAKER: Explaining Consciousness without Magic or Misrepresentation is a new book on consciousness (currently available on Amazon.com at \$9.99 or 7.99 GBP). It demonstrates that it is perfectly possible to account for all aspects of the design-like perfection in our consciousness in this scientific way. Via a logical argument, guided by a fully defensible form of analogy, it reveals (1) what the disorganised interacting consciousnesses that this theory requires must be, (2) what purpose brains initially adapted them for, (3) why they evolved to have such a rich and relevant information-content, (4) how that information came to be encoded in sensory-image-like patterns, (5) why our focus of attention is so salient in our experience, (6) why the qualia of memories and imaginings are faint, (7) how different senses evolved to produce distinct modalities of qualia, (8) how we came to experience connections between qualia representing the same object, (9) what made unpleasant experience suitable for detrimental situations, and pleasant experience for beneficial ones, and even (10) the commonly reported sense that time slows down in circumstances of extreme danger or trauma. Furthermore, it explains all these things as products of natural selection and the established laws of physics. It doesn't invoke any functionalism at all. The theory has been dubbed Position-Selecting Interactionism (or PSI-psychism), and due to its astonishing explanatory success and scientifically-consistent nature, we have every reason to expect it to be the correct explanation for consciousness. As well as fully deriving this theory, THE BLIND MINDMAKER also describes a computer simulation of the proposed evolutionary process by which our ancestors' disorganised qualia came to form sensory-image-like patterns. It also explores what this theory says about the possibility of God, our chances of an afterlife, consciousness in nonhuman animals, the nature of matter, and even the problem of suffering. Unlike most theories of consciousness, Position-Selecting Interactionism specifies precisely what our consciousness is and what it evolved to do; and in this book you will even find a way of testing some of the theory's predictions. C12

**249 Cerebral organoids for neurodevelopmental and evolutionary studies** Alysson R. Muotri <muotri@ucsd.edu> (Sanford Consortium For Regener, University of California, San Diego, La Jolla, CA)

The complexity of the human brain, with thousands of neuronal types, permits the development of sophisticated behavioral repertoires, such as language, tool use, self-awareness, symbolic thought, cultural learning and consciousness. Understanding what produces neuronal diversification during brain development has been a longstanding challenge for neuroscientists and may bring insights into the evolution of human cognition. Human pluripotent stem cells have the ability to differentiate in specialized cell types, such as neurons and glia. Moreover, induced pluripotent stem cells can be achieved from living individuals, but reprogramming somatic cells that would capture their entire genome in a pluripotent state. We have been using this approach to create cortical progenitor cells and neurons to gain insights on genetic disorders. Interesting, human pluripotent stem cells we developed a robust protocol to generate cerebral cortical organoids. These are self-assembled 3D structures that mimics the cortical organization, with a proliferative zone with progenitor cells migrating to different cortical layers with functional activity. The reconstruction of human synchronized network activity in a dish allow the understanding of how



neural network oscillations might be disrupted in neurological disorders affecting the social brain. We applied this technology to understand the impact of genetic variations in genes related to autism spectrum disorders and for evolutionary studies. Our findings suggest a potential bridge to the gap between the microscale in vitro neural networks electrophysiology and non-invasive electroencephalogram (EEG). **PL13**

**250 The Evolutionary Brain Mechanisms That Underlie Consciousness** Charles F. Stevens <cfs@salk.edu> (Molecular Neurobiology Laborat, Salk Institute For Biological Studies, La Jolla, CA )

In 1932, Julian Huxley published a book, "Problems of Relative Growth", in which he established the field of allometry, the idea that, across individuals, species, or even classes, some parts of a body can grow faster than the corresponding parts in other individuals. For example, Huxley showed that, for a single species of ants, the sizes of the abdomen, thorax, and legs are proportional for workers and warrior ants, but the warrior ants have heads that are relatively much larger than those of workers. Huxley also found that when, say, the size of abdomen of larger and smaller workers are plotted against those of warriors, straight lines result (a proportionality). But, remarkably, if heads of larger and smaller workers are plotted against those of warriors, the result is not a proportionality but rather a power law (an allometric relationship). As I will explain in the talk, these allometric relationships reveal that the genetic networks that are responsible for pattern formation are conserved by evolution, and this conservation is typical of brain evolution as well. Furthermore, I will argue that the evolutionary precursors of neural circuits responsible for consciousness in humans must have counterparts in our evolutionary ancestors, to one extent or another. When we can identify the neural circuits responsible for consciousness in humans, we will be able to trace these circuits back in evolution to find the series of changes in vertebrate brains that led to our experience of consciousness. Because we do not understand the brain mechanisms responsible for our consciousness, imagining what consciousness would be like in non-humans is very difficult for some of us. For me personally, my experience of consciousness is intertwined with my language and language related functions that I no idea what consciousness would be like without language. **PL10**

**251 Improvisational Subjective Induction: Attuning Criticality, Integrating Noise, Tethering Meaningfulness** Mark Valladares <markvalladares@yahoo.com> (Overland Park, KS )

The theory defines Consciousness as the control parameter that attunes Criticality to induce self-organization, given that Consciousness is a fundamental/non-dual/reflexive awareness and 'foundational in the Universe' (Theise & Kafatos). Criticality enables Induction from a 'web of constraints.' The constraint of synergies imposes a structural integrity on the biological architecture and in this sense it drives evolution (Van Orden). An improvisational subjective induction is a response in the form of a symmetry breaking bifurcation. The induction constitutes a choice that is tethered to the basins of attraction where evolutionary trajectories converge. Fractal structure enables Consciousness to permeate scale such that a quorum of inner feel achieves coherence as Self-Awareness. Access Consciousness (Block) can then act as a cognitive constraint by attuning sensitivity (synaptic inhibition). The disassociation of cognitive constraints in cortical hubs restores scale-free Criticality (for improvisational creativity (Limb); non-dual awareness). The theory holds that Reflexive Non-dual Awareness is nested where dissipative Fractal Noise is integrated into subjective feel (qualia/information) within the microtubulin polymers. Just as dipolar coupling on the perimeter of tubules accounts for non-local distribution of information, the mechanosensing polymers embody a distinct harmonic resonance pattern associated with the feel of each holographic imprint to instantaneously put the organism in touch with itself (via Tensegrity model). Dissipative Fractal Noise provides the internal scale-free clock such that timing and rhythm govern the information processing which in turn is constrained by the harmonic structure of MT polymers (13 base). Centrioles (9 triplet cartwheel) are implicated as basins of attractions. The holism of the Tensegrity model coupled with quantum tunneling via electron transport (Vattay) allows for the propagation of a wave packet to nestle in slow cortical potentials where the 'higher mind' of Access Consciousness can process the feel. The language of "constraining syner-



gies” suggests how basins of attractions serve to drive evolutionary trajectories. Meaningfulness then, with its fractal structure (Dimotrov) forces the semiotic distillation of cognitive constructs into an aesthetic feel (basin) tethering vibrational signatures at the fine scale. **C20**

## 4.12 Medicine and Healing

**252 Biofield Science: Expanding Our Models of Mind-Body Medicine** Shamini Jain <sjain@ucsd.edu> (Psychiatry, UCSD; Consciousness and Healing Initiative, CARLSBAD, CALIFORNIA)

Recent advances in “mind-body medicine” suggest that integrative medicine practices (including meditation, yoga and acupuncture) yield beneficial effects for patients down to cellular levels. However, evidence from studies with certain consciousness-based integrative medicine approaches (such as Reiki, Healing Touch and the laying-on-of hands - collectively termed “biofield therapies”) appear to defy fully reductionist explanations for their effects. Recent evidence from controlled clinical trials of biofield therapies in cancer, pain and other populations suggest that these therapies offer significant and sometimes specific effects on symptom reduction and clinically relevant immune and endocrine function. For example, our recent randomized placebo-controlled trial investigating the effects of a biofield healing modality for fatigued breast cancer survivors indicated clinically and statistically significant effects on reducing fatigue in the biofield healing group ( $P < .0005$ , Cohen’s  $d = 1.04$ ), as well as mock healing ( $P = .02$ , Cohen’s  $d = 0.68$ ) groups, compared with wait list controls. Diurnal cortisol variability increased for fatigued breast cancer survivors in the biofield healing group, versus both mock healing and control groups ( $P < .04$  in both cases; Cohen’s  $d = 0.58$ ). Similar findings are echoed in other studies, suggesting that biofield therapies have clinically significant effects beyond generalized or placebo elements. Further, despite an incomplete understanding of mechanisms underlying biofield therapies, placebo-controlled preclinical and ex vivo studies suggest these therapies may specifically affect cellular processes associated with cancer disease progression, as well as cell metabolic function. In order to more fully understand the mechanisms by which consciousness impacts health and healing, an expanded, multidisciplinary model of medicine is needed. Such a model may integrate ancient understandings of consciousness-based concepts such as prana and qi with current scientific advances in bioelectromagnetics, psychoneuroimmunology, and systems biology. In this talk, Dr. Jain will review clinical and preclinical empirical data from the emerging discipline of biofield science, discuss how concepts of consciousness relate to the area of biofield science, and explore how expanding our models of spirit-body-mind medicine may lead to further breakthroughs in science, technology and healthcare. **P2**

**253 Pro-Social Science: Bringing Together Concepts From Severe Mental Illness, Emergency Medicine and Brain Research** Ian Doyle Olson <iolson@macalester.edu> (Neuroscience & Philoso, The Barbara Schneider Foundation, St Paul, MINNESOTA)

Some of the most fascinating and relevant concepts in consciousness studies are less glamorous than they are troublesome: Brain disease and mental illness. Today these neurological and behavioral disorders pose some of society’s most challenging research, clinical, and humanitarian problems. Having a severe and persistent mental illness (SPMI) or other brain disease increases the likelihood that an individual will experience setbacks in their work, relationships, and overall health, and have criminal charges, with some disorders having a measurable impact on life expectancy. These problems that brain diseases pose to the individual, families, workforce and economy, healthcare resources, law enforcement, and even educational systems are widespread and increasing. Up to a quarter of the world’s population experience some type of mental illness throughout their lives with a huge number of cases going undiagnosed or untreated. Some are especially susceptible to these illnesses, including the elderly, migrant populations and survivors of war, and individuals serving prison time. The W.H.O. suggests further research into mental illness and offers bleak projections for the future. Without further investigation it is certain that these diseases will pose a greater threat to future generations. Scientific research is perhaps our greatest asset in addressing these dilemmas. Prolific description of epilepsy, mood disorders, and psychotic

states exist throughout history and modern efforts to understand them have been substantial. It should also be noted that the diagnostic criteria and parameters for many of these disorders, and also modern treatment options and outcomes, have improved significantly. Despite these forward steps there remain huge gaps in even our basic understanding of the genetic, cellular, and molecular implications of behavioral disorders and adverse conscious states, and how we should best prevent and treat them. So although the societal cost of these diseases is high and their existence well-documented throughout modern times our understanding of them is quite lacking. With increasing pressure on consciousness studies and brain researchers to propagate the entertainment or commercial value of concepts in neuroscience (such as artificial intelligence, virtual reality, technological innovation and cognitive enhancement, etc.) there exist many opportunities for new leadership and discovery in this pro-social area. The audience will be given a few prompts to consider and the input thus solicited will offer a unique collaboration between socially conscious agents from all areas of consciousness studies. Together we will discuss research topics and public health statistics before transitioning into a hands-on conversation about Crisis Intervention Training (CIT). CIT is the most effective modern technique for de-escalating an individual in crisis and is used by clinicians and law enforcement to better prevent and resolve these dangerous mental events. These skills are practical and will be explained and briefly demonstrated by individuals who have personal experience in mental illness as well as backgrounds in academic neuroscience and emergency medicine. In the spirit of collaboration and dialogue, anyone eager to get involved may email [iandoyleolson@gmail.com](mailto:iandoyleolson@gmail.com). C8

**254 Biomolecular Interactions of Sound Frequencies in Adult Human Stem Vs. Differentiated Cells: New Insights Into Pulsed Electromagnetic Therapy Mechanisms** Subhashini Poola, Rolf Binder, Ondamed Companies, Schwanau, Germany; Asit Panja, AlfaGene Bioscience Inc, Fords, New Jersey, USA; Silvia Binder, The Binder Institute, Schwanau, Germany. <[spanja@aol.com](mailto:spanja@aol.com)> (Biology, City College, New York, New York, NY)

Electromagnetic (EM) and acoustic (sound) therapy treatment modalities have been known to stimulate the body's own healing mechanisms by directing immune response to select body areas for repair and regeneration of the pathological state of damaged or weakened tissues. Both EM and sound therapy are increasingly in demand by physicians and patients alike. The foundation of energy-based medicine is as old as human history. However, despite its historical use and modern popularity, a considerable level of wariness exists in the integration of such concepts into modern medicine. This is largely in part due to the lack of understanding of the mechanisms of biological interactions between sound or EM waves with the cellular components of specific organs and/or tissues in human body. Therefore, we have initiated a multi-disciplinary collaborative program to study bio-interactive mechanisms of focused EM fields and sound with cell and/or tissue types in the physiological and disease state. Modern bio-medical engineering tools, novel stem cell technology, sophisticated cellular, molecular, and genetic techniques are utilized in our studies. Results will be discussed at the TSC2017, demonstrating the organ and tissue-specific correlation between focused EM fields and sound frequencies and regulation of structural and functional properties of various levels of biological organizations (chemical, cellular, tissue, organ, and organ systems). Additionally, we aim to delineate EM field and sound mediated signaling pathways in physiological vs. pathological conditions (e.g. cancer, immunological disorders, eczema, and vascular abnormalities). In conclusion, we will emphasize organ and tissue specific EM field and sound frequencies beneficial to human health and consciousness. C4

**255 The Causal Role Of Consciousness In The Well-being Of Self And Other** Cassandra Vieten <[cvieten@noetic.org](mailto:cvieten@noetic.org)> (Institute Of Noetic Sciences, Petaluma, CA)

There is now no doubt that the mind influences the body through both explicit (e.g. meditation-based stress reduction, visualization) and implicit (e.g. placebo, expectancy) means. Evidence now shows that multiple states of consciousness have direct acute and long-term effects on immunity, gene expression, brain function and structure, heart rate variability, and many other outcomes. Recent evidence indicates that the effects of profound states of mind can stretch through time into future generations through inherited epigenetics, and some evidence shows effects

of mind extended across space - influencing other people's physiology both in person and at a distance. Consciousness affects the physical world in ways we are only beginning to understand. This talk will review evidence in this area, how we might begin to intentionally harness this effect to enhance wellness, and how we can encourage the medical and scientific community to embrace this work more fully. **P2**

#### 4.13 Brain stimulation techniques

**256 Noninvasive Neuromodulation With Transcranial Ultrasound: The State of the Art and Future Directions** Jay Sanguinetti, John J. B. Allen; Stuart Hameroff <sanguine@unm.edu> (Psychology, University of New Mexico, Albuquerque, NM)

Methods for noninvasively modulating human brain function with weak electric currents and strong magnetic fields have become popular in the last few decades. These tools have been applied in scientific and clinical settings and have shown promise for affecting mental states for various outcomes. In this talk, we will discuss our ongoing research with a novel neuromodulation technique using transcranial ultrasound (TUS) to influence mood in healthy participants. In five experiments with over 200 volunteers, we find that TUS to the right inferior frontal gyrus enhances mood and overall emotional states; self report, electrophysiological, and functional magnetic resonance imaging data will be presented in support of these findings. We will discuss our upcoming experiments, including mapping the effects of different ultrasound parameters on evoked physiological responses, applications for clinical populations like depression and Alzheimer's Disease, and combining TUS with mindfulness training. We will end with a vision for how TUS could be used in the future to influence mental states for basic scientific and clinical applications. **C18**

#### 4.14 Quantum theories of consciousness

**257 Quantum Consciousness - The Road To Reality** Shantilal Goradia <sg@gravityresearchinstitute.org> (Gravity Research Institute, Mishawaka, Indiana)

Per Einstein's theory mass tells space how to curve and space tells mass how to move. How do they "tell"? The question boils down to information created by elementary particles blinking ON and OFF as in [1] to generate information. We substantiate our probabilistic gravity [2] to link with dark matter. Physical test, if true, will prove it. The Theory of Everything (TOE) must include information, Feynman's mystical number 137, views of the giants, coupling constants generated by elementary particle interaction, black holes and their gravity waves, etc listed in [3] that includes the draft of our abstract for (TSC 2016). We are working to include more pertinent topics. It is interesting to note that "invisibility" is common to consciousness, dark matter and Vedic ATMA, a common factor of (1) AnuAtma, (2) JivAtma, and (3) ParamAtma, as if they are synonymous. Theories without information are on a crossroad with reality, making them more difficult to understand. That is why we show elementary particles blinking on the front page of our book [4] like books on gravitation show an apple on the front page. Consciousness and information are interconnected. Why would all mighty Nature provide one without the other? [1] Goradia, S. 2015. Decoding the Information of Life, Journal of Physical Science and Application 5 (3) (2015) 191-195 (doi: 10.17265/2159-5348/2015.03.004) [2] Goradia, S. 2015. Dark Matter from Our Probabilistic Gravity, Journal of Physical Science and Application 5 (5) (2015) 373-376 (doi: 10.17265/2159-5348/2015.008), [3] Goradia, S. 2016. Quantum Consciousness - The Road to Reality, Journal of Life Sciences 10 (2016) (doi: 10.17265/1934-7391/2016.06.001), [4] Goradia, S. 2011. Quantum Consciousness-The Road to Reality, Author House, Bloomington, IN. **C15**

**258 The "quantum pleasure principle" - Did life evolve to feel good?** Stuart Hameroff <hameroff@u.arizona.edu> (Anesthesiology; Psychology, University of Arizona, Anesthesiology, Center for Consciousness Studies, Tucson, AZ)

The standard view in evolution is that life developed through behaviors which optimize survival of species. But an organism's behavior is driven by reward, by seeking conscious pleasure,

or avoiding pain. Evolutionary biology (like most neuroscience and philosophy) considers consciousness and feelings to have emerged from complex computation among brain neurons or simpler systems, but fail to identify an emergent threshold or mechanism. Panpsychist and Eastern philosophical approaches consider consciousness to be primary and/or ubiquitous, but fail to show how it arose or causally drives biological behavior. The Penrose-Hameroff 'Orch OR' theory suggests self-collapse of quantum wavefunctions (objective reductions, 'OR') occurs ubiquitously, resulting in proto-conscious moments which are random and disconnected, some of which may include pleasurable feelings, and that microtubules in brain neurons 'orchestrate' OR moments into full, rich conscious experience. It is suggested here that life originated and evolved billions of years ago in the 'primordial soup' in which dopamine-like molecules in 'Oparin micelles' began to have OR proto-conscious moments. Some of these were pleasurable, and provided a feedback fitness function for self-organization and evolution to optimize pleasure and avoid pain. Human evolution continues to optimize pleasure, including hedonism, altruism and spirituality. **PL13**

**259 Consciousness Wave Field Model for Rehabilitation Process** Yijun Liu , Rong Li; Shuna Song; Lei Zhang; Luhao Zhang; Ainai Ma <lyj129@pku.edu.cn> (Peking University, Beijing, China)

Long time it is unclear through what mechanism that consciousness influence patients' recovery, for the lack of a quantitative index and description of consciousness as well as a comprehensive and deep understanding of the recovery process. Heart Rate Variability (HRV) represents the activity of autonomic nervous system of human body and thus reflects the state of consciousness. Based on this quantity we explored the influence of consciousness on patients' recovery. In patients with stroke, we find those with higher HRV recover more quickly. Here we come up with a system model of consciousness: human body can be viewed as a huge, open and complex macroscopic quantum wave system. And there is an imaginary consciousness field which coexists with the visible body. Conscious activity is the wave motion of consciousness wave field as the result of resonance between the internal field of human body and external field of environment, and HRV is a sensitive indicator of the resonance intensity. Since all the physiological activities are driven and coordinated by consciousness wave field, patients with more openly resonant consciousness field has stronger variability with external environmental field. The resonance with external field helps adjusting patients' physiological activities and thus leads to a quicker recovery. Through investigating the relationship between HRV and the recovery process, we come up with a model describing the interaction between the internal and external consciousness wave field, which yields a quantitative description of this resonance: its influence on HRV and recovery speed. This model allows us to explore methods to enhance the resonance, which can be used in the practice of medicine. This investigation, although preliminary, will open the gate to further understanding how human health states is led by consciousness. **C20**

**260 The Science of Quantum Soul and a New Theory of Consciousness Study?** Soam Prakash , Preetam Pyari <prakashsoamdei@gmail.com> (Department of Zoology, Dayalbagh Educational Institute , Agra, India)

The consciousness science has been established in 2016 .The measurement of consciousness still remains to be unsolved, The measurement problem is inhibiting although non invasive technology like SQUID measurements have been proposed by Sahni and Satsangi(2011,12,13,14,15,16). The human soul has now been discovered ultimately and has also been photographed too (Prakash2012,2016) . A consciousness theory of Quantum nature of Soul was proposed also by (Chopra and Hameroff,2012).Quantum Biology is an emerging field.They have decoded transfer in magneto reception in birds, photosynthesis mechanism in plants with functions of such as excitations, charge transfer and olfactory functions also.The schematic diagram provided by Satsangi (2014,15,16) with the system science approach(fig-1,2,3,4) could be an measurement tool of consciousness provided the theory proposed by Hameroff on quantum theory of consciousness(2016) is acceptable.The conceptual diagram proposed by Satsangi could be integrated with Hameroff quantum theory and shall provide the desideratum for the measurement of consciousness.The origin of consciousness reflects our place in universe, the nature of existence. Did consciousness

evolve from complex computations among brain neuron? Or has consciousness is a spiritual approach to maintain. Perhaps it accommodates both by suggesting consciousness derives from quantum vibrations in microtubules, a protein polymer inside the neurons, which both governs neuronal and synaptic functions, and could connect brain processes to self organising process to find scale of quantum reality. Science is now claiming that Quantum Theory process consciousness moves to another universe at death. (Spirit Science, 13 Jan, 2014). Eventhough The Human Soul has been discovered and been photographed (Prakash2012), Scientists hesitate to accept it. The Soul being a functional unit of consciousness, the instrument and meditation practices are methodology. We are shy to accept it and do experiments themselves to validate it. The Reality as such is very illusive to them if they donot accept otherwise how will they can see an object subtle at at Plank,s level. Satsangi and Sahani (2011,2012,2013,2014,2015,2016) have experimental details as well as experiential data s which has been a convincing paradigm for the future of consciousness measurement science as a graph theory model of .Man as Microcosm and reality as Macrocosm have been well depicted there. Richa and Prakash recently have been (2012,2013,2014,2015,2016) projecting the supplementary document in microbes,mosquitoes and mamals (Richa ,Chaturvedi and Prakash 2016) to accentuate that even microbes and mosquitoes have consciousness and souls which radiates as electromagnetic wave and can be measurable when alive (Fig-2,3,4,5). Even Huelga and Pheniv (2013) supported vibrations, quanta and biology whose understanding is held to require quantum mechanical processes namely excitation and energy transfer in photosynthetic complexes, magneto-reception in birds and in sense organs leading to validate them as an Quantum Biology phenomenon. Hence, the theory of quantum nature of universe, multiverse, reality,consciousness and their role in scientific description of religion is now very well conceived possible. This could explain the characteristics of Consciousness reservoir. The role of soul as basic unit of consciousness would be discussed with a new interpretation integrating quantum soul theory to fit in the basic hard problem of measurement of consciousness. C7

**261 Microcosm & Macrocosm-a Relationship Study On Quantum Consciousness** Preetam Pyari , Soam Prakash <preetampyari1958@mail.com> (School Of Art And Culture, Dayalbagh Educational Institute , AGRA, UP India)

The Microcosm and Macrocosm are having do difference except in size however their morphology appears to be same (Maharaj Sahab, 2004). The inner world considered as microcosm is quite similar to macrocosm. The measurement of consciousness still remains a problem with non invasive technology like SQUID measurements have been proposed by Sahni and Satsangi (2011, 12, 16)is quite satisfactory. Even the human soul has now been discovered (Prakash2012, 2016). A consciousness theory of Quantum nature of ?Soul? was proposed also by (Chopra and Hameroff 2012) .An emerging field of QB which (Chin et al,2014) have decoded transfer in magneto reception in birds, photosynthesis mechanism in plants with function of such as excitations, charge transfer and olfactory functions .The schematic diagram provided by Satsangi (2011, 2016) depicting with the system science holistic approach (Fig. 1) would be a future measurement tool for consciousness provided the theory proposed by Penrose and Hameroff on quantum theory of consciousness (2016) is validated. The conceptual diagram proposed by Satsangi could be integrated with Hameroff quantum theory model. Quantum phenomenon and can be seen in microbes and animals and Man & creation.. In the eastern theology the role of sound vibrations and current prevailing inside and outside man. Man being the model a microcosm have astonishing anatomical feature and similarities as well as connectivity (Fig-2,3)with macrocosm. It is visible in nature (Strapp2006,Price and Barrell,2012,hammeroff et al (2014) the symmetry, geometry and fractals lead us to mathematics. The magical ratio, the Fibonacci numbers is being expressed in all created. Penrose ?Hameroff Model of microtubule is one example .The details of this shall be discussed (Kathryn,2016 and Bruggean,2016,Nature). References: Richa, Chaturvedi, D. K., and Soam Prakash. "Role of Electric and Magnetic Energy Emission in Intra and Interspecies Interaction in Microbes\_AJRC\_2016. pdf." American Journal of Research Communication (2016).. Richa,Chaturvedi, Devendra Kumar, and Soam Prakash. "The Consciousness in Mosquitoes." Journal of Mosquito Research 6 (2016)..Penrose, Roger, and Stuart Hameroff. "Consciousness in the universe: Neuroscience, quantum space-time geometry and Orch OR theory." Journal of Cos-

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**262 Multidimensional Consciousness** Mohsen Sarfarazi <sarfarazifamily@aol.com> (Institute Of Spiritual Science, Palm Coast, FLORIDA )

Theory of Multidimensional Consciousness advanced by the author has been discussed. The relationship between sentience and time is clarified. Consciousness is quantified by natural frequency of vibration, being inverse of time. Consciousness is acquired through experimentation in space-time. The author's new theory of space-time is briefly explicated. Time and space are two interdependent aspects of light, a conjugate set of two mutually orthogonal vectors inverse of one another, though which consciousness is disseminated. The single collective concept of space-time, portrays a dualistic nature of creation that compiles the digital codes of light received by our brains, which are then projected holographically as software programs of reality onto the 'parallels' in the form a 3-D images, Thus our brains firstly project the programs of reality onto space-time, and then subsequently, perceive the holographic images through our 5-sensory perception. These parallel planes are myriad of projection screens that operate under similar frequencies that provide the means by which different perspectives of a central program of reality of life may be separated, cataloged as Akashic Records, and then projected on various space-time layers. We constantly travel in time sequentially jumping between the innerspaces of these diverse holographic dimensional planes of reality in dream state. And, the oscillational act of going to and fro these dimensions of reality is referred to as 'vibrations.' The theory of sentient vibration proposed by the author is briefly discussed. Accordingly, our physical consciousness is quantum and discrete in nature. We constantly fade out of one plane of consciousness and fade into another within a quantum interval (darkening period) that is commensurate with the Planck's number of 10 to the power -43 seconds. Within this 'darkening period' we sequentially jump between the parallel sub-dimensions of what the author refers to as the main dimensions of consciousness, each distinguished by its own inherent threshold frequency. The space-time theory advanced by the author asserts that there are a total of 356 such dimensional space-time layers. In terms of vibration theory, the parallel planes are distinguished via their own phase angles through which different perspectives of programs of reality may be projected. Through instituting a rather significant change in the natural frequency of vibration one can travel via time through different innerspaces of the main dimensional layers of consciousness. Based upon the inherent natural frequency of vibration, one can distinguish among at least three levels of consciousness: the physical consciousness, the sub-consciousness, and the superconsciousness. Physical consciousness refers to the lowest level of consciousness by which we manage to function performing rudimentary tasks pertinent to the awareness of ourselves and our surroundings that include logic and planning. Subconsciousness depicts a deeper level of consciousness characterized by a much higher frequency of vibration attainable through dismissing the physically active mind, which is often encountered through the dream state. Superconsciousness refers to a status of extreme high frequency of consciousness that is not ordinarily achievable except perhaps through very deep meditation. P2

**263 Solving Quantum Mechanics Challenges By Universal Consciousness** B V Swami <bvdandi@gmail.com> (Houston, TX )



Quantum mechanics has many challenging puzzles yet to be solved. 1. The build up of interference pattern by a single electron one at a time taking 20 minutes to build up interference pattern. This interference pattern is consistently same whether a single electron is passed one at a time or thousands of electrons passed same time. How can we understand this consistency of the patterns? 2. Consistency of polarization of entangled photons, even though they are traveling almost at speed of light in opposite directions. How do they know each other's polarization? 3. There are many repeated experiments showing consistency of behavior in an entangled photons interference pattern of delayed eraser or otherwise. The counterintuitive features of quantum physics challenge many common-sense assumptions. How it can be harmonized? 4. Quantum mechanics has an element of non-locality - a subtle connection between the two particles that persists even after they separate. How can we understand their consistent behavior at different times and places? 5. Is Quantum behavior at atomic or even molecular level is special or is it universal in general? 6. Ideally any explanation for all these observations should be consistent with other sciences, and biology in nature. Can we find one amicable solution? We show that indeed is possible. We derive and show that universal consciousness possessing the following properties solve all problems amicably. A. Sophisticated intelligence, B. Space independent, C. Time independent, D. Capable of knowing what action is appropriate, E. Having power to bring about the required action, F. Actions are always consistent and complete, G. Not influenced by the interleaved material layers, H. Concurrently capable of acting throughout the universe, I. Always with minimal time or energy optimized, K. Possessing universal consciousness, and L. Not being visible to senses or extension of senses. Experimental evidence and discussion essentially shows universal harmony and consistency in explaining observed phenomenon throughout the nature. **P2**

**264 Tao, Quantum Physics, Unification of Science and Spirituality, Consciousness and the Creation of Universe** Rulin Xiu , Zhi Gang Sha <ruilin@htprc.org> (Theoretical Research Departmen, Hawaii Theoretical Physics Research Center, Keaau, HI )

What is consciousness and how is everyone and everything created? Different schools and disciplines answer these questions in different ways. Generally speaking natural science studies the materialistic nature of everything. Social science, philosophy, psychology, and spiritual and religious ideology account for the spiritual and conscious aspect of our existence. More than 300 years ago, with the scientific revolution, natural science has been formally separated from the spiritual and conscious disciplines. Physics, as the foundation of natural sciences, studies matter and energy. It uses physics quantities to describe matter and energy. Physics quantity is an item that can be measured and calculated mathematically. Physics laws use mathematic formula to express repeatable experiment about matter and energy. Because of its repeatability and quantitative method, physics and natural science has the great ability to create inventions to utilize, transform, and transport matter and energy. Quantum physics studies what everything is made of and how it behaves at the microscopic level. It is one of the most fundamental physics theories. With the ever-increasing popularity and impact of science on our lives, the focus of natural science on the physical existence in exclusion of spirit, spiritual heart, and consciousness has made our society too materialistic. It has caused deep segregation within our spirit, heart, consciousness, and body as well as in our cultures, societies, and world. The unification of science and spirituality is urgently needed to make our society, the world, and us whole again. In this work, we combine ancient Chinese Tao wisdom with quantum physics. Tao is an ancient Chinese natural philosophy, wisdom, tradition, ethic, spiritual practice, and religion with a written history of about 5000 years. According to Tao wisdom, everyone and everything is made of Jing, Qi and Shen. Jing is matter. Qi is the energy. Shen includes spirit, spiritual heart, and consciousness. In this work, we will present a way to define Shen, spirit, spiritual heart, and consciousness as physical quantities that can be measured and calculated in quantum physics. We propose and demonstrate scientifically that everyone and everything is made of matter, energy, and information. We suggest defining Shen as information. Spirit, heart, and mind relates to the content, receiver and processor of information respectively. Here mind is consciousness. We will show that this definition makes it possible to use quantum physics to explain spiritual phenomena. It offers a way to address some ongoing controversies regarding quantum physics. It yields a simple metaphysical understanding



about quantum physics. Furthermore, it paves the way to integrate spirituality and natural science together at the fundamental level. This work reveals that physical reality is manifested by our spirit, heart, and mind. We will also demonstrate mathematically how our consciousness of space, time, inclusion and exclusion manifests our universe from the emptiness. This reveals a deeper meaning and function about space and time. It provides a way to address the question about the origin and creation of the universe scientifically. **C24**

## 4.15 Miscellaneous

**265 Third Millennium Physics is Thought-Driven** Francesco Alessandrini , Roberta Rio <maddiefranco@libero.it> (www.voyageindestiny.org, Udine, UD Italy)

Third Millennium physics is already reality. In this paper, the authors discuss the main features of a new physics and mathematics scheme, which is able to explain features of reality that have been not discovered until now. This new physics relate to matter and energy with a brand new approach, succeeding in clarifying one of the major open point in the modern physics, i.e. describing and controlling the interactions between electrical, magnetic and gravitational fields. The applications of this new physics have already provided their early and outstanding results, which will be documented during the conference. Amongst these, the authors highlight the controlled annihilation of matter and the ability to slow down particles spin, producing controlled heat generation. The fundamentals of modern physics were expanded and revised: the structure of the Universe being based on non-physical entities - such as matrix forms - which trigger the activation of morphogenetic fields, which in turn assemble and stabilize the physical matter and energy particles. The whole concept of this new physics is based on a new paradigm, which incorporates as a crucial law the interaction between the matrix forms and the individual thoughts that activates them. During the conference, the originator of this new physics and the technicians who built the first equipment implementing these concepts will also be presented and honoured. **C15**

**266 Is There An Information Field In The Life World? An Empirical Approach With Human Beings Using Electromagnetical Shielding And Electrophotonic Analysis.** Erico Azevedo , Pissolato Filho, J. <erico@rationalcorp.com> (Energy Systems Laboratory, Unicamp, São Paulo, SP Brazil)

This article is organized in five major sections. Section 1 presents a brief review of biological communication phenomena, mainly within microorganisms, showing that scientific hypothesis have evolved from chemical or electrical schemes to electromagnetic waves, and finally to quantum field speculations. In other words: how is it possible that a very low intensity signal, subject to noise and decay, might enable precise communications such as those that take place in the life world? For some scientists, this might lead to the suspicion that this kind of communication is based in quantum phenomena. Section 2 is dedicated to discuss the knowledge of human energetic states. It explores the frontiers between Physics and Psychology regarding human knowledge, including the consideration of neurological circuits from the Enteric Nervous System that are involved in the basic levels of human perception, and their relation with the continuous imaging activity of dreams and consciousness. Section 3 presents the experimental design. In quantum physics, the best equivalent for an ?information transduction without energy displacement? is the entanglement phenomenon, considered to be a bizarre result by Einstein and others (EPR, 1935) and proven only in 1982 by Alain Aspect and his colleagues. Based in his work, we created an analogous experimental design to investigate the information field phenomenon in the human level. Three precautions had to be taken: (1) eliminating the hidden variable possibilities, understood as the ability of the emitter to give instructions to the receptor; (2) randomness in relation to the interference between emitter and receptor; and (3) ability to use a content akin to communicate the energetic state of a human being. The first subject sat down inside an ETS Lindgren Series 81 faraday cage, designed for medical, industrial and governmental applications, located in a different floor, about two minutes walk from the laboratory in which was the second subject, so that, during the experiments, subjects were physically distant and electromagnetically isolated. Section 4 presents experimental results regarding 42 different measurements. Pulse rate

and SpO2 were measured with a digital oximeter, and the photon emission intensity (Joules) was measured using a GDV-Kirlian system. Based in this approach, a series of statistical analysis were conducted using SPSS and it was possible to verify with significance at the 0.01 level (1-tailed) that control group behaves quite differently from experimental group in several ways and there is evidence enough to affirm that human imaging activity has a strong relationship with the energetic organization status of human beings measured by oximeter and GDV-Kirlian. Statistical analysis include Pearson and ANOVA with a series of graphs to present the major results and support discussions conducted at Section 5. Future work is presented at Section 6. It includes the analysis of a second set of data measured during 162 clinical interviews in which the same physiological variables were measured and a similar time classification was adopted, as well as complementary experiments. **P1**

**267 Researching Consciousness - Yoga and the Inward Journey** Beryl Birch <yoga@power-yoga.com> (The Hard and The Soft Yoga Institute, Great Barrington, MA )

Classical yoga is often referred to as the path of eight limbs, or astanga - astau, 'eight' (pronounced 'ashto,') and anga, 'limb'. {see diacritical marks next page} This brilliant methodology, that serves as a path to the experience of yoga, has been preserved through a text entitled, The Yoga Sutra of Patanjali, and is available to scholars of yoga today through many textual translations. Yoga itself is an experience and cannot be taught. Only a set of instructions, or practices, can be passed along from teacher to student. The 196 aphorisms of the Yoga Sutra offer a practical but very basic outline and plot out a map to be followed. The directives become increasingly subtle and esoteric as the practitioner moves from the five bahiranga (outer limbs) to the three antaranga (inner limbs). This method, when empirically substantiated by the practitioner, step-by-step, can lead to an evolving awareness and ultimately facilitate a quantum leap to the enlightened experience. This experience cannot be conceptualized or intellectually understood. It is 'beyond mind' and happens in complete nirodha (stilling, restraint, cessation). This is the experience of yoga - supreme connectedness and the realization that all things are a construct of consciousness. The brilliance of the methodology is the way in which it moves seamlessly through the limbs - transitioning a practitioner from gross to ever increasingly subtle levels of awareness. The practices work to burn out samskaras, or impressions, that are imprinted in the various fields (koshas) of the body and obscure light and awareness. The practice of asana, for example, works to clear the body 'field.' Subsequent practices, like pranayama (literally 'energy restraint' and meditation, evolve to work on less dense, more expansive and luminous fields, that both intersect and surround the body. The more deeply one goes into the subtle practices, the more deeply liberation occurs in these less tangible, sub-conscious fields. There are many ways to 'practice' yoga. Asana, or the practice of the postures, is only one. Join us as we briefly experience some of the more empirically accessible aspects of yoga not only through movement, but also through breathing and mindfulness. Please wear yoga or workout clothing and be prepared for moderate, sensible movement. No thinking and no 'yoga' experience necessary. **C13**

**268 End of Life Electrical Surges: Current State of the Science** Lakhmir S. Chawla <lchawla@mfa.gwu.edu> (George Washington University Medical Ctr., Washington, DC, ) During the routine use of simplified EEG device in the ICU, multiple investigators have noticed that EEG spikes in patients after cessation of cardiac activity at the time of death. These end of life electroencephalographic surges (ELES) were initially attributed to artifact, but subsequent studies in animals and humans have documented that the source of ELES are in fact EEG signal emanating from the brain. In the first published report of ELES, our research group documented that the raw EEG signal from neuromonitoring devices responsible for the ELES are consistent with high frequency EEG signal. In addition to our report, a second independent report of ELES showed that an ELES tends to occur 30 to 180 seconds after the loss of blood pressure, and lasts from 15 to 240 seconds. Animal studies have documented that ELES also occur in rodents, and the timing of the ELES are congruent between human and animal studies. The frequency, character, intensity and overall significance of ELES are unknown and the source of speculation and controversy. Because there is a delay between the loss of measurable blood pressure and the

onset of ELES of up to 300 seconds in some patients, some investigators have proposed that death should not be declared until clinicians are certain an ELES has not occurred. For most patients, a delay in the declaration of death is not an issue and would represent a prudent decision. However, for patients who donate their organs after cardiac death, known as donation after cardiac death (DCD), a delay in the appropriate declaration of death could lead to longer durations of hypoperfusion for the organs that are eventually donated. Longer durations of hypoperfusion are associated with poorer allograft function and survival. Thus, the correct timing of a declaration of death is paramount for medical ethics and in some cases for the recipients of donated organs. In this plenary session, the new findings about the character, intensity, and duration of ELES will be reviewed. In addition, the implications of these findings will be discussed as it pertains to consciousness. **PL8**

**269 Destruction as a means of remodeling: the many roles of ubiquitin at the synapse** Gentry Patrick <gpatrick@ucsd.edu> (Section Of Neurobiology, UCSD - Division Of Biological Sciences, La Jolla, CA )

Memory is fundamental to consciousness and is stored as an anatomical and biochemical change in the strength of synaptic connections in the brain. This selective strengthening and weakening of synapses in response to past experience and activity is known as synaptic plasticity and is fundamental to all brain processes such as the ability to learn, form memories and modify behavior. In contrast, impairments in synaptic plasticity are considered to contribute to neuropsychiatric disorders and neurodegenerative diseases. Synaptic plasticity is largely mediated by both morphological and functional modifications to synapses. Local protein synthesis and protein degradation are known to contribute to these modifications. The inherent turnover rate (half-life,  $t_{1/2}$ ) for any given protein is determined by a combination of its synthesis and degradation. Importantly, cell biological signals are capable of altering rates of synthesis, degradation or both. In neurons, this may contribute to the dynamic nature of the overall protein stoichiometry of functionally relevant microdomains such as synapses. An emergent mechanism for regulating synapse function is posttranslational modification of synaptic proteins by ubiquitin and their subsequent degradation by proteasomal and lysosomal degradative pathways. Alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA)-type glutamate receptors mediate the large majority of fast excitatory synaptic transmission in the mammalian central nervous system (CNS). The accurate trafficking of AMPA receptors to and from the synapse is a critical component of learning and memory in the brain, while altered AMPAR trafficking is hypothesized to be an underlying mechanism of neurodegenerative disorders including Alzheimer's disease. My lab discovered that mammalian AMPA receptors are modified by ubiquitin which regulates their internalization and endocytic sorting to the lysosome for degradation. In this seminar, I will discuss our past and recent findings for activity-dependent protein degradation at synapses. A major focus will describe the activity-dependent ubiquitination, trafficking and turnover of AMPA receptors and implications for synaptic plasticity and disease. **PL10**

**270 Resonating Structures, Life And Consciousness** Jonathan Schooler <jonathanwschooler@gmail.com> (Psychology And Brain Sciences, UCSB, Santa Barbara, CA )

Synchronization, harmonization, vibrations, or simply resonance in its most general sense seems to have an integral relationship with consciousness itself. One of the possible "neural correlates of consciousness" that has been identified in recent years is the gamma synchrony in human brains, which is the resonating structure of electrical activity in the brain at the 40-120 Hertz frequency. We also see resonances of many other kinds in neural activity in humans and other creatures. Anirban Bandyopadhyay has identified many levels of resonances in human brains and modeled these in his work on artificial intelligence. Going beyond neuroscience and the study of consciousness, we see similar kinds of patterns in living structures of all varieties. Mae-Wan Ho's work in quantum biology has focused on resonating structures for decades, as described in her book, *The Rainbow and the Worm: The Physics of Life*. Resonance presupposes time, the temporal flow, because resonance is all about repeated patterns in time, changing slightly with each iteration. What clues can repeated patterns provide about the nature of consciousness or the nature of reality more generally? **C16**

## 5.0 Experiential Approaches

### 5.01 Phenomenology

**271 Phenomenal Consciousness and the Case of Quasi-particles** Klaus Gaertner, Joao L. Cordovil, Center For Philosophy Of Sciences, University Of Lisbon <klga@gmx.de> (Faculty of Sciences, Center For Philosophy of Sciences, University of Lisbon, Lisbon, Portugal)

One of the most pressing questions in Philosophy of Mind is how to consolidate the existence of phenomenal consciousness and the idea that higher level properties are grounded in micro-physics. According to Schaffer (2012), a grounding relation ‘connects the more fundamental to the less fundamental, and thereby backs a certain form of explanation’. Since grounding is taken to be a transitive, irreflexive and asymmetrical relation, it allows for a strict ordering between levels of priority. This means, if (A) is more fundamental than (B) and (B) is more fundamental than (C), then (C) is grounded by (B) which is grounded by (A), and therefore (by transitivity) (C) is grounded by (A). Thus, grounding is a relation of priority between levels of fundamentality. Following McKenzie (2014) priority refers to the following: entity (B) ontologically depends on or is determined by entity (A). This means that a) if (B) is ontologically dependent on (A), then (B) exists iff (A) exists; and b) (B) is determined by (A) iff (A) exists and (B) is what is given to (A). One paradigm case of the latter is supervenience. As a result, grounding complies with the following criteria: 1) higher level entities are ontologically dependent on micro-physical entities; 2) higher level properties are supervenient on micro-physical properties; and 3) grounding is a transitive relation. The problem of consciousness, then, is how to ground the phenomenal. Now, phenomenal consciousness is characterized as ‘what it is like for someone’ to undergo an experience. According to the zombie argument and the knowledge argument, however, the phenomenal cannot be grounded in fundamental physical properties, and hence physicalism is false. In what follows, we want to reconsider both arguments and show that even without denying the premises, the conclusion does not hold. To do so, we will consider a case from particle physics, namely the case of quasi-particles. Brigitte Falkenburg (2015) states that even though quasi-particles depend ontologically on the existence of ‘real’ particles, ‘[...] they are ontologically on a par with free electrons, protons, neutrons, as well as the subatomic matter constituents of atomic, nuclear, and particle physics’. As a consequence, one can argue that there are good reasons to think that so called ‘phonons’ are as fundamentally real as quarks or electrons are. However, this idea is not compatible with the assumption that higher level properties are grounded in properties of the fundamental level. Of course, this does not mean that quasi-particles do not depend on the existence of fundamental particles, but it means that the supervenience relation does not hold and micro-physicalism is false. As a consequence, or so we argue, both the zombie argument and the knowledge argument do not show that physicalism is wrong in general. They simply deny that the phenomenal supervenes on the physical. However, in the light of what was said above, this fact alone is not enough to deny physicalism. **C1**

**272 Metaphysics of Karma, an Investigation in Imperceptible Up-Link and Down-Link of Impulses** Lokesh Khurana <khurana.associates@gmail.com> (Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Metaphysics of Karma, is it equivalent to Newton’s law that is every action has a reaction or is it as Carl Gustav Jung once opined on unresolved emotions that when an inner situation is not made conscious, it appears outside as fate? The paper studies structures of experience and consciousness and maps it with deeds using experiential approach. When we think, speak or act we initiate a force that returns accordingly. This returning force maybe same, modified, changed or suspended, but it comes back. The paper investigates whether there is an imperceptible up-link of our desires, thoughts, words, deeds, action into a system that is predominated by the associated intentions initiating it. Likewise, is there any imperceptible down-link that automatically creates a future experience concluding it or initiating a new up-link? The paper also investigates into uncorrelated experiences as suspended returning force and linearity between up-link and down-link of impulses. **P1**

**273 To Be Or Not To Be, The Question Of Ego And Ego Death: Phenomenological And Neuropsychiatric Correlates Of Buddhist And Other Contemplative Approaches To The “self”** Brianna Morseth <brianna.morseth@gmail.com> (Psychological and Brain Science, Mind and Life Institute, Minneapolis, MN )

Phenomenologically, “ego death” is the loss of a separate sense of self associated with a variety of altered-state experiences, including but not limited to intense religious practice. Although core to Buddhism is the teaching of “non-self” and practice of relinquishing the ego, various cultures and individuals even within the Buddhist tradition nonetheless proclaim diverse experiences of ego death. For instance, circa fifth century BCE in ancient India, as recorded in Anguttara Nikaya 3.33, an early Buddhist text, the Buddha is reported to have said, “When a monk has no I-making, mine-making, and underlying tendency to conceit in regard to this conscious body...he enters and dwells in that liberation of mind, liberation by wisdom.” In thirteenth century Japan, Zen master Dogen wrote in the Genjo Koan, “To study the way is to study the self. To study the self is to forget the self. To forget the self is to be actualized by myriad things.” Yet what otherwise seem to be liberating experiences of actualization and ego-transcendence may actually share neural correlates with pathological states of self-loss. Indeed, as psychologists researching the experiences of meditators have recently discovered, the experience of “forgetting the self” is not always a pleasant one. In some cases, ego death reaches pathological extremes and is accompanied by depression, suicidality, and drastic alterations in brain function. As modern Theravada Buddhist psychologist Jack Kornfield comments about Ajahn Chah, a twentieth century monk in the Thai Forest Tradition, “Now we have to wrestle with one of the deepest and most demanding aspects of Buddhist psychology, the experience of non-self. Ajahn Chah said, ‘You have to consider and contemplate this slowly, you can’t just think about this or your head will explode,’” which, though an analogy, reflects a much more painstakingly serious approach to ego death with perhaps unintended consequences for the brain. Thus, combining critical readings of Buddhist and other religious scripture with extensive psychological interview data, this project takes an interdisciplinary approach to investigating ego death. First-hand ego death experiences from over one hundred participants from diverse cultural and religious backgrounds are compared, contrasted, and subjected to rigorous statistical analysis. The phenomenology of selflessness is next situated in the context of current psychological understandings of what it means to be, and not to be, a “self.” Phenomenological and neural correlates of selfless states are then identified in the neuropsychiatric literature, ranging from the fluidity of “self” displayed in dissociative identity disorder to the autobiographical memory loss of Alzheimer’s disease. The presentation concludes with a critical, interdisciplinary, and potentially controversial penetration of questions concerning brain disease, mental health, and altered states of consciousness, namely by asking what distinguishes enlightenment from insanity? Are wisdom (by Eastern, Buddhist standards) and psychosis (by Western, medical standards) more alike than we have otherwise acknowledged? If not, then how can these superficially similar states of consciousness be disentangled and what, fundamentally, sets them apart? C

**274 The Law of Attraction from the Book ‘The Secret’: Some Reflections from the Perspective of Devotees of The Sant Mat** Sumita Srivastava , Mr. Anjul Dayal <sumita.srivastav@gmail.com> (Management, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

‘The Secret’ is a book written by Rhonda Byrne, an Australian writer. The book presents a theory called Law of Attraction. This law suggests that like attracts like and emphasizes the idea that an individual’s life is a reflection of his/her past thoughts. Throughout the book, Byrne takes the support from Quantum Physics and argues that we live in two worlds. One that we can see and the other we cannot see. Newtonian Physics helps us understand how to navigate the known physical world, and Quantum Physics helps us to understand the very intelligent non-physical world in which everything is connected to everything else, and from which all known physical things are manifested. The framework suggested by Rhonda Byrne (Ask-Believe-Receive) recommends that if one wants to convert one’s dreams into reality, one has to ask for it from the universe through one’s thoughts. Believe is a mediating variable that links the relationship between asking and receiving. One must believe that the universe is ready to transform one’s thoughts into reality. In this paper, we attempt to verify the law of attraction through an experiential approach. We collected

data of 55 practitioners of law of attraction. Out of which 25 were the devotees of religion of saints 'Radhasoami Faith'. The data collected from both sources was analyzed using the framework analysis suggested by Krueger (1994) and Ritchie and Spencer (1994). Framework analysis uses data management and interpretation sequential approach to analyze qualitative data. It involves thematic analysis, typologies and explanatory analysis. All the participants confirmed the working of law of attraction in their life through continuous interaction with the Power in the universe and validated the framework given by Rhonda Byrne. However, some interesting insights are found by closely examining the data of 25 devotees of Radhasoami Faith. These respondents have discussed that the universe that listens to their thoughts is the abode of the Supreme Power of the universe. They suggest that their strong desires get transmitted to the Supreme Being and continuous prayers transform the dreams into reality. After this initial discussion, they were further probed on the factors that worked in the process of achieving their dreams into reality. High internal consistency was visible in their comments and major themes began to emerge. After following the data analysis protocol suggested by Ritchie and Spencer (1994), quotes were lifted from their original contexts and were re arranged under the thematic framework formed at the initial stage. From the commonly identified themes, a few variables were identified that act as the mediating and/or moderating variables of Ask and Receive framework. These variable are *uchit manokaamna* (appropriate desire), *prarthana* (prayers), *latency* (appropriate time) and *karmas* (past deeds). In this working paper, we present a conceptual model emerging from the data collected and analysed from the study. P1

## 5.02 Meditation

**275 Change in Central Executive, Visuo-spatial and Verbal Working Memory Capacity at Different Phases of Meditation** Sona Ahuja <sonaahujadei@gmail.com> (Pedagogical Sciences, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

The meditation techniques based on oriental philosophy of Saints (Radhasoami Faith) are practiced sequentially in three phases : (i) novice meditators practice mantra meditation (ii) intermediate meditators are trained for the practice of contemplation of form (iii) advanced meditators are trained for sound practice along with the practice of contemplation of form. The repetition of mantra in the first phase can be connected to verbal technique to disrupt the distracting thoughts. The visualization technique in the second phase can enhance the capacity to hold complex visual image. The simultaneous use of sound and form in third phase is likely to involve working memory and phonological loop conjointly (Buttle, 2011). The current study tests this hypothesis of association of different components of working memory with sequential phases of meditation. The participants were studied for (i) perceptual task which required concentration on complex images (ii) spatial span task which required subjects to temporarily hold and manipulate spatial and movement information displayed on screen (iii) visuo-spatial processing skills - subjects mentally compared complex images to one another (iv) digit span task which required visual inputs to be recorded so that they can enter the short term verbal store. Working memory also includes a central executive system (CES) to control attention and information flow to and from verbal and spatial short-term memory buffers. In the second experiment, n-back task was used to assess change in central executive of working memory at different phases of meditation. The automated tasks were administered on participants before and after meditation. The results indicate that all three strata and controls performed same at the baseline level. After the practice of meditation for a period of 20 weeks, the experimental group demonstrated an increase in performance on visuo-spatial and verbal working memory with variation in gain in the three groups. The increase in verbal working memory was significant in the first and third phase of meditation. The gain in visuo-spatial working memory was significant in third phase of meditation. There was sharp gain in concentration at the first phase of meditation whereas no change was observed in the visuo-processing skills of this group. The intermediate and advanced meditators showed significant enhancement in visuo-spatial processing efficiency. No significant difference in performance of controls was found. Inter-strata differences show that there is significant difference in the central executive score of novice meditators and advanced meditators at pre-test whereas at post-test, the difference is not significant. The results are discussed in the light of association of different components of working memory with different phases of meditation. The study also presents the interactional ef-



fect of age and phase of meditation on visuo-spatial and verbal working memory. The correlations among verbal memory, visuo-spatial memory, visuo-spatial processing skills and concentration are discussed. **C13**

**276 Experimental Study on Yoga and Meditation in Enhancing Extra Sensory Perception, Working Memory, Mindfulness and Consciousness in University Students** Jyoti Kumar Arora , Ravindra Bhardwaj and M.M. Srivastava <dei.jkarora@gmail.com> (Humanities and Applied Science, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

To improve the quality of life, there has been the search for strategies for handling stress, and subjective well-being. These explorations have led us to ancient disciplines such as Yoga, which combine the physical elements of a healthy lifestyle with mental peace. It integrates the personality by bringing body-mind-soul coordination in a well-balanced way. The spiritual upliftment from Yoga will help to improve the qualities of their mind for not only worldly achievements and success in life but also attaining the real goal of one hierarchy of spirituality to higher level. Thus Yoga is a skillful trick to calm down the mind and to establish union of body with mind. The university students, the group of youths of the age ranging from 16 to 25 years, supposed to be responsible for the community and their own development unfortunately is under in a sense of dissatisfaction, physical and mental stress. The need of the day is to aware them the importance of our long established Eastern Life Style involving regular practice of Yoga and Meditation leading to life satisfaction after achieving harmony between the physical, mental, intellectual and spiritual values, simultaneously saving them from westernized materialistic world with eroded moral values. The present piece of work is aimed to assess the impact of Yoga and meditation on the enhancement of Better worldliness in terms of Extra sensory perception (ESP), working memory (WM), Mindfulness and Consciousness of the University level students. The study was conducted on 20 healthy male volunteers from Technical College, DEI, Dayalbagh, Agra, between the age group of 16-23 years with height of 1.56-0.05m, weighing 55-5.50 kg. All the subjects were not suffering from heart and lung disorders. The scientific study involves pre and post measurements on subjects of ESP using Zener Cards and qualitative analysis, WM using (WAIS-III UK), Mindfulness: Measurements of Mental Readiness, Well-Being And Decision Making Using Psychological Test Moreover, brief mindfulness training significantly improved visuo-spatial processing, working memory, and executive functioning. Our findings suggest that regular Yoga and meditation practice can enhance the ability to sustain ESP, WM, Mindfulness and ultimately in terms of consciousness. **C20**

**277 The Delusion of God Delusion** Vinit Kumar <vinitkumar122@gmail.com> (Agra, India)

The pursuit of science in limiting measurements and associated factors to the study of brain as a medium of trying to grasp an understanding of higher consciousness is based on a weak foundation. Every individual is but a victim of five emotions of desire anger attraction attachment and ego, this is what limits humans to the realm of consciousness. Transgression beyond this where the mentioned emotions cease to have a hold on human behavior is what is the threshold of higher consciousness. This can be acquired only by meditation. Let us define human mind as a large wheel that is constantly in motion. The only way to bring this wheel to a halt in a wakeful condition is by meditating. All the major religions of east and west have laid stress on the word, some call it mystical word. These religions have talked of existence of a word. So meditation is but trying to resonate with that word. This is the key to higher consciousness. **P1**

**278 Effect of Musical Ragas on Consciousness States Using Electro Photonic Imaging** Pritam Pyari , Sant Saran, Saran Pyari Roy, Sukhdev Roy <sukhdevroy@iitdalumni.com> (Music, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Eastern experiential traditions describe unstruck music (Anhad Nada) as the very nature of consciousness. It is well recognized in its traditions that different Ragas or musical melodies, have a profound impact on the consciousness states correspond to focused attention at different energy centres and hence also have a healing effect. In this paper, we report the results of a pilot phenomenological study on the effect of Indian classical music ragas on the consciousness state and health using Electro Photonic Imaging (EPI) technique. EPI is based on Indian Ayurvedic system and



traditional Chinese medicine that involve meridians, energy channels and energy fields, and leads to a psychosomatic assessment. In this paper, we report the results of a pilot study undertaken to test the age-old empirically validated traditional knowledge of the impact of musical ragas on the consciousness level of an individual. Three 5-minute instrumental flute compositions of Alap form of Ragas, namely, Ahir Bhairav, Jaijaiwanti and Darbari Kanada that affect the Anahata (heart), Vishuddha (throat), and Agnya (third-eye) chakras respectively, were carefully chosen. A group of 30 subjects were carefully chosen that comprised of (i) 15 year old male and female meditators (50-80 years), and (ii) 15 college/university students, were made to listen to the Raga compositions. Their subjective responses were also recorded through a questionnaire, by noting their order of preference and the qualitative effect in terms of feelings, imagination, color perception etc. They were then segregated and subsequently, each of the subgroup was made to listen to the respective raga for 15 minutes. The older mediator group showed preference for Darbari Kanada, whereas, the students preferred Jaijaiwanti. The bio-electromagnetic field glow of the subjects through EPI, was recorded with a CCD camera from all ten fingers, before and after listening to music. The EPI results were analyzed and correlated with the respective subjective responses. The results showed in general, a significant improvement in the Agnya (Third-Eye) chakra alignment and its energy, in the older group of meditators, whereas students showed for Vishuddha (Throat) Chakra. As expected, the ragas resulted in considerable reduction in stress and improvement in health indices. Both EPI and the subjective analysis indicated higher state of consciousness in meditators in comparison to students. The subjective experience pertaining to the preference of ragas, imagination, perception of feelings and colors in majority of the individuals correlated with specific states of consciousness that correspond to that attributed to the different Ragas and Chakras, according to eastern experiential traditions. The study highlights (i) the importance of traditional knowledge, i.e., the correlation of different states of consciousness with different musical ragas, (ii) the usefulness of designing musical psychometric tests to ascertain consciousness levels. Such a test can be invaluable for illiterate individuals and better suited to obtain direct honest responses than through purely written questionnaires. It would not only help in measurement but also to tune consciousness to higher levels. The results of a correlational study with frequencies generated during the musical test using Magnetoencephalogram (MEG) will also be presented. C16

**279 Quantum Operator Formulation of Consciousness and its Application to Experiential States in Meditation** Sukhdev Roy <sukhdevroy@gmail.com> (Physics and Computer Science, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

It is universally accepted in experiential traditions that pure consciousness is the ground of being. We consider its functional space as an infinite dimensional Hilbert space, with mind as a quantum field of information. A pure quantum consciousness operator  $C$  is a product of the  $S$ (self) and  $M$ (mind) operators ( $C = SM$ ). This operator creates excitations or vibrations in the mental domain, i.e., mind particles and generates a coherent macroscopic information field.  $C$  reflects our basic identity and is bosonic and non-Hermitian operator, as the self, mind and brain are open quantum thermodynamic systems, not isolated from the surroundings. To correlate it with the neural synaptic states in the brain to elicit response, a local field operator  $\Psi_i$  is defined that generates excitations at neuronal synaptic sites  $i$  such that their averages are equal. As the non-zero average of  $C$  is a complex quantity, it is designated as the cognitive self or first-person, with which we identify ourselves. It increases as the brain interacts with the environment and the synaptic activity between neurons increases. This is in excellent agreement with the recent neurophysiological study that shows that normal wakeful states are characterized by the greatest number of configurations of interactions between brain networks, representing highest entropy values, and hence larger information content associated to conscious states [R.G. Erre et al., Phys. Rev. E 94, 052402, 2016]. The state of self-absorption is a phase coherent ground state of the information field and excitation from this state is constituted as embodied consciousness. The fundamental excitations as quantum particles carry energy-momentum and exist simultaneously in objective and subjective spaces. An arbitrary information vector is a completely entangled state of the physical and mental. Hence, the non-Hermitian Hamiltonian qubit gives meaning to information.

We consider the brain to generate a coherent state that can accommodate large number of these bosonic particles. The creation operator  $C^+$  creates an information bit, a fundamental particle of awareness, by operating on the quantum vacuum state in the Fock number space. The destruction operator  $C^-$  acts on the coherent state to give the measurement value, whereas, the number operator  $N$ , which is the preservation operator, counts the bits of information in the cognition channels. The cognitive consciousness operator  $C$  which creates, destroys and preserves, is in consonance with the observation of the great particle theorist J.J. Sakurai that quantum creation, destruction and preservation operators correspond to the Creator (Brahma), the Destroyer (Shiva), and the Preserver (Vishnu) in Hindu mythology. The  $S$  and  $M$  operators do not commute with each other and hence satisfy the generalized uncertainty principle. When the uncertainty in  $M$  is zero, uncertainty in  $S$  becomes infinite, i.e., there is an expansion experienced in the self or spiritual domain. This conforms to the quietening of the mind through self-reflection by yoga-meditation. Also, when  $M$  is a unitary operator,  $C = S$ , i.e., the self becomes pure consciousness. The proposed formulation is important, as it develops a spiritual-psycho-physical quantum theory of consciousness and explains the process of meditation. **C14**

**280 Effect of Surat-Shabda-Yoga (Ultra-Transcendental) Meditation on Consciousness States Using Electro Photonic Imaging** Sant Saran , Sukhdev Roy <santsaran1@gmail.com> (Electrical Engineering, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

The main challenge in consciousness studies is to scientifically determine higher states of consciousness by experimentally measuring psychophysiological parameters. Yoga meditation regulates the spirit, mind and body and has a transforming effect on an individual. Although there are different forms of meditational practices, the Surat-Shabda-Yoga meditation, which involves contemplation, internal repetition of spiritual sound and meditation on spiritual sound currents, is known to induce higher states of consciousness. In this paper, we report the results of a pilot phenomenological study on the effect of Surat-Shabda-Yoga meditation on the consciousness state and health of yoga-meditators, using Electro Photonic Imaging (EPI) technique (modified Kirlian imaging), which is based on Indian Ayurvedic system and traditional Chinese medicine. It involves meridians, energy channels and energy fields, and leads to a psychosomatic assessment. EPI also known as gas discharge visualization is a technique used to record the human bio-electromagnetic field. In EPI, electrons at finger-tip are stimulated by applying a short electric pulse of a high voltage (10 kV), high frequency (1024 Hz) and low current for less than a millisecond. This results in a glow due to the ionization of gaseous molecules in the surrounding air through the discharged electrons from the finger-tips, which is then captured by a CCD camera. To experimentally assess the impact of meditation, 35 beginners, both male and female, in the age group of 15-48 years, were selected. Regular sessions involved seven yoga exercises for 15 minutes, followed by the advanced Surat-Shabda-Yoga meditation for 30 minutes. The bio-electromagnetic field glow of the subjects through EPI, was recorded from all ten fingers, before and after meditation, and its effect on respective energy centres was analysed with respect to various parameters, namely, activation coefficient, integral area, integral entropy and form factor that reveal the physiological and psychophysiological condition of the human body in terms of stress, energy, left-right symmetry, organ balance, emotional pressure, entropy, yin-yang balance and chakra alignment. The subjective responses were also recorded through a questionnaire, by noting the qualitative effect of meditation in terms of feelings, imagination, color, etc. The procedure was repeated after three months of meditational practice. The extensive analysis showed in general, a significant improvement in the integral area, increase in form factor, increase in front energy with decrease in left and right energy, and decrease in integral entropy, indicating the lowering of disorder after meditation. Yoga-meditation also improved the balance and alignment of chakras. The results confirmed that different consciousness states are correlated with different energy centres and yoga-meditation leads to improvement in health and stimulation of higher energy centres. The impact is greater in comparison to anapanasati meditation reported recently. The study highlights the importance of (i) integration of subjective and objective studies, or first-person and third-person experiential and experimental phenomenological studies on consciousness; (ii) efficacy of Surat-Shabda-Yoga (ultra-transcendental) meditation, which makes considerable impact on attaining higher states of

consciousness in a very short time; and (iii) utility and reliability of the non-invasive, safe and fast EPI technique, for consciousness and health assessment. **C13**

**281 Exercises for Elevating Consciousness: The Rules for Practicing Them and the Resultant Thereof** Neha Sinha , Mili Mathur, Meghna Srivastava <nehadb01@gmail.com, nehasinahmehta@gmail.com> (Dayalbagh Educational Institute , Agra, UP India)

Exercises for raising the consciousness, also called Surat Shabd Yoga are a) Utterance of the spiritual name by the spirit current; b) contemplation of the spiritual form; and c) attentively listening to the spiritual sound. The above process can be best explained in scientific terms as the experiment of a tuning fork and the resonance produced thereof. Rules to be followed for successful results are adopting a lacto vegetarian diet and abstaining from all narcotic drugs and intoxicants, The resultant is the elevation of consciousness by achieving union with higher regions. **P1**

**282 Buddhist Mind Theories In Contemporary Consciousness Science** Yi Xu , Hengwei Li <gentlebreeze@163.com> (Zhejiang Sci-Tec University, Hangzhou, China)

With the natural sciences walk toward the completeness of its' intellect---- one which concerns not only the nature of physical objects but also the nature of mind which can know the former, the emerging mind science (cognitive science), and especially the consciousness science, as the same with the ancient Buddhism, views the understanding of mentality as the core and fundamental problem for understanding the whole nature. Comparing with the physics, the phenomenology wins the priority in the epistemology, as the Buddha said: "All phenomena are preceded by the mind. When the mind is comprehended, all phenomena are comprehended." Buddhism, since the ancient times, regards mind understanding, the mind training, mind cultivation and mind liberation as its fundamental interest and purpose; and therefore it not only formed a set of elaborate, complex and complete theories about the nature of mind (components, structure and functions of mind), but also developed a systematic set of rigorous first-person methods. Thanks to the common focus, consciousness science tends to actively resonant and deeply converse with Buddhism. Meanwhile, in the context of modern mind and consciousness science, Buddhist mind theories facing the huge challenge of modernization, and on the other hand, might spawning a new vitality during the process of conversation and integration with nature science which it has never been involved in. This paper investigates that, in the development of modern consciousness science, what are the new resources, horizons and insights that Buddhist mind theories has contributed to. In summary, there are five aspects: (1) Based on the Samatha and Vipassana which are the most general paradigms of meditation, the Buddhist meditation methods bring some important resources to the construction of the first-person methods of consciousness science, and thus the neurophenomenology takes it as the well-trained first-person method. (2) The theories of svasa?vedana of Buddhist tradition also provide us with an abundant theoretical resources for answering the question that how the self-disclose and report of conscious experience could be possible or what's the foundational mental structure of doing so, that is, as the natural characteristic of consciousness, the single level "self-awareness" provides a foundation for self-disclose of experience from the view point of consciousness structure. (3) In the Buddhist texts, there are many mental states of the meditation that much similar with so called "pure consciousness", which provide an oriental perspective to understanding the nature of consciousness; furthermore, if the pure consciousness and the contents of consciousness could be separated, it would provide a new idea for the study of neural correlates of consciousness. (4) Reference to the pathological methodology in the researches of the altered states of consciousness, cognitive neuroscience's investigation of neural correlates on meditation states broaden the horizon of consciousness science. (5) The Buddhist-enactive approach of self views the self as non-substantial and a dynamic process while continue construct the identity, the self theories of Yogacara and Madhyamaka Buddhism shows the rich insights for the understanding of the nature of self. **C**

## 5.03 Hypnosis

## 5.04 Other altered states of consciousness

**283 Perceived Persistent Experiential Consequences Of Altered States Of Consciousness (asc) Induced By Ritual Use Of Ayahuasca** Paulo Barbosa <pcrbarbosa@uesc.br> (Departamento De Filosofia E Ci, Universidade Estadual De Santa Cruz, Ilheus, BAHIA Brazil)

Background: Ayahuasca (hoasca) is a N,N-dimethyltryptamine (DMT) containing psychedelic brew originally used for magico-religious purposes by Amerindian populations of the Amazon Basin. Recently, the Brazilian syncretic churches Santo Daime and Uniao do Vegetal (UDV) have spread the ritual use of hoasca to Western societies. Aims: To evaluate perceived experiential consequences of the ayahuasca-induced-ASC. Methods: Twenty three subjects were evaluated before their very first experience with ayahuasca in Santo Daime (n=15) or UDV (n=8) ritual settings and 6 months later. Qualitative semi-structured interviews were administered to assess 1) integration of the insights that were experienced during their ayahuasca ASC into daily life; and 2) persisting behavioral changes subsequent to subjects' sessions. Results: Ten subjects (43.5%) reported integration of insights experienced during the ayahuasca-induced ASC into their daily lives. Eight subjects (34.8%) reported that their experience helped them to be more assertive, optimistic, calmer, and reduce their alcohol, tobacco, and cannabis use. Conclusion: The results suggest that the ayahuasca-induced ASC elicits positive insight which can be integrated in daily life and may effectuate persistent positive behavioral changes. **P2**

**284 The Consciousness of the Body and the Realization of All Times - Past-, Present-, Future-lives and the Lives In Between** Siegmarg Gerken, Siegmarg Gerken PhD, ECP, HP <siegmargerken@gmail.com> (International Institute for Energy & Consciousness, Inc., Mendocino, California)

Near-death and anomalous experiences challenge us to expand our notion of reality and of the perception of consciousness. We live in the fields of consciousness in which we hold images of our experiences. These are bio-psycho-emotional processes and their energetic impressions in our system. In this lecture Dr. Gerken will give a personal account of his NDE and anomalous phenomena and will share some of his research in documenting these fields of experiences with Infrared-Analysis and Bio-Photon Measurement. His insights into the vibrational reality of life culminated in the development of Core Evolution, an integrative approach to well-being and healing. **C6**

**285 A Systematic Study Of Microdosing: Reported Effects From 6 Weeks Of Regular Ingestion Of Low Dose Psychedelics In Healthy Individuals** Vince Polito <vince.polito@mq.edu.au> (ARC Centre Of Excellence In Co, Macquarie University, Macquarie University, NSW Australia)

After a long period of absence from the scientific literature, experimental studies involving psychedelic substances are reappearing. High profile research teams are publishing findings in top journals showing that psychedelics can be used to better understand cognition, perception, neurobiology, psychopathology and wellbeing. In parallel there has been increasing interest in these substances from the general public. One topic of growing interest in online substance use communities is the phenomenon of "microdosing". Microdosing refers to consumption of an extremely low dose of a psychedelic substance, most typically LSD or psilocybin. A microdose can be 1/10th or less of a recreational dose and users will often microdose regularly every 3 or 4 days over an extended period of time. Due to the very low dose users do not usually report the marked cognitive and perceptual alterations that typically characterise psychedelic experiences, rather immediate effects are reported to be very subtle and sometimes barely noticeable. Despite this users make a wide variety of claims for the benefits of microdosing with various substances, including improved vitality, positive mood, increased attention and greater creativity. Although microdosing has exploded in popularity in recent years, to date there has been virtually no empirical research on this topic and the veracity of these claims has not been tested. I will report results of a systematic observational study of the effects of microdosing in healthy participants over the course of 6 weeks. Sixty regular microdosers provided baseline, daily, weekly, and post-study ratings across a range of cognitive

and psychological domains including mood, attention, wellbeing, mindfulness, mystical experiences, personality, creativity and the sense of agency. I will present results showing the medium and long term effects of microdosing in this cohort, and compare the reports of genuine microdosers with individuals' expectations about the outcomes of microdosing. I will address the role of placebo with regards to microdosing and general methodological issues in the study of psychedelic drug use. Finally, I will discuss the potential and implications of regular ingestion of low dose psychedelic substances as a method of altering consciousness in socially desirable ways. **C6**

**286 Autonomous Sensory Meridian Response: Brain Tingles and Personality Correlates** Natalie Roberts , Dr. Simon Boag, Dr. Alissa Beath <natalie.roberts@students.mq.edu.au> (Macquarie University, Sydney, NSW Australia)

While significant progress has been made, altered states of consciousness (ASCs) still represent a major frontier in psychological research. This paper reports the development and validation of a multidimensional self-report measure of a proposed alteration of consciousness, autonomous sensory meridian response (ASMR). ASMR is an intensely pleasurable head-orientated tingling sensation that occurs in response to specific, audio-visual triggers, resulting in feelings of comfort, relaxation and euphoria. Generating significant online interest, there are currently over 6 million ASMR stimulus videos on YouTube, frequently featuring point of view simulated role play, and whispering, tapping and crackling sounds. Individuals engaging with ASMR media report pleasure seeking and anxiety reduction motives, particularly in promoting relaxation, mind-body connectedness, and sleep. In order to understand the underlying mechanisms and benefits of intentional and incidental ASMR induction, a mixed-methods approach to scale development was adopted. Firstly, a content analysis was performed on 303 online accounts of ASMR experiences, to derive a comprehensive self-report measure. The secondary, quantitative study refined the ASMR measure through factor analysis (N = 451), producing a cohesive scale with five subscales: Movement, Sensation, Affect, Relaxation and Cognition. The final ASMR-21 evidenced good reliability with adequate internal consistency ( $\alpha = .82$ ) and demonstrated a divergent pattern of correlations to frisson, flow, absorption and alexithymia. In a follow up study, exploratory and confirmatory factor analyses were undertaken to determine the underlying factor structure of the ASMR measure and replicability of findings across assessment applications. An online ASMR sample was utilised (N = 896), examining the ASMR scale alongside measures of anxiety, misophonia and absorption. The ASMR-21 further demonstrated internal consistency ( $\alpha = .82$ ) and validity as a measure of ASMR propensity. Across studies, correlational analyses demonstrated divergence between ASMR and other, established alterations of consciousness, suggesting a common experience unaccounted for by existing constructs. The ASMR-21 may be useful to researchers interested in disentangling ASMR from other alterations of consciousness, and in promoting wellbeing through intentional ASC induction. **C16**

**287 Intuition: A Meta-analytic Perspective And Enabling Factors** Nandita Satsangee , P. Sriramamurti <nanditasatsangee@gmail.com> (Foundations of Education, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

"Knowledge has three degrees - opinion, science and illumination. The means or instrument of the first is sense; of the second, dialectic; of the third intuition." The phenomenon of intuition has been studied by several disciplines including (transpersonal) psychology, philosophy, science and spirituality leading to multiple perspectives, often substantially divergent from each other. A widely accepted definition of intuition is that it is a system of directly acquiring or experiencing knowledge without any sensory inputs or rational thought processes. However, certain fundamental questions remain: What is the source of intuition? What kind of knowledge is acquired through it? What is the reliability of the knowledge so acquired? etc. In order to answer these and other such questions a meta-analytical study of the phenomenon was undertaken. It was observed that the varied concepts and theories on intuition could be classified into several possible ways: the Eastern and the Western perspectives; the neurophysiological, psychological and spiritual sciences perspectives and so on. Further insights have been added to these by the physical sciences especially by quantum Physics. The present study focuses on the Western psychological perspective (as theorised by some contemporary Western psychologists) and the Eastern spiritual-science perspective (as

practised by specific Eastern spiritual traditions) for searching answers to the proposed questions. Among other findings, it was observed that the Western psychologists have essentially a behaviourist/cognitive perspective of intuition whereas the Eastern thought on intuition is essentially transcendental. The Western psychological view is directed towards knowledge of external reality whereas for the Eastern spiritual practitioners it is directed inward towards knowing the self. Also, their experiential accounts were found to diverge along two dichotomous modes - Dualistic and non-dualistic. These differences can be understood when the phenomenon of intuition, as reported in some accounts, is considered as existing at four hierarchical levels: physical, emotional, mental and spiritual each with their own characteristic manifestations. Factors and methods enabling intuition or intuitive consciousness also vary according to the school of thought. For Western psychologists the chief enablers of intuition are the environment and repeated practice with 'relevant feedback' leading to a kind of 'automated expertise', which is domain specific. According to the Eastern schools meditation is the most potent enabler of intuition. The Eastern perspective has been explicated in detail by two prominent schools of thought which, though having originated in religion, have also been reinterpreted from the scientific perspective: the Sant Mat or Religion of the Saints and Kashmir Shaivism, especially its theory of Spanda Shastra. The two schools have much in common. Both have explained intuition as a state of higher or supra-consciousness attained by proceeding from the grosser to the subtler levels of consciousness in accordance with the law of nature that the subtler can observe the grosser, but not vice versa. 'Subtler' pertains to substances not only of finer dimensions, but also possessing energy of higher frequency. Thus, one progresses from sensory perception to extra-sensory perception to intuitive perception. P1

## 5.05 Transpersonal and humanistic psychology

**288 The Application Of Cultural-historical Approach To The Study Of States Of Consciousness In Traditional Chinese Qigong, on The Example Of The Categories "Yi" and "Xin"** Sergey Slavnov, No <sergei.slavnov@gmail.com> (Global Solutions Ltd., Moscow, Russian Federation)

In cultural-historical theory of Russian psychologist L. S. Vygotsky (1896-1934) consciousness is treated as the system dynamic unity of "Natural (Lower)" and "Higher" mental functions (HMFs). HMFs have the properties of socialization (internalization), mediation, voluntary self-regulation and consistency (which are the results of transformation of "natural" mental functions into HMFs). It is productive to use this model for the study of Altered States of Consciousness (ACS) and understanding the mechanism of change of consciousness in traditional practices, which cultivate them, for instance, psychotechnical features of Chinese qigong. One of the "three treasures" ("Jing-Qi-Shen") in Chinese qigong is "Shen" - one of the possible interpretations of it is the integrity of consciousness. A criterion of achievement of integration is the possibility of balancing all psychosomatic nature of the individual, i.e. "Qi" and "Jing". "Training" of "Shen" is based on the cultivation of special ACS related to the use of "Yi" as "higher" mental function in relation to other factor - "Xin". "Xin" is a spontaneous, emotionally colored, but not consciously directed (not "coherent") state of consciousness. "Yi" is "the mind of wisdom and will," the source of distinguishing awareness and conscious intention. So "Yi" is "higher" mental function in relation to "Xin", its formation as a functional organ is the cause and source of integration of "Shen" (and of the whole psychosomatic human nature). According to Chinese sources, the practical meaning of meditation is "Yi Xin Hui Yi" - transformation of "emotional intelligence" to match the "mind of wisdom", in the words of Yang Jwing Ming. Regular cultivation of this ACS leads to the formation and application of "functional organ" as a tool of integrating mind and body in traditional qigong practice. C

**289 Compassion As Transpersonal And Neurocognitive Concept: Meta-analysis** Milica Zegarac <milizegar@gmail.com> (Global PhD Psychology, Sofia University, Palo Alto, CALIFORNIA)

Compassion as a feeling of concern, caring and motivation to help those who are needy and suffering, is a transpersonal emotion, a state of being, a permanent trait, or a learned skill. At the same time, it is one of the highest developmental achievements of our evolution as species. Compassion



means the activation of the heart chakra for the evolutionary energy to flow and transform us from the “human islands” to the true “shores of the same ocean”. This meta-analysis will consider its spiritual, affective, neuro-cognitive, behavioral, pro-social, therapeutic and clinical implications. It will also examine role of compassion in transpersonal psychology and in ‘the farther reaches of human nature’. The spiritual concept of compassion is to a greater or lesser extent part of all Abrahamic, non-Abrahamic, and mystical contemplative traditions (Kabbalah, Sufism, Zen). As an affective state, it has an affiliative function, and could be considered both as a temporary or a permanent feeling, mostly acquirable trait and a learned skill. Its pro-social behavioral component, the compassion for others with its empathic motivation, altruism and service to the community, points to the innate quality of us as humans. Motivation and intentional action to alleviate suffering of others is cognitively related to the theory of mind, empathic perspective taking, and mentalizing. Neuroscience has been able to determine the neural correlates of several similar concepts, such as empathy, altruism, or loving kindness, and relate them to compassion. Those states partially overlap with compassion, but may also differ completely. For example, the scientific evidence confirms that empathy and compassion are different phenomenologically and need to be viewed as distinctive physiological manifestations (e.g., neurotransmitters) and neurocognitive events (e.g., specific brain regions). Therapeutic and clinical implications indicate that the compassionate attitude per se is a predictor of psychological health, well-being and resilience. Certain specific types of meditation, often originating from the ancient Buddhist or Hindu practices (e.g., tonglen, lojong), have important roles in fostering feelings of empathic resonance, loving kindness and compassion, as well as in promoting compassionate skills that can be part of clinical programs for emotion regulation, stress reduction, or even healing trauma or mental disorders. In addition to that, and per many theoreticians of transpersonal psychology (Sri Aurobindo, Assagioli, Maslow, Wilber), a compassionate self-transcendence is the highest stage of transpersonal and spiritual development. That means shifting from the ego-centered self-love to the ego-less love, compassion and altruistic service. This personal transformation of affective states and traits grounded in I-Thou duality, moving towards the states of non-dual awareness, compassion and acceptance directed towards all, is the pinnacle of human evolution. P2

## 5.06 Psychoanalysis and psychotherapy

**290 Mind Training Programs Like CBCT is Beneficial In: A. Combating Behavioral Disorders, B. Sharpening Human Intellect and Wisdom and C. Improving Health, Peace, Love and Compassion for Self and Others.** Shyamala Mruthinti <mruthsh@gmail.com> (Datta ImmunoChem Inc., Mableton, GA )

Our education system has advanced in teaching various subjects to produce highly accomplished intellectuals in various fields; yet we seem to be lagging behind in understanding & receiving any training to organize our thoughts or know the real nature of our mind. Increasing number of psychiatry doctors, hospitals and new drugs pumped into niche market to treat various cognitive and behavioral disorders such as: depression and Alzheimers; have failed to decrease an escalating patient numbers. One cannot explain why someone who is successful like Oscar winning Hollywood actor, late Robin Williams committed suicide; and someone who is paralyzed for more than 50 years, like Dr. Stephen Hawking, who is world famous theoretical cosmologists, continues to live and contribute towards science to date. He was diagnosed with amyotrophic lateral sclerosis (ALS) when he was 21 and was given 2 years to live and he is 75+ years now. Doctors and scientists are baffled by his survival and assume that his positive mental outlook is the key factor to prolong his life. They wonder if positive thoughts and psychological well-being do much to help with patients outcome. Healthy mind is healthy body and every thought emotion and feeling crossing the mind also affects our genes, proteins and neuroplasticity to strengthen or weaken our immune system. Dr. Hawking cautions that, man made creations such as: artificial intelligence, nuclear war and genetically engineered viruses may destroy human race! Cognitive Based Compassion Training (CBCT) is based on Buddhist secular meditation practices, derived from the ancient Indo-Tibetan Lojong tradition initiated by Emory University. The training provides six well laid out Modules which are: Module I. developing focus, attention stability and clarity of the mind by using breath as the point of focus. Metaphor: training puppy dog. Module II. introspective awareness: In this module participants are taught to watch their own mental



activity as silent observer without getting entangled or carried away with each thought. Metaphor: Unchanging sky like mind and changing cloud like thoughts. Module III. Self-compassion: In this module participants are taught to realize the value of their own self and be kind and loving to their own self with an understanding that: success, failure, distress confront all. Metaphor: wear your own oxygen mask before helping others. Module IV & V: Cultivating equanimity & Impartiality and Inter Connectedness: In this module participants are taught to recognize that all humans are fundamentally same and our life depends on fellow human beings, plants, animals and nature. Module VI: Engaged Compassion: In this module they are taught to feel others pain in their heart and render possible help and support to alleviate their suffering. In summation CBCT is an ideal psycho-neuro-immuno therapeutic holistic approach which can improve attention, memory, cognition, self-esteem, relationships, interpersonal skills, and cultivate empathy, love, compassion towards all. C20

## 5.07 Lucid dreaming

## 5.08 Near-death and anomalous experiences

## 5.09 Parapsychology

## 5.10 Contemplation and mysticism

**291 Wavering Desires of Mind and Ultimate Desire of Consciousness** Kanta Arora  
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This paper is in continuity and concludes the subject of my earlier poster presentations in TSC-2015 and TSC-2016 - Titled: Consciousness, Divinity and Trinity of Human Form and Consciousness and Smoke of Clouding Waves of Desires. In my earlier papers I have discussed as to how desire is the root cause of all existence. Desires arise, ripen and are reborn like a corn. The clouds of strong desires well up from within and surround individuals to push them forward to action, will and determination. How human form is a tool, technician and transmitter for fulfillment of Ultimate (divine) desire that works for expansion, sustenance and absorption activity. A stream of desires extends its current outward to enjoy temporal worldly pleasures with a strong tendency to revert back inwards for eternal bliss. In the present paper I endeavor to explore and discuss as to what is the ultimate desire of the consciousness in the perspectives with Indian Philosophy. In the whirlpool of all desires, one strongly wants to exist for oneself and do away with all feverish activity and longs for eternal peace. Even a bird roaming in the sky when tired, folds its wings and gushes out to its nest for rest to enjoy sound sleep wherein there is no desires or dreams. Amongst all crazy burning desires of mind an individual longs for release from the eclipse of agitating desires for permanent rest and peace. The ultimate category of existence is the self consciousness. It being the kernel of very existence is nearest to us. The first and foremost love of all beings is love for the self which ignites further love for all other existence around. When an individual seeks to rest within his own self all other things become secondary for him. To be at oneself is the highest object of desire higher than any phenomenal object of love, such as progeny, wealth or the like it. It is in fact for the sake of the self that all things become dear to us. But when one attains the self, there are no desires left to be fulfilled. One renounces all attachment to his body and longing for external objects of senses. One gets elated to a position wherein one gets and holds to another support from within and experiences greatest love and happiness. Momentum of love and happiness can be experienced and not explained. All wavering desires of heart and head get burnt to light the way for rest within one's own self. The paper illustrates and concludes as to how physically experiential realities make us believe that ultimate desire of the beings (manifested state of consciousness) is to be Desire less. C

**292 Eastern and Western Modes of Thought** Christian Thomas Kohl  
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1. The Indian philosopher Nagarjuna (2nd century Current Era) is known in the history of Buddhism mainly by his keyword 'sunyata'. But Nagarjuna's central view can be named 'dependence

of things'. Nagarjuna is not looking for a material or immaterial object which can be declared as a fundamental reality of this world. His fundamental reality is not an object. It is a relation between objects. There is another criterion of Nagarjuna's philosophy. Not his keywords 'sūnyata' but his 25 philosophical examples are the heart of his philosophy. His examples are images. They do not speak to rational and conceptual understanding. They speak to our eyes. Images, metaphors, allegories or symbolic examples have a freshness which rational ideas do not possess. Buddhist philosophy is a philosophy of allegories. 2. The first European scientist who saw with his inner eye the forces between two things had been Michael Faraday (1791-1867). Faraday was an English scientist who contributed to the fields of electromagnetism. Later physicists like Albert Einstein, Niels Bohr, Erwin Schrodinger, Werner Heisenberg and others followed his view in modern physics. I compare Nagarjuna with European scientific modes of thought for a better understanding of Asia. And slowly we are beginning to understand these principles that quantum physics call: 'Complementarity', 'interactions', 'entanglements'. C26

**293 Cosmic Consciousness: An Integral Perception** Preeti Srivastava, Prof. Savita Srivastava <2301preetisrivastava@gmail.com> (Pedagogical Sciences, DEI, Agra, UP India)

The ordinary human consciousness is confined to one's own individual consciousness. That is, we are directly aware of only our own thoughts, feelings and sensations. What lie outside our personal consciousness - the consciousness of other beings and things in the world - are apprehended by us only indirectly, through external sense contacts, emotional empathy or mental inference. However, the personal consciousness of our separate individual self is part of and one with the consciousness of the Cosmic Self. Our individual physical, vital and mental consciousness is derived from and is a part of a universal physical, vital and mental consciousness. But there is a wall of ignorance between the individual consciousness and the universal consciousness. Consequently, the individual self feels itself to be separate from the universe. By means of a spiritual discipline our ordinary consciousness, which is more or less gross and dense, becomes subtler and is able to perceive what lies outside our individual consciousness more directly through an inner perception. It becomes a direct perception of consciousness all around us through our own consciousness. Further, by a widening of the individual consciousness, it extends itself progressively so as finally to be identified with the consciousness of the universe, seeing oneself in everything in the cosmos and everything in the cosmos in oneself. One is then said to have cosmic consciousness. Thus, "When one has the cosmic consciousness, one can feel the cosmic Self as one's own self, one can feel one with other beings in the cosmos, one can feel all the forces of Nature as moving in oneself, all selves as one's own self" - Sri Aurobindo. Two sides of the cosmic consciousness: (a) Cosmic Self and Cosmic Energy: Therefore, in the experience of cosmic consciousness one becomes directly aware not only of Cosmic Self or Spirit but also of Cosmic Energy which manifests itself as cosmic Mind, cosmic Life and cosmic Matter. Regarding the relationship between the Cosmic Spirit and Cosmic Energy, Sri Aurobindo states: "The Cosmic Spirit or Self contains everything in the cosmos" - it upholds cosmic Mind, universal Life, universal Matter as well as the overmind. The Self is more than all these things which are its formulations in Nature". Cosmic consciousness is a complex matter. To begin with, there are two sides to it, the experience of the Self free, infinite, silent, inactive, one in all and beyond all, and the direct experience of the cosmic Energy and its forces, workings and formations, this latter experience not being complete till one has the sense of being commensurate with the universe or pervading, exceeding and containing it. Till then there may be direct contacts, communications, interchanges with cosmic forces, beings, movements, but not the full unity of mind with the cosmic Mind, of life with the cosmic Life, of body and physical consciousness with the cosmic material Energy and its substance. C22

**294 Spiritual Wellbeing Through Chakra Energy** Ashima Srivastava <ashima710@gmail.com> (Psychology, Saran Ashram Hospital; Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

The present paper investigates the effect of balanced chakra energy on spiritual Well being. Spiritual well being is a self perceived state of the degree to which one feels a sense of satisfaction in relation to God or sense of purpose and direction in life. Spirituality plays an more critical

role in the emotional lives of people, who have developed a more integrated spirituality and life style. In this paper, the researcher has examined the emotional pain, anxiety and psychological stress of Thirty female patients of Saran Ashram Hospital, Dayalbagh, Agra. The female patients, whose emotional pain level was high in the beginning were given therapy on Chakras and results indicates a high relationship between Spiritual Well being, positive emotions and balanced Chakras. **P1**

## 5.11 Virtual reality

**295 Consciousness: Between Virtual Reality of Cyberspace and Virtual Unreality of Depersonalization** Elena Bezzubova <ebezzubo@uci.edu> (New Center for Psychoanalysis, Los Angeles; UCI, Newport Beach, CA )

The presentation examines consciousness through the comparison of Virtual Reality (VR) and Depersonalization-Derealization (DPDR). VR is the experience of digitally created cyberspace that is rapidly becoming intrinsic for the consciousness of 21st century man. DPDR is the experience of virtuality that is for centuries known as an enigmatic psychopathological syndrome. First the presentation examines the striking similarity between reports of digital gamers and other avid inhabitants of cyberspace on one hand and reports of patients with depersonalization and derealization on the other. The central shared characteristic of VR and DPDR is the “as if” quality often described as “in effect, but not in fact”, echoing Freudian psychic reality with its primacy of internal experience over external facts. Then the presentation compares the opposite vectors of this “as if” quality in VR and DPDR. VR presents the not-factual “as if” virtually real: unreality experienced “as if” it were reality. DPDR presents the not-factual “as if” virtually unreal: reality experienced “as if” virtually unreal. VR is the mirror image of DPDR. In conclusion the presentation focuses on relations and agency as fundamentals of consciousness. Describing the qualities of “Real” and “Mine” as expressions of Agency, the paper develops the dialectics of reflective consciousness and creative consciousness that designs both virtual reality and depersonalization. **C3**

## 5.12 Miscellaneous

**296 Who Do I Trust?** Antonio Harrison <aharrison1@uwf.edu> (Renaissance Behavior, Pasadena, CALIFORNIA )

For many in Western culture, Eastern Philosophy and Ideology have become a trend within the general public as a way to eliminate the stressors placed upon individuals with respect to the societal rules, norms, boundaries, and constraints. With the influx of gurus, various methodologies, and places of worship, an individual embarking on such a journey can become lost in the tidal wave of information and styles. The purpose of this talk is to share the experience of one man's journey to find the “correct” path to consciousness and enlightenment and provide professionals in the field of the Science of Consciousness a glimpse of how this journey takes form in hopes to extend further research that is socially valid and makes a significant impact. **C26**

**297 Origin and Evolution of Life Consciousness** Chandra Prakash Trivedi <atcpttrivedi@gmail.com> (Education, Vedic Research Institute, Ratlam Former Principal MJS P.G.College, Bhind, Indore, M.P. India)

The Origin of Life and Consciousness is a great puzzle for the Scientist. Its seeds are in pre-cosmic dawn phonon. The Scientists have used sound to ‘talk’ to an artificial atom 2015, the recent discovery of Gravitational waves akin to sound waves and photons can be scattered by phonons in a crystal. Nat. Commun Lie et al 2014 The NASA researchers noticed polycyclic aromatic hydrocarbons (PAHs) in meteorites. With extra hydrogen or oxygen called quinones have the potentiality for origin of life. The Phonon is earliest. It has activated the dark matter with resonance. The phonon and photon manifested with blast and light as dualistic complimentary force of vital energy. The phonon stimulates the event to happen and photon under go synthesis and degradation with time Einstein's equation  $E=Mc^2$ . It has been observed that the DNA has purine and pyrimidine complimentary base differing only in Nitrogen base. It has pulled out like a zipper along

with incandescent gaseous clouds and gigantic radiations, prior to the formation of solar system. With time the earth cooled down with floods of water and movement of molten mass generated the magnetosphere around the earth with ozone layer in the atmosphere. It has given the way for synthesis of first amino acid in the slime soup from DNA base pair as precursor molecule and phonon stimulated the event. They follow each other in chain with synthesis of chromosome pairs in prokaryotic cell and autotrophic eukaryotic cell in series with cell division and evolution. The Life has evolved from single DNA and cell with genetic recombination and cell division. The first amino acid is synthesized in slime soup from purine and pyrimidine base pair with resonant vibrations of charged ions in the colloidal solution. It has evolved in to a prokaryotic cell and autotrophic eukaryotic cell with protoplasmic vibrations and cell division. The protoplasmic vibrations connect the life with DNA as two pillars on the path of evolution. The Higgs field imparted mass to proteins and food metabolism is the source of life. The phonon has evolved into thought and words with consciousness. The DNA is instrument of life and phonon beholds the life consciousness with its dualistic complimentary spectrum to execute function of life. The plasma membrane acts as transition zone with electron configuration, just like two faces of the same coin. **P1**

## 6.0 Culture and Humanities

### 6.01 Literature and hermeneutics

**298 The Science of Dreaming and Sleep in Selected Charles Dickens' Novels and Letters** Olga Colbert <olvalero@smu.edu> (World Languages and Literature, Southern Methodist University, Plano, TX )

The present study delves into the representation of dreaming in Charles Dickens' novels, particularly in *Oliver Twist*. Dickens showed great interest in the science of dreaming and had ample up-to-date knowledge of the latest sleep and dream theories available in the Victorian era, as can be seen in his personal correspondence, most notably in the famous letter he wrote to Dr. Thomas Stone on 2/2/1851. The purpose of my study is twofold. On the one hand, I explore Dickens' literary use of dreaming as a textual strategy: as a tool to advance the novel's plot, to show the inner state of the novel's characters, or to create an impression of verisimilitude, for instance. But, most importantly, I use Dickens' personal writings side by side with his novels to elucidate whether the scientific paradigm about dreaming included in the novel(s) in question is consistent with the current (in Dickens' time) scientific knowledge, or whether the way dreaming is represented in his literary work(s) is anachronistic or visionary (ahead of his time). *Oliver Twist* is a particularly useful novel because, in addition to including descriptions of dreams the fictional characters have, we find entire passages dedicated to pondering on the nature of dreaming, enumerating types of common dreams, and taking a stand on the interference of sensory perception during the dreaming state. I am particularly intrigued by Dickens' assumption of the commonality and universality of lucid dreaming as revealed in these passages. I study popular Victorian dream theories, such as those contained in Robert Macnish's *The Philosophy of Sleep*, as well as recent dream theory, particularly psychophysiologist Stephen LaBerge's numerous articles and books on the topic of lucid dreaming to see if Dickens deviated in any way from the reigning paradigm of the Victorian era in his representation of dreaming in his novels. While Dickens puts to great narrative use many of the characteristics of dreaming described by leading Victorian theorists, I argue, however, that his most visionary statements derive from his acute observations of his own dreaming experiences. **C23**

**299 Symbolic Matrices In Early Chinese Texts** Scott Davis <scottdavis@asia.com> (School Of Liberal Arts, Nanjing University, Nanjing, JIANGSU China)

There is still great confusion involved, in our approach to the classical literature from Bronze Age China, as to the nature of these contributions to knowledge. Are they philosophy? If not, then what are they? In this paper, I will argue that these texts present a mode of cosmological organization that, in our contemporary context, we can identify as a model of consciousness. Consciousness operates in a behavioral field of affordances or actants that sometimes reconstitute

natural (primarily physico-chemical) networks, such as the symmetries of features of fire and water observed in the *habitus*. These features of heat/cold, rising/falling movement, differential patterns of risk, functional application in social life and so forth constitute a node of organization in the texts, in such a way as to claim a distinct position for fire/water symbolism in the mega-text matrix in such ancient texts as the *Zhou yi*, *Analects* and the *Zuo zhuan* (Mr. Zuo's commentary on the Springs and Autumns Chronicles). The features allow for recombination and permutation, which is why they support such an extended textual system. "Modeling consciousness" is not a Bronze Age goal, but due to various properties of these texts in the context of a divination culture, the textual design embodies systematic aspects pertinent to our contemporary questions about consciousness. In this paper I will reconsider certain Chinese classical texts in light of a new discovery about their organization and purpose within the culture, and draw conclusions accordingly in regard to our understanding of consciousness. **P2**

**300 Multifractals in Literature - Does Literary Genius Reflect a Certain Level of Consciousness?** Swati Idnani, Suresh Idnani; Teena Idnani <swati.idnani@gmail.com> (Cognizant, Vernon, CT)

Fractals are self-similar mathematical objects. When we begin to expand one fragment or another, what eventually emerges is a structure that resembles the original object. Typical fractals, especially those widely known as the Sierpinski triangle and the Mandelbrot set, are monofractals, meaning that the pace of enlargement in any place of a fractal is the same, linear: If they were rescaled  $x$  number of times to reveal a structure similar to the original, the same increase in another place would also reveal a similar structure. Multifractals are more highly advanced mathematical structures: fractals of fractals. They arise from fractals 'interwoven' with each other in an appropriate manner and in appropriate proportions. Multifractals are not simply the sum of fractals and cannot be divided to return back to their original components, because the way they weave is fractal in nature. The result is that in order to see a structure similar to the original, different portions of a multifractal need to expand at different rates. A multifractal is therefore non-linear in nature. Physicists from the Institute of Nuclear Physics of the Polish Academy of Sciences (IFJ PAN) in Cracow, Poland, performed a detailed statistical analysis of more than one hundred famous works of world literature, written in several languages and representing various literary genres. The books, tested for revealing correlations in variations of sentence length, proved to be governed by the dynamics of a cascade. This means that the construction of these books is in fact a fractal. In the case of several works, their mathematical complexity proved to be exceptional, comparable to the structure of complex mathematical objects considered to be multifractal. The interesting aspect of this analysis regarding whether consciousness manifests itself in every form of expression - literal, verbal, non-verbal, brain/heart/hormones/chemical reactions driven is the subject of our research. If literary genius does indeed reflect a certain level of consciousness, it could be a stepping stone to being able to methodically evaluate levels of consciousness in a subject by the mere style of one's writing and promote awareness as well as reason to evolve spiritually. **C23**

**301 Nature as the Subliminal Self of Man in Indian English Literature: An Overview** Lowleen Malhotra <lowleen122@gmail.com> (English, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

In the Ancient sagas of Literature nature has been designated a significant role in the life of man, may it be in the form of worshipping the holy cow, the Banyan tree, or the Hansa. These chronicles have been the reservoir or store well of umpteen knowledge, material and spiritual, stimulating the desire for inward perception that is the beginning of the path of consciousness. Man is incomplete without nature's support as it caters for his food, clothing and shelter, the basic needs of life. Besides, the preservation of this ecosystem is the source of wellbeing on this planet. The fables such as the *Panchatantra* and the *Jatakas* are means to instil in the tender hearts noble and sublime feelings which may in future guide their thoughts and actions. This eco consciousness is the essence of the harmonious co-existence of man, nature and the Almighty. This tradition has been passed on to posterity through the literary expressions of writers as Ruskin Bond, Tamsila Ao, Janaki Lenin, etc. They have deciphered the encrypted signals of destruction and devastation of material and the

ethical world due to mindless mechanisation , deforestation, and concretisation of landscapes. Various approaches have been coined for instance, ecofeminism, ecocide, zoopoetics to awaken, and reaffirm the directness of the impact on eachone of them of their deeds. There exists a symbiotic and an intimate relationship between man, nature and soul in the wide sphere of cosmic creation. Therefore, we may say the Literature is a documentary on the interplay of man and nature ,viewed to foster sensitivity and sensibility to achieve higher consciousness in life. C23

## 6.02 Art and aesthetics

**302 Study of Mind on Evolution of Design for Vocational Skill Development Students of DEI** Parul Bhatnagar , Radhika Seth, Dei.radhika@gmail.com, Textiles-DDUK, Dayalbagh Educational Institute ; Meenakshi Seth, Dei.meenakshi@gmail.com, Textiles-DDUK, Dayalbagh Educational Institute <parul@dei.ac.in> (Drawing and Painting, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

The paper Study of Mind on Evolution of Design for Vocational skill development Students of DEI deals with the study of Students studying for graduation and Post graduation stream, where Innovation, Creativity play a major role with music tunes being played in the backdrop. A lot of different literature uses different terms. The mind could be divided into three systems. The consciousness mind?gives you awareness of the present moment. You are aware of flashes being shown on the smart-board with call for the Mystic music something on the outside as well as some specific mental functions happening on the inside beyond the body. For example, you are aware of your environment, your breathing, yet you are deeply absorbed in creativity. The subconscious mind consists of accessible information. You can become aware of this information once you direct your attention to it. Think of this as memory recall the colour of light, the chakra sound. You doodle on the sheet without consciously being alert of your surroundings. You are absorbed and listen to the music and design you way. You can easily bring to consciousness the subconscious information about the path innovative style of design. You can also easily remember various doodling styles that you frequently use. It is possible that some of what might be perceived to be unconscious becomes subconscious, and then conscious (e.g. a long-forgotten childhood memory suddenly emerges after decades). We can assume that some unconscious memories need a strong, specific trigger to bring them to consciousness; whereas, a subconscious memory can be brought to consciousness more easily. The unconscious mind, consisting of the primitive, instinctual wishes as well as the information that we cannot access. Although our behaviours might indicate the unconscious forces that drive them, we do not have easy access to the information stored in the unconscious mind. During our childhood, we acquired countless memories and experiences that formed who we are today. However, we cannot recall most of those memories. They are unconscious forces (beliefs, patterns, ideas, subjective maps of reality) that drive our behaviours. The study focuses on the design students of Dayalbagh Educational Institute (Deemed University), where the true self-awareness is brought forward with starting doodling or play of colours and forms. With the intuitive consciousness, neurophysiological processes can be presented in a creative and artistic form, which gives us way to reality. It is said we do not realise the awareness towards our creativity and in turn productivity. For the execution of our creative ideas, we tend to look outside for motivation, which is actually not true. Self-awareness is about increasing consciousness level by which we can bring out the best of our selves and the best out of life. Motivational Consciousness opens up new avenues and abundant possibilities. The presentation includes a brief display of audio music with a video-film, demonstrating the impact which plays on young innovative creative minds. P1

**303 Hidden in Plain Sight: How Millennia of Storytelling and Art Leave a Trail of Clues to the Deeper Nature of Consciousness** Nick Day , NICOLAS WILLIAM DAY <nick@conscious-pictures.com> (Conscious Pictures, Sonoma, CA )

The emergence of language and the capacity for storytelling can be considered fundamental to our becoming human. Our brain seeks significant patterns and connections -- the story -- in

everything we see, hear or sense. Storytelling favors survival by activating a powerful inner world of association and meaning, enabling us to more successfully navigate the world, empathize with others, and develop complex abstract ideas. Similarly, the visual arts express and reflect back to ourselves our connection to nature and relationship to the cosmos in symbolic and aesthetic form. Thinkers since the time of Plato and Aristotle have described traits common to these forms of expression as archetypes: characters, images and scenarios that recur over time, whether in myths, legends, cave paintings or movies. What does this creative expression reveal about the deeper nature of consciousness? How does it intersect with quantum theory and philosophy? This talk will offer some interpretations, as well as explore broader aspects of storytelling and art throughout human history as it relates to consciousness. **C23**

**304 Creativity and its Mediation for Navigating between Reality and Virtual Reality** Margaret Dolinsky <dolinsky@indiana.edu> (School Of Fine Arts, Indiana University, Bloomington, IN )

Drawings, paintings and sculptures that are formed through hypnopompic imagery and realized in plastic forms, computer graphics, and 3D virtual reality will be discussed. This talk will present the creative process and a method of surrealism that mediates dreams and images for virtual reality. The images are realized in a creative continuum that begins with automatic drawing, travels as plastic dimensional form and becomes 3-dimensional virtual reality. Art that emanates from hypnopompic imagery to become conscious in a virtual environment reveals how thoughts become worlds for the flesh to navigate and the mind to assimilate. In particular, I will illustrate how my artistic process evolves and how it provides ideas through symbol making, visual perception, and metaphors in order to become a way of visual communication whereby a visitor manipulates the images as metaphors in order to travel through virtual environments. **A1**

**305 Create Your Own Flow - Discovering the Benefits of Creative Processes and Their Ability to Innovate Flow** Naama Kostiner <nishla40@hotmail.com> (Haifa, Israel)

The frenetic pace of life in modern day society presents us with constant and newly evolving challenges, making us susceptible to feelings of stress and worry that may affect our sense of physical and mental wellbeing. Learning to transform the energy of stress into a powerful supportive energy has therefore become an imperative component in achieving a stable, healthy lifestyle. Employing the use of artistic expression as an emotional catalyst and liberator has been proven to be highly effective throughout the ages. In 1942, English artist Adrian Hill immersed himself in a creative process of painting and writing while recovering from tuberculosis in a sanatorium. This experience led him to an understanding that releasing creative energy completely engrossed the mind, freeing it from frequently inhibiting thoughts of misfortune. A feeling of serenity penetrated instead, supporting his recovery. This experience laid out the foundation for 'Art Therapy', utilizing creative processes as means of coping and shifting consciousness towards a state of wellbeing. Professor of Psychology Mihaly Csikszentmihalyi (1975, 1997) and his colleagues have researched a quality of experience defined as 'flow'. The term refers to a mental state of operation in which a person is fully immersed and concentrated in an activity, to the extent of losing track of time and forgetting about the outside world. These experiences are reported to be accompanied by positive emotions. **C23**

**306 Hindu Temple Architecture: Mini Cosmos or Fancy of the Architect?** Renu Singh Parmar , Mehar Parmar <dei.renuparmar13@gmail.com> (Deptatment Of Architecture, DEI Technical College, AGRA, Utter Pradesh India)

Hindu temple architecture symbolically represents the quest of -MOKSH. (ultimate spiritual liberation, the realization of oneness) by setting out to dissolve the boundaries between man and the divine. The Hindu temple is above all a building serving metaphysical rather than physical needs. It is a threshold between the transcendental and phenomenal world. This monument of manifestation represents the outer and inner cosmos. The outer cosmos is expressed in terms of various astronomical connections between the temple structure and the motions of the sun, the moon and



the planets. The inner cosmos is represented in terms of consciousness at the womb of the temple and various levels of the super-structure that correspond to the states of consciousness. It is a depiction of the macrocosm (the universe) as well as the microcosm (the inner space). From top to bottom the Hindu temple seeks to represent everything of which the cosmic world (brahmaand), the entire universe, is composed of. Its morphology follows the requirements of man's vision of the cosmos which he wants to create on the earth; it is not the fancy of the architect. Visions differ, therefore forms differ, but forms are not experiments of architects. The North Indian-'Nagara' style is characterised by a conical and convex spire or 'shikhara' usually topped by a vase shaped finial, the 'kalasha'. In the South Indian 'Dravida' style, the spire is more of a pyramidal tower ascending in a series of horizontal terraces to a finial shaped like a rounded cone or miniature stupa. Those belonging to the middle region and of mixed types are called 'Vesara'. The purpose of the superstructure is always one and the same. It is to lead from a broad base to a single point where all lines converge. The physical space for the God, represented by his image is called 'Garbha-Griha' (the womb - the inner sanctum). The physical space for the devotees, located in front of the Garbha-Griha is called 'mandapa'. There is no duality, man and God are the same, only the ignorance of man makes him feel that he is different from God. This concept is 'I am Brahma', and is called 'advaita'. But the concept of 'vishishtadvaita' expresses 'I' and 'He' are one and the same, yet both exist independently in a particular sense. The eternal nothingness yet universality - is a part of a Hindu Temple Architecture. The ideal form gracefully artifice suggests the infinite rising levels of existence and consciousness, expanding sizes rising towards transcendence above, and at the same time housing the sacred deep within. **P1**

**307 The Telenoetic Medium - Presentation of The Author's Video Artwork, A Mnemonic Device to Facilitate Meditative, Noetic States of Consciousness** Pam Payne <pam@brickhaus.com> (CAiiA, Planetary Collegium, Plymouth University, England, Brooklyn, NY)

Artistic Research supports my doctoral research, the correlation of rhythm and consciousness. My artistic practice has always been an expedition of consciousness. I'm interested in activities and devices that facilitate a transformative shift in consciousness. Whether sonic, visual, spatial or cognitive, material or ephemeral, I describe a telenoetic medium as one that facilitates a transformative shift in consciousness. Noetic = gnosis or experiential depth of awareness. The rhythmic motion of the video I am presenting corresponds to brainwave frequencies correlated with lucid dreaming and meditation - in this case adapted to theoretically facilitate conditions for lucid wakefulness. The visual layers combine rhythmically, encouraging a mental circumambulation, generating a liminal state of awareness. This 'priming' creates an opportunity for enhanced lucidity which the viewer may realize immediately or sometime afterwards in the form of inspiration or enhanced creativity. In this way, the work is 'Telenoetic'; facilitating noetic shifts in consciousness. The artwork and my research is inspired by the Lucid Dreaming exercises described by Dr. Stephen LaBerge, Raymond Lull's 13th Century mnemonic wheels and The Art of Memory, and the West African Yoruba rhythms of ritualized possession rites. The artwork is part of an evolving series; previous versions have been exhibited at TSOC Tucson 2016, Cairo in 2016 and 2013 and NYC in 2015. **A1**

**308 Musings on Captured Moments** Jens Pilegaard <2saltydogss@gmail.com> (2Saltydogs LLC, Glendale, CALIFORNIA)

Is everything we see and experience an illusion, created by our brain, to make sense of the phenomenal world? Is a photograph an extension of that illusion? A common theme in my landscape photography has been capturing lines, patterns and symmetry, permeating nature. Where some people see blank space, I see raw beauty. Does a viewer of my photographs get a sense of the universal connectedness I feel every time I solo into the wild, find my quiet spot and wait for the moment to unfold; then release the shutter. A discrete moment frozen in space/ time. Is that moment as real as the 'Real' moment? If time is a series of discrete moments then maybe a discrete moment experienced and simultaneously captured on a frame of film, is equally real but our sense perception may disagree. Composition, scope, scale and presentation of a photograph ultimately determine the degree and variety of qualia evoked. My favorite format, the panoramic perspective,

printed extra large, closely resembles how our eyes see the external world. It draws you in, allowing the moment to envelope your senses. And if an image on occasion speaks to you on some deeper level, a glimpse of the Photographer's 'Real' moment may peek through. 2saltydogss@gmail.com; www.PilegaardPov.com; www.think1studios.com A1

**309 Consciousness And The Arts** Pallavi Sharma <satsangi.pallavi@gmail.com> (HR, NXP Semiconductor, NOIDA, UP India)

Art is a medium of turning the world inside out! Microcosm to Macrocosm! Art and creativity can invoke our own spiritual journey from physical form to mental and to Transcendental! It has been scientifically proved that visual art can heal us, inspire us, and alter our brain chemistry leaving us filled with inspiration and love. Many of the great Artists have presented to this world great masterpieces by connecting to their innermost sensation and inspired by higher consciousness. Art has the ability of drawing from our own imagination, to transport us to other realms and create new worlds. It is a known fact that creating art is also therapeutic. Each one of us probably may have noticed some or the other time how the most beautiful paintings, music and poetry evoke a sense of connection, peace and gratitude. This is what is Art awakening consciousness. Every one of us lived like artists as children and we have the ability to bring back this powerful form of expression and self-discovery. All of us have the potential to be an artist, to harness and express our innate wisdom and creativity. Art also lets human mind interpret and brings in perspective that may not be seen by naked eyes but only inner eyes. With the best art work that we may see, we are reminded that we live in a creative universe that is itself a work of art, filled with masterpieces of rivers, stars, mountains, children, clouds and flowers. The greatest artists, poets and musicians down through time (like Picasso, Walt Whitman, Mozart and Van Gogh) have tried to communicate this message to us. This world is also similarly a piece of art and the master is none other than the Almighty! Among numerous Nobel Prize winning scientists, the great majority also practiced a creative art or craft, which seemed to contribute to their scientific success. Their innovations and discoveries were due to higher mental quotient, wisdom, consciousness. Developing mastery in an art influences how we think about challenges and see the world. Einstein, who played the violin, said: "If I were not a physicist, I would probably be a musician. I often think in music. I live my daydreams in music. I see my life in terms of music." In summary, Art encourages us to cherish intuition, uncertainty, and creativity and to search constantly for new ideas; most of us know the feeling of being moved by a work of art. They say a picture can describe a million words. Art does not need language of speech, it does not discriminate and has a powerful ability to inspire; hence, it may be appropriate to say that Art can change the world by triggering higher consciousness! P1

**310 New Visual Languages and the Speculative Nature of the Quantum Universe** Paul Thomas <p.thomas@unsw.edu.au> (Art And Design, University of New South Wales, Balmain, NSW Australia)

This paper will explore concepts of consciousness, art and the quantum computer via the synchronicity happening between science and art in dealing with the development of new visual languages on the speculative nature of the quantum universe. The artwork "Quantum Consciousness" is an audio-visualisation of atomic data which indexes the quantum "movement" of an electron. This project delivers an aesthetic and immersive experience that places the viewer inside the virtual superposition of a sub-atomic particle (i.e. its field of probability). Quantum Consciousness is in the visualization of the co-emergence of thought-data (viewer) and quantum-data (electron). The scientific research informing the work was conducted in collaboration with Assoc. Professor Andrea Morello. Dr. Morello's current research looks at controlling the spin of electrons and nuclei for the development of the processor in quantum computer. The experiment makes visible and audible the spin of the superposition of a phosphorous electron that has been bombarded by microwave signals. The paradox of the quantum superposition (best articulated in the Schrodinger's Cat - thought experiment) exists as an actual and empirical condition in which an electron occupies multiple positions in space simultaneously, but none specifically. The scientific data for this project is generated from a microwave signal which transforms a reading of Richard Feynman's (1982) paper on the birth of the quantum computer. The link between the quantum

computer, consciousness and artistic expression is presented via the installation through the co-emergence of thought and quantum conditions. Quantum Consciousness is thus an experiment in the imaging and materialising of impossible states of quantum matter and the co-emergence of human consciousness. The paper looks at contextualizing conceptually the artwork Quantum Consciousness, quantum mechanics and whether the world comes into existence once we observe it. This concept will be aligned with synergies taking place within domains of art and science to demonstrate a shared conscious understanding of the world. The paper will ask questions relevant to consciousness and how the new quantum computer derives its power from the atoms, speed, superposition and the Epicurean swerve. The quantum speed can be seen as being comparative to the speed of thought. According to Giles Deleuze the speed of a perturbation in the universe needs to be faster than the speed of thought for it to have the potential to bring something new into the world, a becoming as oppose to being. According to theoretical physics the process of observation is a continual conscious construction of the world as an ongoing manifestation through the advent of searching new meanings. By posing questions on thinking and thoughts being atomic and stem from an understanding of rationalising nothing. I investigate the probability of a different understanding, which will change the way artist contributes to consciousness through nanotechnologies and quantum phenomenon. C7/A1

### 6.03 Music

**311 Healing through Sound and Universal Frequencies** Dorit Aviv <merkavator@gmail.com> (Merkavat Ot, Herzeliya, OUTSIDE US OR CANADA Israel)

Dorit Aviv, White Eagle, is an experienced Shaman teacher and healer. Studies show that almost every disease can be cured using sound and frequency healing, thanks to the ability to single out each frequency according to the organ it affects. Medicine uses frequencies as a diagnostic tool (CT, MRI) and has yet to use it for healing. I use a variety of instruments from ancient cultures all over the world, which were used for healing and sacred ceremonies. The sounds penetrate every cell and create change on all levels, physical, emotional, mental and spiritual. They do so since every cell and organ has its own music and frequency. P2

**312 Music And Spiritual Sphere** Deepshikha Nigam Sood , PRABHAVIT KUMAR SOOD <deepshikhans@hotmail.com> (Theology, DEL, New Delhi, DELHI India)

To undertake this study, a theological Approach was made for better defining the musical rendering in the spiritual Sphere. Music is deeply connected with the roots of All religions / Faiths, although even people who do not know this material Music, which is known as classical, semi Classical etc can also reach the highest level of eternal Musical sound by uplifting of their own consciousness through meditational practices. 1. The Material and external Musical Rendering in Spiritual Spheres or the followers of various faith effects the mind, body and soul of their adherents.. 2. Whereas the Spiritual or eternal Musical rendering through sound practices elevates the consciousness level of the soul, which leads the followers towards the ultimate goal of life, by achieving the oneness with Supreme consciousness. The findings of our research will be reported in this paper, from stage 1 to stage 2 gradually. The process described above is not reversible and once a being progresses cannot regress back. The Spiritual music when experienced elevates intense and lasting bliss and can be known as the instrumental cause of spiritual upliftment, whereas the material music helps and prepares the listener or the practitioner externally for warming up, to initiate into the higher consciousness. These two characteristics of Music, the Material and the Spiritual Music will be proven in detail in this paper. The Musical rendering in the Religions of the world is the expansion of sound. Sound, is one of the causes of the creation. It is divine grace, and powerful Mystery and can be understood by developing an insight with the synthesis of Science and Spirituality. Thus it shows that Music has its existence beyond history as it has its roots in creation. The cosmic radiation proves it. Therefore music is one of the instrumental causes for self realization, and awakening of the consciousness, leading us on the path of, leading us beyond the recognition, existence and duality. Singing of Prayers and listening of devotional

music increases devotion in humans. By increasing devotion one can meditate better. Music as a general principal reduces the complexity of religion to make it understandable. Music and Religion, both being practical subjects, there was felt a requirement of practical analysis and the need for better defining of the said topic. During the search for the material, the Musical sphere of various faiths was the main focal point. Listening and Analysing methodology was applied to various devotional and spiritual styles of music, such as Choirs, Qawalis, Bhajans, Chanting and the musical recitation of the Quoran. The Topic for Research has a wide ranging scope and keeping the limitations of time and prescribed length, focus was based on a few main Religions / Faiths such as Christianity, Judaism, Hinduism, Sant Mat, Buddhism and Islam. The awakening of the Soul through devotional and Spiritual Music, inner sound and sound practices of the said religions / Faiths were studied with Theological Measures. **P2**

## 6.04 Religion and spirituality

**313 Maternity To Eternity Consciousness** Sapna Agarwal , Tamanna Agarwal  
<agarwalsapna@hotmail.com> (Pathology, Saran Ashram Hospital, Agra, U.P. India)

The Supreme Being, all conscious , Most Merciful Radhasoami Dayal manifested Himself on the Janmashtami Day, in 1818 in order to redeem the living beings. He declared open His doors to all, on the Basant Day in 1861. Satsang headquarters, however, kept shifting from place to place, where the Sant Satguru of the time resided. On June 1, 1914, the then Secretary, Sabha issued a circular letter that it was the intention of Huzur Sahabji Maharaj( Founder Of Dayalbagh, The Garden Of The Merciful) to establish Satsang Headquarters in Agra. Most Merciful was Pleased to lay the foundation of Dayalbagh colony by planting a mulberry tree near an old Mughal well on the Basant Day( Jan 20, 1915) and of a school in its neighborhood the very next day. Thus began the story of Dayalbagh. Thereafter, there was a surge of activities and within a period of 20 years , a well laid out colony had come up with a school , college , hostels , the Technical school , a Leather working school , a Bank , a Prayer Hall , Dayal Bhandar , A world class State of the Art Dairy , and a Hospital ( pertaining to Maternity facilities also ) . Model Industries were established to provide employment . All this happened with Spiritual and Higher Consciousness scientific activities going on in parallel ( pertaining to Eternity ). The following quote from Sir Sahabji Maharaj, Who in 1915, established Dayalbagh as well as various educational institutions in this Garden of The Merciful, which celebrated their centenary (1915-2015) spells out the vision of our Mission Consciousness : ?May, the radiance of Satsang (Meditation through ?Surat- Shabda-Yoga? of the Eastern Philosophy of Saints) which has been kindled, be spread all over, after we have left, so that Mankind may know about your holy services and the magnificence and glory of our Supreme Father, resplendent in His Abode, spread all over the Cosmic Universe? The completion of 150 years of Satsang was a glorious moment in the history of Dayalbagh and Gracious Huzur Most Revered Prof. P.S. Satsangi Sahab delivered this message, “.....There is need for complete education in which not merely the education of physical region,(Pind) and the region of universal mind, (Brahmanda) is given but also the education of Purely spiritual Region,( Nirmal Chetan Desh) is also included.” **P1**

**314 Towards Global Prosperity Through Intuitive Consciousness** Aashiq Bommireddipalli , Swanti Devguptapu, Dhun Aadhar <aashiqb2291@gmail.com> (Dayalbagh Educational Institute , Agra, India)

A harmonious environment with a healthy, active and economically protected lifestyle are the most prominent measures of a person's wellness and quality of life. However, the large and frequent recessions in the economy, a pronounced business cycle, very high or variable inflation, or frequent financial crises are any optimist's nightmare. The desire of the human race to obtaining universal peace and harmony is still unfulfilled and looks far out of reach in the present scenario. A closer view and analysis of these issues reveal that most conflicts in humanity arise out of insecurity, which in turn, is a manifestation of lack of intuitive consciousness. Taking recourse to the eastern tradition and wisdom, the root of the conflicts lies in active indulgence with lust, rage, greed, attachment and ego. This work, which is an extension of an earlier publication (B. Aashiq

and Prem Sewak Sudhish (2013), "An Integrated Community Economic System: Gateway to a Sustainable New World Order", Recent Advancements in System Modelling Applications, pp. 125-133, Springer) makes an attempt to depict how by adopting a life of spiritual values, practices and service to society under the guidance of an Adept, emphasizing on the performance of duty, would streamline the thoughts and discretion of an individual towards the right path and aids in achieving both materialistic and spiritual goals. This work also demonstrates how aspects of community living can help curb the negative tendencies of the mind, while nourishing the higher values ascribed to the spirit. **P1**

**315 Sant Mat - Radhasoami Faith With Reference To Sufi Saints Maulana Rumi, Sultan Bahu And Saint Bulleh Shah** Toran Kapoor, Mr. Shanti Swarup Talwar, Ex. Lecturer Punjab University, India; Mr. Alakh Prasad Talwar, Manager, Honda Motors, India. <torantalwar@gmail.com> (Applied Science And Humanities, I.T.S Engineering College, Greater Noida, Uttar Pradesh India)

Most of the writers of Sufi saints have narrated in their biographical sketches, their genealogy, tracing it back in some cases, to link them even with Prophet Muhammad and Ali, his son-in-law. Stress has also been laid on their education, particularly knowledge of Arabic, Persian and Quranic law, their penances, renunciation, meditation etc. However much less has been said about the mystical words they repeated and their attainments in the spiritual realms. There are passing references in some cases up to 'Hahut' the fifth stage. An important Sufi saint Sharafeddin of Delhi has stated 'Wahdat al-Wajud' as the fourth and final stage in Sufi journey related to 'Lahut' (Trikuti). A similar statement has been made by Sajid Muhammad Hussain Jaffar as well. Saints life Naraj, Mirza Bedil, Moinuddin Chishti, Hafiz and Sarmad have eulogised the celestial word experienced by them but none of them has neither revealed the celestial stage of the word nor the mystic names. Maulana Rumi has mentioned of the region 'Hut' without naming its celestial word clearly. Sufi saints Sultan Bahu and Saint Bulleh Shah were more vocal in this respect. Saint Bulleh Shah has mentioned about his achievement up to 'Hutal-Hut' and 'Hut'. Their teachings are practically similar to that of Sant Mat along with their sound. Param Purush Puran Dhani Huzur Soamiji Maharaj (1818-1878), was the first Acharya (Sant Satguru) of Radhasoami Faith. He has not only explained fully well, names of the celestial regions and their mystic sounds according to Radhasoami faith but also revealed their names and the celestial sounds according to the Muslim saints up to 'Hut' (Sat lok) beyond which none of the Sufi saints traversed. **P1**

**316 Civilization: From Crisis To Renaissance** Gazal Mathur, Sohag Mathur, Bhakti Mathur <gizzymathur@gmail.com> (Consciousness Studies, Dayalbagh Educational Institute, Mumbai, Maharashtra India)

We may categorically state that mankind is standing on a precipice. One wrong step may lead it to utter devastation, an abyss or even total annihilation. This doomsday prediction may sound rather formidable, morose and even somewhat ludicrous yet we find that most growth indicators, be they social, ecological, political etc. seem to suggest that this is an eventuality that mankind may have to contend with. Where on the one hand our contemporary world is facing an era of unprecedented development, in many spheres of life (technology, communication, commerce etc.) - on the other hand this materialistic high seems to be coming with a lofty price tag. In fact mankind is waking up to the fact that the cherished acquisitive stance that is leading to progress is possibly the very thing that is also leading it towards a civilizational crisis. Therefore, the sustainability of its growth is now questionable, in terms of namely, (1) ecological sustainability, (2) social sustainability and (3) spiritual sustainability. The intention of this paper is thus to map a sequence of events that promote mankind's shift from near devastation towards an enlightened spiritual community. We will elucidate upon: The Present World Order? This will research the present state of affairs from the perspective of: (1) Ecological sustainability, (2) Social sustainability and (3) Spiritual sustainability. The Cause Behind it? This section will delve into the possible reasons for civilizational decline. As per Buddhism, Hinduism and other Eastern religions? the essence of our woes is credited due to Duality? the universe is one - yet rather than perceive ourselves as a cohesive whole we see each other as individual parts. This then leads to narrowness in thought and action which spirals into a crisis situation. The Future Crisis? This section will

briefly discuss the future secular and non ? secular path of civilization. It aims to briefly take into account scientific/social expectations but will largely focus on predictions of major religions of the world in order to decipher the commonalities in predictions. It may come as a surprise that this spiritual degradation is an evolutionary process designed to bring about a renaissance. The Cure ? Better Worldliness This will be a discussion on the existence, purview and connotations of a Better World Order. In order to make a directional change, mankind must abide by the principal of ?Fatherhood of God and Brotherhood of Man? ? herein lies our only hope for redemption. Both the secular and mystical can subsist side by side, in complete harmony, - if we live by the above adage. It is now the onus of the youth to bring about this renaissance. **P1**

**317 Brain, Mind and Consciousness : A Sant Mat (Religion of Saints) Perspective** Dayal Saini , Professor Ranjeet Kaur Satsangi, Shabd Pyari Adhar <dylsain@aol.com> (Dayalbagh Educational Institute , WALSALL, WEST MIDLANDS United Kingdom)

The nature of consciousness has been a problem of pertinent importance since beginning of the mankind. The brain, mind and consciousness, their mutual interrelations and interactions has been emerged as a topic of debate involving various questions such as 'Is consciousness evolved through the mind or from the body?' or 'Is the mind as well as the body the manifestation of consciousness which is eternal and all pervading?' It is ironic that science, though immensely successful in explaining the intricacies of the external world, is unable to give satisfactory answers to the above questions. Although we find systematic science of consciousness in religious scriptures such as the Vedas, Upanishads and Bhagavad Gita etc., this is limited to level of consciousness up to the region of universal mind only. The Religion of Saints reveals a complete cosmology of the universe explaining origin, interrelations and mutual interactions and functioning of the brain, mind and consciousness at micro and macro levels. This paper sheds light on the Sant Mat perspective of consciousness in relation to the brain and mind. Sant Mat believes in the existence of one ultra transcendental spiritual force field, which is omnipresent, eternal, all pervading and composed of subtlest particles of zero dimension. This is the ultimate reality and ultimate consciousness of the nature of bliss, love and unstuck sound. Mind and matter are the altered states of this primary consciousness. Mental particles are less subtle than spiritual particles and particles of matter are gross. Man is a perfect microcosm of the whole cosmos. Brain is matter and is an extremely specialised, efficient and important organ of the body evolved in the course of evolution by consciousness itself. Similar is the case with mind, which establishes the link between the brain and the conscious soul. **P1**

**318 Spiritual Consciousness in College Teachers and its Impact on Organizational Commitment** Dayal Sandhu , Archana Kapoor <sandhu.dayal9@gmail.com> (Pedagogical Sciences, Dayalbagh, Agra, India)

Work Spirituality in its elementary constituent is consciousness, inter-linkage with one another and a superior existence, a sense of contentment, and value as well as implication to one's profession. The multidimensional concept of work spirituality has a vast array of widespread span across organizational processes and systems. It is an area which has an impact on the subtle, subconscious system of a person, hence leading to various mental and physiological and thought involving changes. Organizational spirituality at the workplace is growing rapidly and people are looking for their spiritual needs at the workplace. They seek value, support and meaning in their lives and organizations are also getting positive work outcomes in the workplace where employee's spiritual needs are fulfilled. This research is intended to determine the impact of work spirituality towards employees' organizational commitment amongst college teachers. The organizational commitment has been treated as dependent variable and work spirituality considered as predictor variable for the research. The research employed normative survey method for the purpose of investigation. Accidental non-probability method of sampling technique is used to select seven higher educational institutions of Agra city of Uttar Pradesh, India and random probability sampling technique is used to select 420 teachers of six educational streams. The investigator used self-developed workplace spirituality questionnaire, organizational commitment scale by Dhar, Mishra and Srivastav (2002) to collect information of teachers and to gauge workplace spirituality



and organizational commitment amongst college teachers respectively. A total of 519 copies of questionnaires were administered to teachers of selected seven college of Agra district, U.P. India and a total of 420 questionnaires were returned and properly filled. This study employed statistical techniques like Analysis of Variance (ANOVA), Tukey HSD Post Hoc Test, Pearson Product Moment Correlation Coefficient and linear regression analysis to obtain the results. The findings of the study reported that level of workplace spirituality and organizational commitment of college teachers of Agra city, U.P., India is found to be moderate or average. It is also inferred that there is statistical significant association and positive relationship of workplace spirituality with organizational commitment. The study further revealed that there is positive and significant impact of workplace spirituality towards organizational commitment amongst college teachers which is analyzed from linear regression analysis. This research suggested arrangement of workshops on yoga, meditation and other relaxation techniques and behavioral, technical and leadership training to the college teachers. It suggested minimization of work, simplification of rules and procedures, recruitment of competent, well educated and trained staff, recognizing a good work, frequent and non-critical feedback to teachers on their performance. This research further suggested constitution of personnel management team in each college to resolve work related problems of teachers, leading to improvement in their total performance and enrichment of their work life and also prevention of political interference in the management and administration of college. **P1**

### 319 The Devotional Consciousness Of the Religion Of Eastern Saints (Sant Mat) B Saravanan B Saravanan <saravananb3022@gmail.com> (DEI, AGRA, UP India)

**THE DEVOTIONAL CONSCIOUSNESS OF THE RELIGION OF EASTERN SAINTS**  
(SANT MAT) B. Saravanan Great significance is attached to devotion to the Spiritual Master or Guru Bhakti in Sant Mat (Religion of Eastern Saints). The Supreme Saint (Param Sant) Soamiji Maharaj, the first Revered Leader and founder of Radhasoami Faith, whose birth bicentenary is forthcoming in the current year, has emphasized the significance of worship / devotion to the Sat-guru, the spiritual Master in His Divine Magnam Opus, Sar Bachan :- Kya Hindu Kya Musalman, Kya Isai Jain I Guru Bhakti Puran Bina, Koi Na Pave chine II i.e., ?None can attain peace , without performing devotion to the Guru, i.e., the spiritual adept, be it Hindu, Muslim, Christian or Jain.? Thus Sant Mat upholds the message of Guru Bhakti as the panacea for all the ills & evils of the world and for attaining peace on eternal basis here and hereafter, for one and all, be it of any caste , creed, gender, nationality, etc. For the purpose He has propounded the solution : ?Ek Janam Guru Bhakti kar, Janam doosre Nam, Janam teesre mukti pad, Chauthi mein Nij Dham? In other words, one may perform devotion to the Guru, in one?s entire life, then proceed to performing repetition of Spiritual Name in the second life, thereby attaining Salvation from cycle of birth & death, in the third, and Ultimate Abode in the fourth. Revd. Prof. Prem Saran Satsangi Sahab, has pointed out that all the stages can be crossed during one?s lifetime, by an ardent devotee of the Lord. And what is Devotion but all actions done in pursuit of the mandates of the Guru Maharaj, fulfilling the same, as declared by Soamiji Maharaj ? ?Guru Agya se jo shish karayi, So kartut Bhakti Phal deyi? He has therefore advised that one may not leave the ways of Bhakti or Devotion at any cost, lest one may be left with nothing but repentance at the end ? ?Bhakti na choote koi jukti se, Nahin ho bahu bidhi raho pachtai? The impact of the above entreaty can be appreciated better when we learn that the devotional practices taught by Him, when practiced, lead to various states of consciousness, from the wakeful, dream and sleep states to transcendental states of supreme consciousness, as has been disclosed in depth by Him in His teachings. The road map laid down by Him to attain Supreme Spiritual Consciousness, through the devotional practice of Surat Shabd Yoga, facilitates the contact of individual spirit with the universal spirit. The devotional consciousness thus developed in the Religion of Eastern Saints not only enables the blossoming of fine qualities of love and compassion but lead to the establishment of Brotherhood of Man and Fatherhood of God and Better Worldliness in society at large. This constantly expands the horizons of love and service to ever new frontiers, reminding us of the profound saying of Confucius :: ?The more man meditates upon good thoughts, the better will be his world and the world at large.? **P1**



**320 Living Every Moment With The Ultimate Consciousness** Sumiran Satsangi , Shipra Satsangi: Professor Ranjeet Satsangi <sumiran.satsangi@gmail.com> (Dayalbagh Educational Institute , Delhi, India)

Introspection of our 'Daily Karmas' and surrounding environment around us at the end of the day reveals the condition of our mind which is filled with infinite thoughts at any point of time. It tells us that condition of mind changes every moment and it also reveals our vulnerability in this world at large. Constant struggle with life problems and changing circumstances and condition of our mind (full of numerous thoughts) takes away our power to take right decisions which we all are required to take, multiple times each day of our life. Every object in this world derives its energy from its source, be it a ray of sunlight, a drop from the ocean, or an electric current as an example. Source is thus the reservoir of energy, or ultimate powerhouse from where it all starts. Similarly all human beings have an 'Atman' or soul which derives its energy from the Supreme being or its creator. It is said that each person is born with a purpose and each person has his trajectory or path defined by the Supreme Being. It would be desirous and beneficial that we try and follow this path and not even for a moment divert from it. But we experience it is not possible every moment, i.e. we get disconnected with the path often. We then wonder that we were taking the right decisions till this time, but suddenly at some hour or some day, some moment our mind changes its track and takes us to the path, which is different to what our inner conscious wants us to follow. The present paper explains the importance of our constant connect with the Supreme Being, our creator or in simple words our source or Ultimate Consciousness at all times. How can we try and sustain it at every moment of time is what the paper would explore through questionnaire and personal interviews. **P1**

**321 The Prophets of The Almighty: The Educators of The Mankind** Savita Srivastava , Dr. Preeti Srivastava <2708deisavitasrivastava@gmail.com> (Foundations of Education, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

The greatest power in creation which impels the masses towards righteous aims and deeds is the force of true education (material, intellectual, and spiritual), brought about through the Faith of the Prophets of God. This is a truth which the records of history testify to. In the following section are examples of their educative influence on mankind throughout history, both to prove their truth of being "Educators of mankind", but also to present to anyone who is of the opinion that "religion" is bad, that "religion" itself is actually extremely good, but like all things in creation, over time it will lose its vitality, beauty, and relevance, and will eventually fall into a condition of decay, and is then in need of renewal. The Prophets of God are the first educators of the human race. They bestow a universal, and complete education upon man and cause him to rise even from the lowest levels of savagery to the highest pinnacles of spiritual development. The philosophers too are educators along lines of intellectual training, however at most they have only been able to educate themselves and a limited number around them, to improve their own morals and, so to speak, civilize themselves; but they have been incapable of universal education. They have failed to cause an advancement for any given nation from savagery to civilization. Human beings, despite the great capacities they are endowed with, are still always in need of the influence of Education from a superior in order for these latent capacities to be revealed. Without this education man, would remain brutish. The original Educators of the human race have always been the Prophets of God who are the Founders of Religion. Those unique personages such as Buddha, Moses, Krishna, Christ, Muhammad and Sant Mat. Every concept of nobility and righteousness possessed by man today, has been the result of the educative influences of the Prophets of God. When one seeks "Spirituality without Religion", or "God without Religion", the "spiritual" behaviours and actions they are seeking to reveal in their own lives are in fact the result of education which mankind has derived from the Prophets of God. Human progress is infinite, and there will never be an age when mankind is no longer in need of the educative influence of the Prophets of God i.e. one cannot claim that today the knowledge we have derived from religion and past experience is sufficient to enable us to reach all further progress and perfection in the future, in the same way that a past civilisation which imagines itself as modern could not claim that it were no longer in need of the influence of further guidance and education. Mankind is perpetually in need of the influence of a

Prophet of God to protect it from declining into materialism and godlessness. P1

## 6.05 Mythology

## 6.06 Sociology

**322 The Black And White Color Metaphor In The Context Of Yi Ethnicity Culture Are Different From Han Ethnicity Culture.** Ke Ding , Yajun-Zhao <15708451408@163.com> (????, China)

Metaphor refers to the concept of a cognitive system used to express the concept of another cognitive domain..Metaphor is a hot topic in many disciplines, especially the cognitive function of metaphor has been paid more and more attention. The role of linguistic and cultural factors in the construction of metaphorical mapping is one of the most important themes. It is well known that in Chinese culture, white is often a symbol of morality and black is often used as a metaphor for immorality.Different from most of the “white and black” culture, the color concept of Yi ethnicity custom loves “black”. Black in the concept of Yi ethnicity means high, large, deep, wide, multi, dense, strong and so on. In this study, the author uses the variation of the Stroop paradigm to explore the metaphorical mapping of black and white color metaphors and moral concepts in the context of Yi ethnicity culture. Under the background of the Yi nationality, the study assumes that the white and the immoral words have the same psychological representation, the black and the moral words have the same psychological representation, and the color Stroop effect should appear in the part of speech judgment task. The results show that the main effect of color vocabulary is not significant,  $F(1, 19)=1.41, p>0.05$ ; the main effect of vocabulary types is significant,  $F(1, 19)=19.44, p<0.001$ , significantly faster than on moral judgment of words to the subjects to judge reaction reaction of moral words; vocabulary and vocabulary the ugly color effect is not significant,  $F(1, 19)=0.12, p>0.05$ . Under the background of the Yi nationality, the metaphor of the black and white color in the moral concept is not obvious, and the Color Metaphors in different cultural backgrounds are different. C2

## 6.07 Anthropology

## 6.08 Information technology

## 6.09 Ethics and legal studies

**323 Conscious Economics and SustainAbility** Mario Carrassi <mario.carrassi@uniba.it> (Economics, University of Bari - Italy, Bari, Italy)

The current state of the planet is essentially attributable to one factor: the lack of awareness. Never in human history have we produced such an accumulation of information as in the last 100 years. But if we look at how we are and how we behave, we can ask ourselves what all this knowledge has really produced, and what we have done with all this knowledge and information. At the present time, it seems that the human race is at war with the Earth. It is evident that global warming, climate change, marine pollution, deforestation, excessive use of pesticides, the intensive exploitation of animals are all consequences of human arrogance that reduces nature to an object and believes that all living species are inferior, sacrificing the Earth in the name of greed. The conquest of nature and the perception of being separated from it also leads to the conclusion that technology can provide useful solutions to counteract the shortage of resources in the interest of the survival of the human species. We imagine ourselves to be able to restore the natural order through our scientific knowledge. We are in the era of the numbers, where it seems that all that matters is to know how to maximize the numbers, even at the expense of human life and the survival on this finite planet. The simplified representation of the economy as a closed circuit of money and resources is quietly deposited in our brain and constructs the dominant thought governing the choices and decisions that are commonly regard as economic, but in fact refer only to measurements of money and financial movements (Dunn & Norton, 2013). The noble purpose of economics to seek a balance between unlimited needs and scarce resources has been confused and inexorably replaced by the accumulation of money which should instead represent

only the chosen instrument to measure and facilitate trade, in order to meet our needs. So we have confused the means with the end (Drucker, 1985; Laszlo, Saillant, Cooperrider, & Brown, 2014). The modern economy, influenced by Newtonian and Cartesian science, is mainly based on a mathematical abstraction that does not take into account the value of human being, other beings, the planet and life. This dominant economic theory is incapable to effectively manage the complexity of social phenomena and the various problems of the ecosystem. (Stiglitz, Sen, & Fitoussi, 2010) By losing the interconnection of life, we have lost a sense of authenticity and intimacy with the dimension of Being that allow us to live happily and in harmony with the natural world. Human beings have become the tools to produce and accumulate money in the name of cold mechanical business rules. We should not be surprised if the financial, social and environmental crises are leading us intensely in touch with the evidence that such unconscious behaviour produces intense and irreparable consequences that can put a strain on the very survival of the human species on this planet. It is therefore necessary to think of new paradigms of well-being and development, based on a different conception of science and life in its globality, which develops above all on a new sense of identity and on the awareness of who we are and what is our role on the planet: from exploiters to steward to guarantee the flourishing of all life. Research indicates a relationship among subjective well-being, ecologically sustainable behavior, mindfulness and other contemplative practices (Haidt, 2006; Jacob, Jovic, & Brinkerhoff, 2009; Layard, 2005; Nettle, 2005). We can therefore train 'sustainability' through conscious and self- reflexive practices aimed to awaken this forgotten capability to feel the connection to nature and the others, so that love, peace and happiness can spontaneously flow and expand from the micro-foundation individual level to the macro systemic institutional level, leading to the common good of everything that is part of the process that connects C8

**324 Organizational Consciousness - How Science and Wisdom Traditions Inform Leadership and Organizational Transformation** Christian Mayhofer <mayhofer@cmpartner.at> (N3XT, Vienna, AUSTRIA Austria)

We are exploring, researching and experimenting in our consulting work how insights from science and various wisdom traditions can inform the way organizations are managed, created, designed, consulted and transformed. We see that the world has become too complex and it's challenges too urgent to be managed in and from a traditional linear materialistic world-view. More knowledge, more data, more technology does not help in most cases anymore but a higher level of consciousness for Leaders and Organizations instead. We clearly state that, in order to take on the responsibility of leading and guiding organizations, these leaders need to develop new skills and capacities in order to imagine and co-create a beneficial and impactful context. In other words: we don't need more technology but more wisdom in order to make productive and beneficial use of these technologies and possibilities we have at hand. In order to facilitate the organizational transformation we access the collective consciousness of the organization and increase its ability to being and becoming aware to its own being. We are using insights and technologies from Zen Buddhism, et al. to help leaders to address and bring forth a greater level of consciousness among themselves and their teams. Transformation therefore is not the result of a change process in the way of wanting something, but the moment an organization is becoming aware of what is right now, setting new intentions (new choices) and live and act from that realm. The creation of new conditions then allows a transformed collective mind to manifest. We will show a client case where we worked with terms like core purpose (to transform identity) and the reality of BEING as a state of the conscious mind, rather than BECOMING, WANTING and HAVING, which represents the old paradigm of linear change. C8

## 6.10 Education

**325 The Study of Consciousness in Teacher's Training** Maribel Barreto , Juliana Costa <maribelbarreto1@gmail.com> (Human Sciences, Ocideemnte Foundation, Salvador, BAHIA Brazil)

The present research highlights the importance of consciousness study during teachers academic training. This study has been developed in higher learning institutions in Brazil for 16 years. It

addresses the understanding of life dynamics of human as an integral being in its physical, psychic and spiritual dimensions. It shows the human socio-anthropological evolution and consciousness process. The human potential that favors the understanding of relationships significant value, their role in existence, and helps discern the best way in each phase of their development (Barreto, 2013; Torres, 2007). Thus, teachers have revealed ways of providing students a differentiated academic training, values that involve individuality and community; subjectivity and objectivity; the microcosm and the macrocosm in dynamic equilibrium. The research about the development of teachers consciousness in training has shown its impacts mainly in the increasingly conscious professional activity, which involves significant learning of different knowledge areas: biological sciences, chemistry, physics, arts, language, mathematics, philosophy; as well as the process of self-knowledge (Ausubel, 2002; Wilber, 2001). This perspective reveals the need to surpass linear, superficial, fragmented and orderly knowledge if we really want to know something in this world. The complex phenomena is multidimensional as the human being in his process of knowing, self-knowing and self-performing; learn, live and be; feel, think and act. The results indicate that the study of consciousness contributes directly to teachers integral training aiming the constant improvement of his practice. After all, the consciousness is the best way to get to know ourselves, to know the other, the society, the planet, the universe, from the enlargement of our perception about reality as a whole. This perspective of teachers training is also based on Moraes (2008) when he announces that we must educate with love and solidarity, educate for the evolution of human thought and spirit, educate for the recovery of sensitivity, for the encounter of beauty, for the quest of the fullness and elevation of human consciousness. **P2**

**326 Consciousness of Values and Righteous Behaviour of School Students - A Primary Research** Rajneesh Bhasin , Arya Bhasin; Satgur Pyari <oshobhasin@gmail.com> (Dayalbagh Educational Institute (DEI), Noida, Uttar Pradesh India)

India is a country with over a billion people and over 32% of its population is between 5 years and 19 Years in age; and hence, students are expected to be there in almost every part of the country. Generally, everywhere in India, as soon as students enter school, they are pushed into a rat race for eventually cracking entrance exams to make it to one professional college or another and high expectations are set on them. Throughout, from early years, there is a lot of emphasis on giving inputs to students to improve themselves in studies by adding additional coaching classes for subjects in which they may be weak or in which they need to excel. In many schools, a great deal of lip service is paid to moral values, but emphasis on moving ahead of the others to win in a competitive environment compels the students to succeed by hook or crook, thereby keeping moral values on back burner. In comparison to such a scenario, there is as much focus on Moral Teachings and Values as on Studies in the unique education system of Dayalbagh Educational Institute (DEI). DEI students are taught that in their journey towards development of a 'complete man,' knowledge of subjects in the curriculum is just one aspect of education and the rest, rather most of it, concerns inculcation of morals and values. This implies that the product of the DEI system of education ought to be different from those following the usual course curriculum, and this difference is likely to be discernible from school level itself. In this context, the relationship between consciousness of the values emphasised in the school and the behaviour of students appears to be a good topic to study. In this paper, we are reporting the results of a detailed Primary Research with students of Class IX and Class X from DEI Institutions, namely, Radhasoami Educational Institute and Prem Vidyalaya, and students of Class IX and Class X from other Institutes in Agra, India. A questionnaire developed to measure the relevant variables was tested for its reliability and validity, and was then administered on control and experimental groups. The results were subjected to statistical analysis and the findings have been discussed to assess the impact of moral values on righteous behaviour of school students. **P1**

**327 The Importance of Advanced Investigations Courses on Consciousness in Schools in Brazil** Juliana Costa , Maribel Barreto <juliandradecosta@outlook.com> (Ocidemnte Foundation, Salvador, BAHIA Brazil)

This study was accomplished with the purpose of evidencing the Nucleus of Advanced

Investigations on Consciousness (NIAC) importance in State Schools of Bahia, Brazil. The implementation began with five institutions, selected by the Education State Secretariat (SEC), with the purpose of promoting educators training focused on Consciousness and Socioemotional Competence development for Self-knowledge sake. Three questions guided this process: who am I?; Where do I came from?; Where will I go?. The process was based on "Consciousness creates reality" (Aspect, 1982); "In nature nothing is created, nothing is lost, everything is transformed" (Lavosier, 1777); and "The quantum information [consciousness] contained in them [microtubules] is not destroyed" (Hameroff, 2013) conceptions. Based on these reflections and seeking to meet SEC needs, the educators training in NIAC involves nine central themes: education and life; consciousness and education; self-knowledge and human relations; students integral development; ludology and education; creativity and learning; initiation to consciousness teaching methodology; socioemotional competences teaching methodology and transdisciplinary learning. It is perceived in this formation process that educators are being aided in their consciences development, so that they can systematically implement the Initiation to Consciousness subject with Basic Education students. As a result, it is hoped that it will be possible to assist educators and students in the construction of their consciousness, so that their achievements demonstrate individual and social balance, with a consequent decrease in schools, family and society conflicts as a whole. **P2**

**328 Leadership Consciousness Through Techno-Psycho-Axiological Approach** Abdul Sameer Khan , Dr. Neha Shivhare <a.sameer.k88@gmail.com> (Pedagogical Sciences, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Leadership has been defined as that activity or ability which is required to lead a group of people (BussinessDictionary, 2017) and we all know in general sense consciousness is the state of being aware of and responsive to one's surroundings. Leadership consciousness is a relatively new term in the field of consciousness. In the words of Barrett (2010), "Leaders grow and develop by learning to master the seven levels of personal consciousness and the seven levels of organizational consciousness" and these levels of leadership consciousness are service, making a difference, internal cohesion, transformation, self-esteem, relationships, survival (Barrett, 2010). For developing leadership consciousness in the young generation, education which is having quality and values is an essential component. Since, quality and values are sensitive issues which involve human feelings and behavior, therefore, simply focusing on only technology, or psychology, or sociology, or philosophy for their integration in teaching cannot be justified. Each of these can help in combating the problem only partially. Therefore, there appears a need for an approach which can combine important aspects of technological advancements in a psychologically sound manner with an axiological perspective for integrating quality and values with teaching. This paper emphasizes the use of techno-psycho-axiological approach in order to develop the leadership consciousness among the learners. Therefore, by utilizing techno-psycho-axiological approach, quality and values can be ensured in the teaching-learning system which may be helpful in developing the leadership consciousness among the learners in order to make them leaders in almost every sphere of their lives. The present paper will be suggesting some practical measures for integrating techno-psycho-axiological approach in education for evolving leadership consciousness in the young generation. **P1**

**329 A Study of Digital Activism and Attitude Towards Peace Among Pupil Teachers** Priyanka Mittal , Dr. Kshama Pandey <priyankamittal19@gmail.com> (Faculty Of Education, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Over the past two decades, the increasing availability and affordability of internet and mobile phones have democratized information by putting new technology in the hands of the general public, alongside peacebuilders. Citizens use digital devices to have their voices heard and to synchronize actions that challenge their relationship with governments. They also use them to share initiatives that promote better knowledge of local circumstances that can be used to prevent conflict. The rapid development and widespread and increasing use of Social Networking sites is arguably one the most significant developments in contemporary human communication over the past two decades. Indeed, perhaps comparable only to development of mobile communication.

tion technologies, social networking may well be one of the most important and visible forms of human interaction since the invention of the Internet. In this regard following questions arises: 1) What opportunities and problems exist for digital activism use in peace building? 2) How might the new media contribute or be capable of contributing to the digital activism? 3) How might this digital activism be conceptualized - as a new movement, or through the lenses of some existing or other reflections? 4) In what ways may messages shared on social media be considered “democratic”, and are there ways in which they could be helpful in peace building? 5) Is digital activism developing positive attitude towards peace? In this paper, we examine and highlight the enormous potential of these fairly digital activism and attitude towards peace. In order to analyze the relationships between digital activism and attitude towards peace, researchers made an effort to study the social activism and attitude towards peace of pupil teachers. To fulfill of the objectives researchers have made a layout of questions related to digital activism and attitude towards peace. Sample for present study was selected from Dayalbagh Educational Institute . The sample comprised of 200 pupil teachers (70 males and 130 female) from faculty of Education. t-test was used for quantitative analysis. On the basis of quantitative analysis of the data, result shows that male students possess more social activism rather than female pupil teachers. Result reveals that there is significance difference in attitude towards peace. Therefore, the results show that female pupil teachers possess more attitudes towards peace in comparison to male pupil teachers. **P1**

**330 Music Based Intervention Programme for Developing Consciousness Among Students** Lalitesh Tiwari , Dr. Neha Shivhare <lalitesh967@gmail.com> (Pedagogical Sciences, Dayalbagh Educational Institute , Agra, Uttar Pradesh India)

Consciousness is that state of awareness in which mind control on our emotions like what, why, where, whom, which, who (Brass & Haggard, 2008). In educational perspective the term consciousness implies attention, focus, awareness toward learning in different teaching environment. To be conscious means - to have a degree of witnessing awareness and a degree of freedom of choice when thinking, feeling, sensing and interacting with people and the environment (Brazdau, O, 2015). Many efforts have been made by people to raise the level of consciousness in human being through Yoga, Meditation, Effective pedagogical practices, Contemplative pedagogy etc. Music has been used as a means of communication with the inner self and the outer world. Music can be chosen as one of the mediums to develop consciousness. Music has a remarkable ability to affect and manipulate how we feel (Vaidya, 1994). It has the power to stimulate the brain system, creating feelings of pleasure and comfort (Wilcox, 2012). It goes beyond our minds to our hearts shaping how we think and feel. Scientific evidence suggests that even a little music training can shape our brain (Hicks, 2014; Landau, E., 2012), improving the ability; emotional aspects of brain (Krumhansl, 2002; Trost et al. 2012) and consciousness is also related to the emotional and cognitive aspects of brain, therefore, music may also lead to better realization of consciousness among the listeners. Therefore, it appears that music, which has the ability to affect cognition, can lead to the development of Consciousness among the listeners. Hence Music Based Intervention Programme can be developed to inculcate consciousness among the students. This paper focuses on the development of Music Based Intervention Programme to improve consciousness among the students studying in VIII standard in India. **P1**

## 6.11 Entertainment

**331 Understanding Media Representations Through Attention, Immersion and The Unconscious Mind** Maja Gutman <gutmanmaja@ucla.edu> (Electrical Engineering, University of California, Los Angeles, CA )

Media representations dominate the present reality so intensely that it seems our cognitive maps cannot function outside the realm of spectacle anymore. This discourse taps into many of the branches of the theoretical framework dealing with media representations and their perpetual circulation in the sphere of spectacle and the stream of consciousness. It is our belief that media representations form a completely new paradigm significantly transforming the very category of “the subject” as such. The key phenomenon used here to explain the transfer process of media

representation to subject (and vice-versa) is that of human attention. We argue that this process is derived from the unconscious mind. It manifests itself through the subject's response to media stimuli and is also visibly framed in the everyday practices of uses and gratifications. We have chosen to define these practices as re-representations. In this research work, critical theory, structuralist, post-structuralist, semiotic and psychoanalytical findings were employed to constitute a solid theoretical ground for studying the field of media representation and media consumption. The paramountcy of understanding the human psyche demanded the use of various theories on subjectivity, bringing us even closer to the eternal dilemmas taking part within our mental space. Our findings suggest that the radically de-centred self presents a particular paradox: by privatizing the wholly constructed concept of dilemma, produced by lifestyle media in particular, the subject is prone to question subjective reality before questioning the existing order of outer reality. This also suggests that dilemmatic subject reveals dynamic internal structure, where stream of consciousness can be explored in parallel with external stimuli of media representations. We define media representation as strategically constructed content. Concurrent with the psychoanalytical discovery of the fragmented human psyche, the representations are constructed to address the basic human condition. The ability to shift libidinal energy of the human psyche can be seen in semantic games (and their built-in binary oppositions) which are always present in media representations. Their deeply rooted (supposedly immanent) meanings form a substantial cognitive system that perpetuates itself through unconsciously invested attention of the subject. Through its investment of attention in various media representations, subject de facto propels the system of media representations. As a resultant, the mobilization of subject's attention can potentially work as a media currency. Second aspect of this discourse deals with the question of re-representations (produced by subject) that are seen as a result of cumulative effects of representations. We define re-representations as subject's unconditional and rarely questioned contributions to the realm of media representations; moreover, we define them as an engagement induced impromptu, that is, unconsciously. Further findings suggest that certain representations in traditional and new media routinely capitalize on the subject's attention through strategic processing of sensory information (or, mobilization of the senses) and that the perception of the self and the body has radically transformed with the emergence of virtual and augmented realities. **C19**

## 6.12 Miscellaneous

**332 Consciousness as a Driver of Individual Social Responsibility** Pragya Gautam , Mrs. Kanchan Parashar; Prof. Shalini Nigam; Prof. VK Parashar; Mr. Tarun Gautam <pragyadei2017@gmail.com> (Noida, Utter Pradesh )

Corporate Social Responsibility (CSR) has been creating a lot of buzz off-late. Numerous researchers have made attempts to define CSR. However, a different and more basic concept of CSR has been gaining attention, which is Individual Social Responsibility (ISR). Consciousness is the state of being aware of and responsive to one's surroundings. It is the state of understanding and realizing something. Thus, consciousness is at the very root of ISR, which refers not only to participating in acts of charity or working for upliftment of communities, but also refers to general philanthropic behavior of an individual. It is the instinct to volunteer and address the social issues prevalent in the society. This paper aims to talk about existing literature on ISR and Consciousness, with special focus on the linkage between Spiritual Consciousness and ISR. Our hypothesis of the research is that individuals with higher levels of spiritual consciousness possess a stronger instinct of ISR. We intend to test our hypothesis on a sample of volunteers belonging to a spiritual group in India. The main tenets of this group revolve around achieving higher levels of spiritual consciousness through mediation as well as by serving the society. For the purpose of the study, we would focus on the community service related to upliftment of people who belong to rural and backward areas. This is mainly done by providing vocational skills, thus facilitating in making them independent entrepreneurs. The population of interest for this study would consist of volunteers and beneficiaries between 18-40 years of age. We plan to collect primary data through structured interviews and questionnaires administered on experiment group (volunteers who are members of the spiritual group) and control group (non-members of the group). In addition, beneficiaries of the service would also be interviewed. This paper will also aim to present 6 brief case



studies, two each from experiment group, control group and beneficiaries. C8

**333 The Illusion Of Perceiving Reality: A Study Of Luigi Pirandello's 'six Characters In Search Of An Author'** Sonal Singh <sonalsingh.des@gmail.com> (English, DEI, Agra, UP India)

Shattering the notion of reality and blurring the line between truth and illusion, Luigi Pirandello's play *Six Characters in Search of an Author* (1921) came as a great shock to both the theatre lovers as well as thinkers. Many of the creative writers, under the influence of scientific theory of relativity, had attempted to bring the aspect of the relativity of truth through their works. This brilliant piece of dramatic creation attains its objective of disintegrating the notion of absolute realism by using the theatre itself as a tool. Right from the level of the dramatist's vision, including script, dimensions of the characters, role of the actors, setting, directorial instructions, lights, expressions, masks, stage props, curtain fall, up to the presence of the audience, each element of theatre has been skillfully and metaphorically used to bring out the ambiguity of truth. The dichotomy present between illusion and reality is precisely expressed by one of the characters in the play, "How can we ever come to an understanding if I put in the words I utter the sense and value of things as I see them; while you who listen to me must inevitably translate them according to the conception of things each one of you has within himself." Pirandello firmly believed that the quality of one's experience is the outcome of the richness of one's consciousness and so he has insisted upon the belief that in art there is no fixed reality, its only perception, which in turn is governed by the level of our consciousness. Thus a writer may project one level of reality while an actor will interpret it differently as per his own perception and a person sitting in the audience may have entirely diverse view towards it. So, the thought swings between different levels of consciousness beginning from the author's mind and ultimately reaching the perception of the reader or the audience. P1

## NOTES

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## TSC 2017 East-West Forum Abstracts

### VISION TALK

#### **From $n$ -Qubit Multi-Particle Quantum Teleportation Modelling to $n$ -Qudit Contextuality based Quantum Teleportation and Beyond**

*Revered Prof. Prem Saran Satsangi  
Leader of Radhasoami Faith, Dayalbagh  
and*

*Chairman, Advisory Committee on Education,  
Dayalbagh Educational Institutions, Dayalbagh, Agra, India*

This talk further generalizes the modelling framework for contextuality based quantum teleportation to  $n$ -dimensional quantum states, or  $n$ -qudits (quantum odd-prime based units) which holds considerable promise for even higher mathematical abstraction. The proposed generalization extends the two states in the qubit model, to  $n$  states and this  $n$  could tend towards infinity. We are heading towards point-sized loops or fine-grained particles of nature, which have been rejected out of hand by string theorists. It is not physical reality when measured from the sense of Planck's length of  $10^{-35}$  metres, but finer-grained particles than Planck's length  $10^{-35}$  metres may exist, although, they are not matter anymore. We argue that why stop at degree of freedom of three, but instead pursue quantum odd-prime based units with higher degree  $n$  such as 5, 7, 11, 13, 17 and so on till  $n^{\text{th}}$  degree of freedom even tending to infinity. String theorists admit its multiple landscapes with higher degrees of freedom which points its uniqueness both for particles finer than  $10^{-35}$  metres as well as distances greater than  $10^{10}$  light years. Modern research by physicists and mathematicians including Roger Penrose, Max Tegmark, Nick Bostrom and Herbert Bernstein provides scientific basis to this work.

The race of Superman is being continually evolved in our community ever since the advent of Param Purush Puran Dhani Soamiji Maharaj, Founder of the Radhasoami Faith, almost 200 years ago in the year 1818. This process is not selection-based, but evolutionary and is open to all. It is not limited to small children in the age group of three months to three years only, who join as a focused group in the agricultural fields of Dayalbagh every morning with their parents. Even adults and elderly people are involved and contribute towards it. It does not matter whether one is a Muslim, Hindu, Sikh or Christian. Everyone who promotes the cause of better worldliness is included in it. Everyone is moving towards better consciousness and will come to know of things on one's own. While pursuing their own religion, everyone will move towards more consciousness and ultimately omni-consciousness. In fact, the Superman programme has been continuing for quite some time. Dayalbagh has only expanded the target group now to catch children at an even younger stage, but all those who have already been part of it, including elderly people, are still involved in enhancing their 'Consciousness Worthiness'.

#### References:

1. Srivastava D.P., Sahni V., Satsangi P.S. (2017), *From  $n$ -qubit multi-particle quantum teleportation modelling to  $n$ -qudit contextuality based quantum teleportation and beyond*, International Journal of General Systems, DOI:10.1080/03081079.2017.1308361.
2. Narayan Apurva, D.P., Sahni V., Satsangi P.S. (2017), *Robustness of  $n$ -qudit quantum Hopfield networks against Noise and Decoherence*, Oral Talk at TSC 2017 Integrated East-West Forum, June 5, 2017, San Diego, USA.

## **PLENARY TALKS**

### **Is consciousness guiding the universe?**

*Stuart Hameroff MD*

*Professor, Anesthesiology and Psychology*

*Director, Center for Consciousness Studies*

*Banner-University Medical Center*

*The University of Arizona, Tucson, Arizona*

The place of consciousness and its role in the universe remain unknown and controversial. Western philosophy and mainstream science consider consciousness to be computational, epiphenomenal, acausal and illusory, whereas Eastern philosophical and quantum physical approaches consider consciousness to be an intrinsic feature of the universe, playing an active role. But which specific intrinsic feature of the universe entails consciousness? Sir Roger Penrose proposed consciousness results from self-collapse of the quantum wavefunction by 'objective reduction' ('OR'), a process in the basic structure of spacetime geometry. The Penrose-Hameroff 'Orch OR' theory further suggests OR events in cytoskeletal microtubules within brain neurons are 'orchestrated' by inputs, memory and vibrational resonances, and terminate by 'orchestrated OR' to give meaningful conscious moments. If so, consciousness as an intrinsic feature of the universe (one offering pleasurable experience) may have prompted the origin of life and driven its evolution, and perhaps that of the universe itself. In the context of the 'anthropic principle', which considers the extraordinary 'fine tuning' in the various physical constants enabling life and consciousness in the universe, it is suggested here that the constants may mutate and evolve over aeons to optimize consciousness, that, in some sense, consciousness is guiding the universe.

### **The Neuroscience of Psychiatric Disorders, the Metaphysics of Consciousness, and the Prospect of an Afterlife**

*Rocco J. Gennaro*

*University of Southern Indiana, USA*

In this talk I first review and discuss evidence regarding brain damage or neural abnormalities associated with some psychopathologies and cognitive deficits, such as hemispatial neglect, agnosias, schizophrenia, aphasia, amnesia, somatoparaphrenia, alexithymia, and others. It becomes clear just how closely normal mental functioning and consciousness depends upon normal brain functioning as well as how some very specific mental changes occur when, and only when, very specific brain damage occurs. I then explore the metaphysical implications of these results with respect to the nature of mind and consciousness. In particular, I examine the plausibility of materialism, roughly the view that mental processes are brain processes, in light of the evidence discussed and in contrast to a dualist conception of the mind (whereby mental states are not physical in some sense). I also examine the prospects for a conscious afterlife based both on the brain evidence adduced and the metaphysical implications discussed. For example, even if conscious mentality merely depends upon proper neural function, does it then stand to reason that all of one's conscious mental activity ceases when all neural functioning ceases? I argue that the affirmative answer to this question is more reasonable than the negative answer, although it may be impossible to know with certainty. I also briefly address how Eastern and Western conceptions of an afterlife are often quite different and examine how these differences might bear on the central issues discussed.

## Psychophysical Parallelism and the Mind-Body Problem

*Subhash Kak*

*Regents Professor, Oklahoma State University  
Stillwater, Oklahoma, USA*

The capacity to make choice means an agency that has no place in a world governed by closed laws, unless one considers Psychophysical Parallelism (PP), that excludes causal interaction between mind and body. In this view, mental and physical phenomena are two aspects of the same reality like two sides of a coin. This paper discusses PP from many different perspectives and stresses the earliest articulation of it in the *Vaiśeṣika Sūtra* of Kaṇāda. PP was once a dominant philosophical view in Europe also but now has been relegated to the margins. According to Moritz Schlick, PP is the “epistemological parallelism between psychological conceptual system on the one hand and a physical conceptual system on the other. The ‘physical world’ is just the world that is designated by means of the system of quantitative concepts of the natural sciences.” The idea is an old one having been first enunciated as *samavāya* (inherence). PP is consistent with complementarity and indeed the inspiration for it. Bohr argued that the consideration of the biological counterpart to the observation of the relation between mind and body does not become part of an infinite regress. He argued that “We have no possibility through physical observation of finding out what in brain processes corresponds to conscious experience. An analogy to this is the information we can obtain concerning the structure of cells and the effects this structure has on the way organic life displays itself.... What is complementary is not the idea of a mind and a body but *that* part of the contents of the mind which deals with the ideas of physics and the organisms and *that* situation where we bring in the thought about the observing subject.” Schrödinger implicitly invoked the principle in describing the state function of a quantum state ( $\psi$ ) as representing our knowledge about the system. Elsewhere, he presents the psychophysical parallel basis of this claim in a clearer form: “Consciousness cannot be accounted for in physical terms. For consciousness is absolutely fundamental. It cannot be accounted for in terms of anything else.” The notion of psychophysical parallelism rules out the need of hidden-variable theories. According to it, quantum mechanics is an epistemic theory in which there is no need to introduce additional variables that will convert it into an ontic theory. The lack of experimental support for hidden-variable theories is to be expected within the framework of this parallelism. It is also not surprising that extensions to quantum theory cannot give more information about the outcomes of future measurements than quantum theory itself. One must also assume that the psychological part of PP implies that there exists no specific correlate of consciousness in the brain (as it cannot have a physical basis).

## How Memories Are Made

*Jack Tuszynski*

*Department of Physics  
University of Alberta  
Edmonton, Canada*

In this talk, I will present a bottom-up model of memory formation in the human brain. The starting point in this model is the microtubule-MAP complex inside neurons. I will briefly describe the multifunctional roles of microtubules including their electrical conduction properties that have been recently investigated by my group and by other researchers. I will explain how the microtubule structure is intricately designed to facilitate its functioning as a biological memristor, i.e. an electrical element that retains memory of past ionic current flows. Furthermore, I will link this property to the earlier work of Craddock et al. who developed a molecular model of memory encoding in dendritic microtubules using the CaMKII enzyme as a kinase that phosphorylates specific sites on the microtubule surface. These properties are then shown to affect the functioning of motor proteins involved in intra-neuronal transport, which directly affects the activation of neu-

rotransmitter release in synaptic connections. An integrated picture is emerging that interconnects all levels of the brain activity from proteins to dendrites, to neurons and to the whole brain. I will conclude this talk with realistic estimates of the upper levels of memory storage and information processing capabilities of the human brain.

## Ten concepts fundamental to the understanding of consciousness

Anirban Bandyopadhyay

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We will discuss ten scientific concepts important to consciousness. First concept is the *“colony of the immortals”*. We consider that our universe is alive, it is a life inside a life inside a life from the end of cosmos to the smallest Plank scale. The continuity of life is not broken. Each life is a nest of time cycles (clocks), wherein there is a host who lives several orders of time longer than the guests sitting on its perimeter (e.g. neuron lives much longer than other living cells). Second concept is the *“flute of Krishna”*, it is a network of flutes, kept side by side and one inside another. Each flute is a fractal cavity resonator, so is the neuron and even proteins, vibrates like a wheel of frequencies, or has the ability to filter any sensory information into a time cycle or music. Third concept is the *“bing bang balloon”*, here we reject Turing & propose our own fractal tape (2014, Information). In this fractal information theory (FIT) that operates by Geometric Musical Language (GML), wherein entire universe is a self-assembled Bloch spheres. Here, the Bloch sphere of a Qudit includes a clock that holds a geometric shape made of singularity points which unfolds its undefined features, scale by scale to expand perpetually. Fourth concept is the *“tear drop of primes”*, the number of tunes that the flute of Krishna noted above could play if plotted against numbers gives the most fundamental symmetry of the universe. As the numbers increase, it repeats the triplet of triplet made of teardrop to ellipsoid. The transition of this pattern is fundamental to all other patterns we can show that from this pattern all possible spirals are born. Fifth, a *“chameleon of nested phase”*, a fractal network of geometric phase represents everything in the universe, mass, space, time and all fundamental constants. When we use the phase of a clock to replace mass, space and time, then, it seeks for a change in the understanding of the science that we currently study. Every single force, symmetry of the universe is regulated by teardrop of primes, but implemented by a chameleon of nested phase. Sixth concept is the *“geometries of continued fractions of Brahman”*, in all life forms geometry = nested cycle of continued fractions. Multiple infinite series governing the universe are evolution of geometric shapes. It is a single circle that cooks infinite series, and those infinite series governs the universe, nesting of clocks when remains inside the boundary, it makes life, but when stretches one touching point of the diameter to another, it is the birth of infinite loops. Seventh is the *“repentance of morphing”*, a nested time cycle always oscillates to fix into the most feasible diameter, or a defined clock, but it fails due to the continuous expansion of the information architecture or the self-assembled Bloch spheres (bing bang balloon). Thus, an ideal morphing could never be done, this is the fundamental driving force. Eighth, *“an imaginary life of three infinities: e, pi, phi and i”*. These four infinite series set the grammar of dynamics of every single system of the universe, these are fundamental to all. Electromagnetic oscillations resonance frequencies differ by a ratio of pi, magnetic resonance frequencies differ by phi, and a connection between the two happens by e. These pythagorean triples make the structures. Nine, *“harvesting noise by a magnetic personality”*, we have invented a new fourth circuit element Hinductor to mimic a biomaterials vibrations. This device is an insulator, produces magnetic flux as the charge stores, that gets added to the spin wave. This device runs by noise, ruins by signal. Tenth, *“hot dance of proteins in its own Raga”* ; the absorption band of the biomaterials shows how it exploits triplet of triplet band for nested clocks that itself-dances to make a pi. However, there are e, pi and phi forming various spirals and

structures making nested frequencies as the code of life. Nesting the frequencies as the necessity to run a life with music is the creation of 30000 proteins from 17 ragas.

## **Devotional Literature of Eastern Radhasoami Spiritual Philosophy:**

### **A Literary-Psychoanalytic- Consciousness Exploration**

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*@*

*Arsh Dhir*

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The leaf has fallen from the tree onto the dust below: all its beauty has been lost and is  
drying up every day.

As long as it was a part of the tree, it was loved by its master, the tree

Now when it has fallen from the tree it gives bad smell and rots into manure.

-His Holiness Huzur Sahabji Maharaj

The metaphor of the fallen leaf aptly describes the plight of an ordinary man, experiencing 'jiva consciousness. The word 'jiva' is derived from the Sanskrit verb 'jiv' which means 'to live'. 'Jiva', therefore, stands for a living being. In fact, the words 'Ego' and 'I' express 'jiva consciousness', the consciousness of the 'man of the world' and not the consciousness of the spirit. Eastern meditationists and Saints who possess inner experience and knowledge of entire creation of the universe, have directed their efforts to pierce the veil of 'Ego', thus making man realize the spiritual essence, instead of making him curious to enquire about the place of his stay.

In psychological parlance, 'jiva consciousness' comes close to the notion of 'Superficially Altered states of Consciousness' (SASCs) given by Polish Psychologist, Andrzej Kokozska (2008). His Holiness Huzur Sahabji Maharaj, in the scriptural texts of Radhasoami Spiritual Philosophy, explains 'jiva consciousness' as the consciousness of an ordinary man, devoid of spirituality. While discussing the notion of Altered States of Consciousness (ASCs), Kokozska states that man in his life time mostly experiences SASCs which are accompanied by a change in view of reality, rationality of experiences, emotional reactions, sometimes disturbed sense of time and cognitive processes, lack of stimulation, a feeling of dark emptiness etc. If, Kokozska believes that Profoundly Altered States of Consciousness (PASCs), accompanied by strong positive emotions, resulting in consciousness of the Higher Power guiding and controlling the life on this earth and also life beyond this earth, can be attained through prayer, meditation etc, we put forth the proposition that reading and listening to devotional literature of Saints is one of the potent means to experience communion with the Absolute, resulting in 'Spirit- Consciousness'.

Much has been written by philosophers and literary scholars on Hindu, Christian, Islamic and Sufi devotional literatures and also on the works of Sant Kabir, Nanak Sahab and Tulsi Sahab. The paper is a pioneering attempt to showcase the treasure of spiritual wisdom contained in the Sacred literature of the Eastern Saints of Radhasoami Philosophy which unveils the path to the Mansion of the Supreme Spirit and 'Spirit Consciousness'.

This research initiative is based on the premise that reading of such devotional literature with sincerity, faith and humility enables man to rise above 'jiva consciousness' or in psychological terminology, Superficially Altered States of Consciousness (SASCs). If reading of a novel, poem or drama written by a writer gives us delight and some insight into life, Sacred Literature, embodying divine revelations, completely transforms our lives, stimulates higher thoughts and purges the mind. There is a difference between reading of these texts and Shakespeare and Milton. Sacred

texts are not only read, but are often chanted, read aloud, memorized, recited in their entirety either in seclusion or in a congregation to realize the eternal truth.

The inexhaustible gamut of Radhasoami devotional literature includes devotional poems dealing with themes ranging from praise of Supreme Lord's Glory, exhortations, prayers of anguished spirits longing for Supreme Lord's love, description of creation and its grand divisions, prose, allegories, Treatise on scientific- spiritual expositions, Autobiographical Retrospectives and plays.

The first section of the paper attempts to integrate the strands of Eastern philosophy and the Western psychology, exploring the notions of 'jiva consciousness', 'spirit consciousness', 'SASCs and PASCs'. The second section places selected Sacred compositions of Radhasoami devotional literature within literary-psychological- consciousness interpretive framework, thus foregrounding newer paradigms of *Guru- Bhakti* (devotion to Guru), highest form of Spiritual Consciousness, and a unique fusion of scientism and spirituality. The concluding section presents a detailed discussion of Rev. Prof. P.S. Satsangi's Triple Hierarchical Paradigm of Consciousness, with interesting and apt illustrations from the play *Deen O Duniya*, written by His Holiness Huzur Sahabji Maharaj.

Keywords: Devotional literature, *jiva* consciousness, spirit consciousness, triple hierarchical paradigm of consciousness.

## G.H. von Wright on the crisis of intelligibility in physics and the prospects of a new form of scientific rationality

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The Finnish philosopher Georg Henrik von Wright (1916-2003) is known for his contributions to the study of inductive reasoning, deontic logic, values and norms, and the logic of explanations of human action. He was also an essayist who reflected upon the problems of our civilization. In particular, he was concerned with the adverse effects of science and technology (such as pollution, overpopulation, alienation and stress, and the threat of nuclear war) and was led to question the impact of scientific technology on life, and therewith also the value of the type of rationality which science represents (von Wright 1986, 1989; Pylkkänen, forthcoming).

Von Wright recognizes Adorno and Horkheimer's analysis, according to which the prevailing kind of rationality involves above all the use of means to achieve various ends. This is an instrumental, technical and goal-oriented rationality that enables a better efficiency in the production of goods and in the organization of services. But such technical rationality is helpless when it comes to finding and articulating the values that legitimate the aims; and such rationality devoid of values seems to be a major factor behind the adverse effects of science and technology.

To tackle the situation von Wright felt that we should explore the deep relationship that exists between the form of the scientific rationality of a given age and the nature of the scientific world-view of that age. In particular we need to understand how the technical rationality is grounded in the mechanistic-deterministic world-view of Galilean-Newtonian science, which separated subject from object, values from facts, and mind from matter. But von Wright also drew attention to how developments in quantum physics radically violated many of the basic principles of this world-view in the early 20<sup>th</sup> century, creating a crisis of intelligibility. To resolve this crisis, a new more holistic world-view is needed; and with such a new world-view there may arise a more



harmonious form of scientific rationality. Von Wright speculated that such rationality might shift the relationship between human beings and nature from the current one of domination to a new kind of co-evolution. This, he felt, might be to the advantage of the adaptation of industrial society to the biological conditions of its survival.

This talk presents von Wright's views about the crises of reason and intelligibility and evaluates whether developments in quantum theory give support to his ideas about a new form of scientific rationality (Bohm & Edwards 1991; Bohm & Hiley 1993; Pylkkänen 2007; Pylkkänen et al. 2016; Walleczek and Grössing 2016).

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## In Search of a Source of Proto Consciousness

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The Penrose-Hameroff theory of the epistemology of consciousness is gaining increasing acceptance by the scientific community. According to this theory, a conscious moment arises when the universal proto consciousness is harnessed by way of reduction of global quantum coherence in the brain that builds up starting in the microtubule and indispensably aided by quantum entanglement. What is missing in this effective paradigm is apparently a source of proto consciousness. A search for such a universal proto consciousness naturally leads to the ultimate source of everything, which is the quantum vacuum and the Quantum Field Theory (QFT) that deals with it. The stunning scientific discoveries of the twentieth century, supported by QFT, reveal that the quantum fields, which are the primary ingredient of everything in this universe are present in each element of space-time of this immensely vast universe. The most intriguing question is what keeps the immutability of the fields intact throughout the universe for all times. Does it not suggest the existence of some sort of self-referral scheme that is responsible for maintaining the delicacy of the quantum fields? Self-referral is an inherent feature of the 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 aspect 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 of the anticipated unified field near Planck's dimensions could possibly be imparted to ambient dimensions by means of quantum entanglement. The attributes of self-interaction, self-coupling, self-organization or self-referral is also the hallmark of proto consciousness. As Penrose proposes, our brains contrive to harness an as yet undiscovered element embedded in primary reality that is responsible for evoking our awareness. Could it be plausible to identify this unknown feature to be the robust self-referral that is apparently associated with the quantum fields for keeping their immutability for all times in spite of their ubiquitous fluctuations within dynamism?

Keywords: Penrose-Hameroff, Orch OR, microtubules, quantum entanglement, quantum field theory

## The aesthetic basis for everyday objects

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I consider two kinds of natural aesthetic objects that occur both in Western and Eastern cultures - the song "happy birthday" and the golden mean ratio in architecture and art. I show that each object is effective and favored by professional and naïve people because of how normal perceptual processes result in mental representations that satisfy Aristotelian aesthetic principles.

"Happy Birthday" has taken on the role of increasingly mandatory performance at birthday parties. This is striking because in fact it was originally written as a school-room song, with entirely different words. The question arises: why is it socially adopted for birthday celebrations? I will present evidence that it is compelling for several reasons: the first, second and fourth line have the same rhythm, and the same relative pitches, while the third line has the opposite relative pitch and an extended ending. This gives it both a unity and departure from that unity, satisfying one Aristotelian aesthetic principle (optimal complexity).

More important is that the song asks a musical question several times about its tonal center.

If it starts in the key of C, the first two lines alternate from C to F. The third line passes through both, while the fourth line conclusively determines that it is now in the key of F. This follows the second Aristotelian principle, resolution of representational conflicts: the overall move from C to F, spells out an “Amen” – which fits the social function of the song at birthdays.

The golden mean ratio is pervasive in Western and Eastern art and architecture, and is intuitively preferred by everyone. Here the question arises again, why is that ratio naturally preferred? Again, its visual perception satisfies both aesthetic principles. It elicits an automatic recursive operation operating on itself, as an ideally complex process; it resolves an early stage representational conflict of reduction into constituent squares, which have a resolution. Both aspects predict that the Golden Mean frame should enhance the perception of depth. I will present some art examples and experimental evidence that this is in fact true and conclude with some preliminary observations about the minor differences in how these two folk objects function in Western and Eastern societies.

## TSC 2017 INTEGRATED EAST-WEST FORUM ORAL ABSTRACTS

### 8. Yoga and Meditation alters Central Executive Functioning and Brain Dominance

Sona Ahuja

The central executive component of working memory acts as a supervisory attentional system. It is a flexible system responsible for the control and allocation of attention and regulation of cognitive processes. Researches report the significant impact of meditation on working memory. The mechanisms involved are not studied extensively yet. It is not clear if there is change in all the components of working memory or some specific component and the gain specific to the phase of meditation is yet to be explored.

In the first experiment, the effect of yoga and meditation was examined on the ability to control attention and information flow to and from verbal and spatial short-term memory buffers. The participants included advanced meditators (trained for sound practice along with the practice of contemplation of form - second initiates), intermediate meditators (trained for the practice of contemplation of form - first initiates), beginners (pre-initiates) and non-meditators. The automated N-back task was administered on participants before and after meditation to assess the shifting between tasks or retrieval strategies. Their performance was compared with that of control groups. The results indicate that all the groups performed same at the baseline level. After the practice of yoga and meditation for a period of 20 weeks, the three experimental groups demonstrated improved performance on N-back task. The difference in the gain of each strata is discussed in the light of change in central executive component of working memory.

The expression — left-brain/right brain — refers to specialized functions of the two hemispheres. It is believed that during meditation the brainwaves of the entire brain synchronize and there is decrease in cognitive dissonance. To test this hypothesis, in the second experiment, the brain dominance of the participants at four levels was studied – non-meditators, pre-initiates, first initiates and second initiates. The results underline the difference in brain dominance at four levels of meditation, before and after the practice of yoga and meditation.

### 9. Identifying, in terms of Social Responsibilities, the effect on environment of Eastern Spiritual Practices that evolve Spiritual Consciousness

Vineeta Mathur, Rahul Mathur

This paper endeavours to study social responsibility as a measure of studying environment around Eastern spiritual practitioners such as those who perform yoga, and others who believe in and practice Surat Shabda Yoga (the spiritual yoga practice in the Sant Mat tradition). The third group comprised of people who do not believe in yoga. We first tried to identify the group having highest degree of spiritual Consciousness and secondly find any correlation between spiritual

Consciousness and an individual's social responsibility. Eighty four adult participants between the ages of 25 yrs to 50 years took part in the survey. The participants were asked what defined each best: Group A) I do not believe in yoga; Group B) I believe and perform yoga and Group C) I believe and perform Surat Shabda Yoga. They were sent the two questionnaires over social networking mediums, in soft copy format. These were to be filled on a five point Likert scale and submitted.

Scores were tabulated under the above three categories and correlations between Questionnaire 1 on social responsibility and Questionnaire 2 on spiritual consciousness were determined for each group. Mean scores of level of spiritual consciousness for participants of each group were: Group A-42.8, Group B-44.1 and Group C-47.4. This clearly showed that the group having highest level of spiritual consciousness was the group that practiced Surat Shabda Yoga (47.4). Mean scores of social responsibility for participants of each group were: Group A-40.9, Group B-42.1 and Group C-44.9. The results of correlation between spiritual consciousness and social responsibility were then found for each group. It was observed that correlations for Group A (0.2256) and Group B (0.4212) were low and not significant while positive significant correlations between spiritual consciousness and social responsibility were found for Group C (0.7857).

The results showed that people who have higher grades of spiritual Consciousness are more socially responsible and have a good effect on the environment. The method of spiritual practice does have a relationship to our behaviour towards society and our being responsible citizens of the future. Since the spiritual practice giving highest consciousness scores was Surat Shabda Yoga, the traits of people who follow this practice may help a society to prosper and humanity to evolve. They have the Superman traits, as proclaimed by the Revered Fifth Leader of the Radhasoami Faith, Sir Anand Swarup Sahab.

## 11. Impact of Surat Shabda Yoga on Organizational Citizenship Behaviour of Employees: A Multi Method Analysis

Sumita Srivastava, Anjul Dayal

In management literature, Organization Citizenship Behaviour (OCB) is defined as those extra work-related behaviours which go above and beyond the routine duties prescribed by job descriptions or measured in formal evaluations (Bateman and Organ, 1983). The term OCB is placed above the concept of job satisfaction. Employees with high OCB cooperate with peers, perform extra duties without complaint, are punctual, volunteer for helping others, use time efficiently, conserve resources, share ideas and positively represent the organization (Turnipseed and Rassuli, 2005). The practice of Surat Shabda Yoga (as taught in the religion of saints) helps individuals to understand their ultimate potential and connects them to their complete self. This paper presents the findings of research conducted to identify a possible connection between practice of surat shabd yoga and organizational citizenship behaviour. We have used multi method analysis to investigate this relationship. Two studies were conducted to validate the relationship between the identified variables.

In the first study, a sample of 107 employees of an organization was taken and divided into experimental and control group. The experimental group belonged to the practitioners of surat shabda yoga (n= 65) and the control group did not practise surat shabda yoga (n=42). The findings of the empirical study confirm the impact of surat shabd yoga on organizational citizenship behaviours of employees. In the second study, focus interview method was used. Qualitative data of 65 practitioners of surat shabda yoga was examined using framework analysis (Krueger 1994) to explore possible connection between the practice of surat shabda yoga and OCB. The findings of the second study, though exploratory, are interesting. They identify a strong connection between surat shabda yoga and OCB and reveal a third variable-need for self actualization (the highest order need of Maslow's need hierarchy theory) that explains the relationship. This study identifies surat shabda yoga as a strong mediating variable between the need for self actualization and OCB. This

multi method study extends the existing research on spiritual theory of management.

### **0. Hindu Temple Architecture : Mini Cosmos or fancy of the Architect ?**

**Renu Singh Parmar, Mehar Parmar**

Hindu temple architecture symbolically represents the quest of 'MOKSH' (ultimate spiritual liberation, the realization of oneness) by setting out to dissolve the boundaries between man and the divine. The Hindu temple is above all a building serving metaphysical rather than physical needs. It is a threshold between the transcendental and phenomenal world. This monument of manifestation represents the outer and inner cosmos. The outer cosmos is expressed in terms of various astronomical connections between the temple structure and the motions of the sun, the moon and the planets. The inner cosmos is represented in terms of consciousness at the womb of the temple and various levels of the super-structure that correspond to the states of consciousness. It is a depiction of the macrocosm (the universe) as well as the microcosm (the inner space). The eternal nothingness yet universality - is a part of a Hindu Temple Architecture. The ideal form gracefully artficed suggests the infinite rising levels of existence and consciousness, expanding sizes rising towards transcendence above, and at the same time housing the sacred deep within.

## **26. Consistency of Eastern Philosophy with Modern Science**

**Shiroman Prakash**

Scientific knowledge is based on performing repeatable experiments to rule out refutable hypotheses. These hypotheses are, in principle, also subject to the mathematical requirement of global consistency, and ideally follow from one or more mathematical theories capable of systematically generating an infinite number of testable hypotheses. The currently established theories of physical science have been extremely well-tested, but many have argued that they do not provide any unambiguous hypotheses regarding the existence and nature of conscious subjective (i.e., first-person) experience. The Radhasoami faith is a branch of Eastern philosophy that is based almost exclusively on the first-person experience of practitioners of a specific form of meditation known as Surat Shabd Yoga. In this sense, we argue that it can be thought of as an empirical theory that can be used to generate testable hypotheses about first-person experience.

While this branch of Eastern philosophy is not, in any way, a competitor with physical science in terms of predictions for the results of third-person experiments, it is important to ask whether the Radhasoami faith is consistent with the established theories of physical science, in the domain in which they have been unambiguously tested. In this talk, we will defend the statement that the Radhasoami Faith, a branch of Eastern Philosophy, is consistent with all firmly established results of physical science to the current day. We will also defend the statement that the Radhasoami Faith is consistent with several hypotheses of new physics related to quantum gravity under active research. Our arguments will be partially based on the harmonic paradigm of quantum field theory, in which degrees of freedom are organised hierarchically by frequency. While much work remains to formulate this empirical theory in a mathematical language, we will argue that it is possible to do so, and that this philosophy is fully consistent with, and perhaps also implies, the metaphysical ideas of Max Tegmark, in his book, "The Mathematical Universe", that reality, in its ultimate form, is an abstract mathematical structure.

## **34. Anaesthesia and Consciousness : Integrating eastern and western perspectives**

**Pushpa Sahni**

From eastern perspective, understanding how the material brain produces subjective experiences is based on a study of inner experiences such as those during meditation. Western scientists believe the unique features of quantum physics can explain the mysteries of consciousness. The neuroscientific approach to the study of consciousness is characterized by the search for the "neural correlates of consciousness". Scientists hope that the understanding of anaesthetic mechanism in human brain can unveil the mysteries of consciousness. It is of interest to note that Hameroff's quantum theory of consciousness is also grounded in information coherence, albeit by non-classi-

cal physical processes. Accordingly, he suggests that anaesthetic actions in the hydrophobic cavities of neuronal microtubules, which are purported to mediate coordinated quantum computation in the brain, disrupt this coherence, leading to the loss of consciousness. Neuro-imaging studies during general anaesthesia have also shown decrease in effective connectivity in the cerebral cortex and thalamo-cortical systems. Anaesthetics may not be a useful tool to study consciousness because of their diverse molecular actions, but differing molecular actions can nonetheless result in a single common mechanism.

Modern scientists should also take a lesson from the remarkable incident of Param Guru Huzur Sarkar Sahab, “During His stay at Lahore, Sarkar Sahab, who was suffering from a chronic abscess on the sternum, felt the need of medical examination. Major Hugo, the Surgeon-General in the Mayo Hospital, was called in. After examination, he advised an early operation and Sarkar Sahab agreed. When all the surgical instruments were ready, the Surgeon proposed to put Him under chloroform. Sarkar Sahab told him that there was no need of anaesthesia. The doctor insisted and said that even the slightest jerk or movement was fraught with risk. He was however assured that there would not be the slightest movement. Sarkar Sahab withdrew His attention current inward and when the operation was over, He came back to normal consciousness. The doctor marvelled at Sarkar Sahab’s self-control, fortitude and serenity.”

### 35. From n-Qubit Multi-Particle Quantum Teleportation Modelling to n-Qudit Contextuality based Quantum Teleportation and Beyond

**Dayal Pyari Srivastava**

Quantum entanglement is a key resource for several applications in quantum information processing. Thus, it is important to quantify the degree of entanglement in multi-particle systems. Experimental realization of multi-particle systems and the detection of all orthogonal basis states forming a complete set of entangled states remain a challenge, nevertheless, efficient theoretical construction and characterization of different multi-particle entangled channels for analyzing information processing protocols is an important precursor to successful design of experiments.

This paper generalizes the modelling framework for contextuality based quantum teleportation presented at the previous editions of TSC (TSC 2016) to n-dimensional quantum states, or n-qudits (quantum odd-prime based units) which holds considerable promise for even higher mathematical abstraction (Srivastava, 2016). The proposed generalization for n-qudits extends the two states in the qubit model, to n states and this n could tend towards infinity. In terms of mathematical abstraction, there is no limit imposed. We can see that we are heading towards point-sized loops or fine-grained particles of nature, which have been rejected out of hand by string theorists, that it is not unique. It is not physical reality when measured from the sense of Planck’s length of  $10^{-35}$  metre, but finer-grained particles than Planck’s length  $10^{-35}$  metre may exist, although they are not matter anymore. Pursuing such abstraction further is the purpose of this presentation and we argue that why stop at degree of freedom of three; instead, why not pursue quantum odd-prime based units with higher degree n such as 5, 7, 11, 13, 17 and so on till  $n^{\text{th}}$  degree of freedom even tending to infinity so that we have the highest abstraction. It involves only a mathematical description of the gates and their matrices as will be presented in the talk. Recall that while claiming uniqueness for string theory, they admit its multiple landscapes with higher degrees of freedom which in a sense fouls up its uniqueness both for particles finer than  $10^{-35}$  metre as well as distances greater than  $10^{10}$  light years. We will discuss n-qubit multi-particle quantum teleportation modelling, starting with example of three-particle quantum teleportation and extending it to n-particles, extend the model to n-qudit contextuality based quantum teleportation, with definitions and discussion of the various stages of the circuit and finally present the contextuality based models.

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### 50. Overcoming Decoherence in Biological Systems using Topological Quantum Error Correction

V Gurucharan, Shiroman Prakash

Orchestrated objective reduction, proposed by Penrose and Hameroff, hypothesizes that the consciousness in brain originates from the quantum process of objective reduction, orchestrated by microtubules. However, the critics of this hypothesis point that the temperature and moisture inside brain is not conducive to quantum information processing, as these conditions would lead to quantum decoherence. As is widely known, quantum decoherence is a major problem in realizing scalable quantum technology also. Decoherence can be defined as the entanglement of a quantum system with the environment. It affects the encoded information in the system by generating unwanted errors. However, one could try to correct these errors in the quantum system by using various schemes of quantum error correcting codes. Due to limitations like No-Cloning theorem, it is difficult to use a simplistic analogue of classical repetition code for quantum error correction.

Kitaev proposed a powerful class of topological quantum error correcting codes defined on a two-dimensional spin lattice, called the Toric code, which we hypothesize to be particularly useful for quantum error correction in biological systems like microtubules.

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### 58. Arbitrators of Consciousness Key to Solving Alzheimer's Disease

Nancy Woolf

Microtubules--and to some extent, actin filaments--attain their highest function in large neurons of the cerebral cortex as the arbitrators of consciousness and memory. These filaments do this job on top of serving general functions in cell survival and maintenance. What goes terribly wrong with microtubules in aged brains most directly accounts for symptoms in Alzheimer's disease (AD), as well as explaining the core triggers of most, if not all, the progressive pathologies underlying the disorder. Scientists need to eradicate Alzheimer's disease where it strikes its most devastating blow--at the innermost recesses of the cell. Pragmatically speaking, we need to restore memory capacity, problem solving ability, and coping skill, not focus solely on ameliorating pathology without improving cognition. Fortunately, fixing microtubules is the ultimate solution--holding promise to make Alzheimer's disease a thing of the past by addressing both cognition and pathology.

Tau-tangles and amyloid plaques--along with a neurotransmitter deficit are the major AD changes in brain. Four of the five current FDA-approved treatments attempt to remedy the acetylcholine neurotransmitter loss, but these drugs result in modest clinical improvement and fail to halt progression of the disease. For this reason, new clinical trials have targeted the tau-tangles and amyloid plaques, but which come first in the pathological cascade? Recent evidence suggests tau-tangles may come first.

Yet another position is that neither amyloid plaques nor tau-tangles lie at the core of the problem. Jack Tuszynski at the Li Ka Shing Virology Institute and Cross Cancer Institute in Edmonton, Canada and myself, a retired neuroscientist who was at UCLA for 37 years--have a different idea. We argue that microtubule deterioration is central, if not primary, in AD pathology. Microtubule proteins made of tubulins change their overall structural conformation when bound to a stabilizing drug. This is the basis of most cancer treating drugs. Genetic engineering of tubulin enables one to design a protein that assumes the shape and configuration of a naturally occurring protein when it is bound to a drug. This means a permanent fix--no drugs are needed to maintain the preferred state.

Based on this idea, we developed a novel treatment strategy for AD--one that might lead to a cure, or at least elucidate the contributing mechanism or primary cause of the disorder. The background leading to this idea is outlined in our book: Nanoneuroscience: Structural and Functional



Roles of the Neuronal Cytoskeleton in Health and Disease. We argue for a need to repair microtubules in damaged regions of AD brain, and propose doing exactly that by introducing stronger and stabler tubulins—ones that will stay bonded to other tubulins slightly better.

The most intriguing aspect of rejuvenating microtubule function in AD is that such treatments hold so much promise for directly restoring memory and cognition. Microtubules might best be called the ‘soul’ of the cell, because of their starring role in memory, cognition, and consciousness. A unique role played in the brain, these small filaments evolved simple functions to store and retrieve information. While the DNA in the cell nucleus contains information passed from one generation to the next, the microtubule matrix stores a lifetime of memories and the secret private life of a single human being. The microtubule matrix does this incredibly simply—it keeps a record of the nerve cell’s responses to each input, and subsequently analyzes how inputs lead to thoughts, how one thought leads to another, and how thoughts lead to behaviors that yield successful or unsuccessful outcomes. The amount of information and the sheer power of the microtubule matrix is one of nature’s most powerful computers. Let’s hope that science can unlock its secrets and restore brain health in the near future.

### 59. Western Scientific Techniques applied to study Eastern Meditation Practices in Dayalbagh Community Mukti Sahni

The tools and concepts used in Dayalbagh community for scientific study are among the most modern ones available in the Western world such as SQUID (Superconducting Quantum Interference Devices)-based Magento-encephalogram (MEG) installed in Magnetically Shielded Room as well as measures for social issues like Corporate Social Responsibility (CSR), a term coined by Harvard management gurus. There is a lot of work to be done for scientific study of consciousness and one particular direction which was agreed to by scientists at ‘The Science of Consciousness Conference 2016’ organized by Prof. Stuart Hameroff at Arizona is that we can observe the effect on the environment which can be measured without even being privy to these ultra-transcendental meditational practices and this is the direction in which we are trying to measure Corporate Social Responsibility for group of people who practise this and others as control group who do not practise this.

A survey conducted in April 2016 in India over all communities found that 38% employees log in extra hours for social work. A similar survey conducted over our community members all over the country from Kashmir to Kanyakumari and even further to Sri Lankan shores, including cosmopolitan cities, rural hinterland and tribal areas and of course, the headquarters at Dayalbagh found the corresponding participation level to be close to 100%, all the year round, with no expectation of any material return (nishkam sewa, i.e. selfless service). We have found in this quest that it is best to pursue the golden mean instead of pursuing the extreme positions and there, we think we can also come up with measures which can be observed by anybody in the outside world. This raises great prospects of realizing possibilities and potentials for using this mode of ultra-transcendental yoga without even becoming an adherent or an initiated follower of the Faith.

Roger Penrose in his recent book (Faith, Fashion and Fantasy in the new Physics of the Universe, 2016), instead of subtler points, approaches the exponentiation  $a^b$  where  $b$  and  $a$  both can tend to infinity, and not only that,  $(a^b)^n$ , all three can tend to infinity, so he is doing it on the other extreme side, whereas the quantum mechanics people approach it from the infinitesimally small size and they stop at strings of dimension one, but there is no reason to do that. Some of them do mention that as part of the landscape of prevailing string theory, there is a suggestion that one move to point loops of zero dimension, there are infinite number of them, so infinitesimally small quantity on one side, and infinitely large quantity, infinity to the power to infinity to the power to infinity. In a nutshell, the Hilbert space with field of complex numbers, Hilbert space of  $n$  dimensions,  $n$  tending to infinity, is what represents the God, if you want to say something. God is precisely a Hilbert vector space of  $n$  dimensions over a field of complex numbers, but it is with that subtlety that you perceive it not as a scorching heat, but you perceive it as a blissful existence with all the musical inclination. We need to resolve the inextricably linked problems of subtlest particles smaller than  $10^{-35}$  metres Planck’s length and large distances more than  $10^{10}$  light years, and approach zero and infinity by application of logic and induction in the right way. Like

Max Tegmark in his book 'Our Mathematical Universe', we also believe that it is this mathematics and its abstractions which will lead scientists to the ultimate reality and this is a very good evidence of such effort.

Luckily at Dayalbagh, we have a confluence of people with the latest scientific techniques as well as people who are armed with this inner force of reality.

### **61. Robustness of n-qudit quantum Hopfield networks against Noise and Decoherence**

**Apurva Narayan, Dayal Pyari Srivastava, Vishal Sahni, Prem Saran Satsangi**

Srivastava et. al. [1] have presented a promising scientific model for understanding consciousness and the brain, based on the quantum Hopfield networks. A majority of the quantum theories of consciousness exploit the power of mathematical abstraction for providing a generalized model. Srivastava et. al. [2] have shown that higher level of mathematical abstractions may be well suited to modelling consciousness, by extending the single quantum two-state system to a n-dimensional quantum system or n-qudits.

Noise and decoherence are well known issues in quantum system modelling [3, 4]. In this work, we show that leveraging higher level of mathematical abstraction empowers us, to model the system accurately (as presented in [2]) and to make it robust against noise and decoherence. We show through numerical simulations, that the robustness of the model scales proportionally with increase in the number of quantum states.

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### **63. The Awakening of Creative Consciousness: A Novel Approach towards Attractors**

**Tatavarty Guru Sant, Tatavarty Neh Satsangi**

A mind that is stretched to a new idea never returns to its original dimension». The above line signifies that when it comes to change, we mostly think it to be a word calling up resistance. Moreover, the biggest changes often start very incognito. All change starts with and is in fact- a change within our consciousness, when we start looking at things from a different angle. Creative use of our consciousness towards self-change is actually a cost-less approach to take up responsibility in a transition time between cycles, this phenomena is described as "creative consciousness".

The process of how our current ideas are stored in the mind is still unknown in detail, but we can model this using variants of the complexity science idea of "attractors". For any dynamic (time changing) system the attractor is where it will end up eventually. A minor perturbation (any change in physical system) can be sufficient to switch to a different attractor. Since ideas are woven together in minds, if anything is evolving, it is not 'memes' but minds. Expressed ideas and artifacts are merely how a mind reveals itself under a particular context. In this paper we have created a model of creative process cycles through realms of consciousness having various stages such as i) the preparation stage ii) incubation stage iii) vantage point iv) incubation period v) illumination vi) conformation and vii) validation stage. Through this model we have established that Creative Consciousness has the ability to change and/or redirect the flow of energy which gives rise to its existence by the choices it does or doesn't make. Results also indicate that consciousness is a creative living process continually redefining itself and what it experiences by the experience it has. The results also establishes that the role of consciousness seems more to do with directions, with

the choice as to which of life's many paths we wish to follow, and how Creative Consciousness allows efficiency in the search through state space, and this efficiency itself helps us to converge on the creative areas of possibility and leave aside what are often (literally) the dead ends. Further the analysis is combined with teaching of religion of saints to provide set of actions through which one can elevate towards the higher levels of consciousness.

## **72. Effect of Surat-Shabda-Yoga-Meditation on Consciousness and Health using Electro Photonic Imaging**

**Sant Saran, Sukhdev Roy**

In this paper, we present the results of a pilot study on the effect of Surat-Shabda-Yoga meditation on the consciousness state and health using Electro Photonic Imaging (EPI) technique (modified Kirlian imaging). EPI, also known as gas discharge visualization, is a technique used to record the human bio-electromagnetic field. In EPI, electrons at finger-tip are stimulated by applying a short electric pulse of a high voltage (10 kV), high frequency (1024 Hz) and low current for less than a millisecond. This results in a glow due to the ionization of gaseous molecules in the surrounding air through the discharged electrons from the finger-tips, which is then captured by a CCD camera. EPI images from all 10 fingers of both hands provide potential information in terms of various parameters, i.e., Activation Coefficient, Integral Area and Integral Entropy, about the physiological and psychophysiological condition of the human body. Activation coefficient provides a quantitative assessment of stress on evaluation of autonomic balance. Integral Area provides a measure of the general health index, while integral entropy is a measure of the disorder in the energy pattern of human energy system. Integration of EPI with the principles of Indian Ayurvedic chakra system and traditional Chinese medicine that involve meridians, energy channels and energy fields, also leads to a psychosomatic assessment of the connection of functional state of organs with psychological state, i.e., balance of energy centres and yin-yang meridians.

In this study, a group of 35 yoga meditators in the age group of 15-50 years, were studied, before and after 45 min. meditation sessions, and after four months of regular daily sessions that involved 7 yogasana exercises for 15 min. and Surat-Shabda-Yoga meditation for 30 min. The results indicate a high functional energy at psychophysiological levels in meditators. There was a significant improvement in the Integral area which is a health index, whereas, integral entropy decreased indicating the lowering of disorder after meditation. Yoga meditation also improved the balance of chakras. A qualitative analysis of the experience of the meditators was also recorded and results correlated to determine effective markers of higher states of consciousness. The study shows the usefulness of Surat-Shabda-Yoga on stress reduction, health improvement and attainment of higher states of consciousness. It demonstrates the importance of integrating subjective and objective studies on consciousness and the effectiveness of the non-invasive, safe, fast and reliable EPI technique for not only consciousness and health assessment, but also as a useful tool for medical biometrics.

## **73. Effect of Indian Classical Music Ragas on Consciousness States of Yoga-Meditators using Electro Photonic Imaging**

**Pritam Pyari, Sant Saran, Saran Pyari Roy, Sukhdev Roy**

In this paper, we report the results of a phenomenological study on the impact of Indian classical music ragas on consciousness states of yoga-meditators, especially on respective chakras using Electro Photonic Imaging (EPI) technique (modified Kirlian imaging). 35 yoga-meditators, both male and female, after meditation, were made to listen to four 5-minute instrumental flute compositions of Alap form of Ragas, namely, Ahir Bhairav, Jaijaiwanti, Bhupali and Darbari Kanada that are known to affect the Anahata (heart), Vishuddha (throat), Agnya (third eye) and Sahasrara chakras respectively. The yoga-meditation sessions involved 7 yogasana exercises for 15 min., followed by Surat-Shabda-Yoga meditation for 30 min. The responses were recorded through a questionnaire by noting their order of preference and the qualitative effect in terms of feelings, imagination, color etc. The procedure was repeated after four months of meditational

practice. The subjective experience pertaining to the preference of ragas, perception of feelings and colors in majority of the individuals showed progressive improvement to higher states of consciousness that correspond to that attributed to the different chakras, as per eastern spiritual traditions.

The above subjects were grouped based on their response to the four different ragas. They were exposed to 30 min. of respective ragas after which EPI was recorded with a CCD camera from their fingers and the effect of the ragas on respective chakras was analysed. The results confirmed the impact of ragas on respective chakras-energy centres that correspond to different consciousness states. The study highlights the importance of, (i) integration of subjective and objective, or first-person and third-person experimental phenomenological studies on consciousness; (ii) efficacy of surat-shabda-yoga meditation; (iii) age-old Indian traditional knowledge of the impact of ragas on consciousness; and (iv) measurement and progression of the consciousness state of an individual through music.

### **74. Yogabhyas and its impact on Behaviour concerning Corporate Social Responsibility**

**Prem Pyari, Kavita Kumar, Dayal Pyari Srivastava, Anoop Srivastava**

Abstract constructs are not easy to define. Sometimes, even when abstraction is expressed as a formula, like that for General Theory of Relativity, it is not easy to conceptualise or visualise its import. Consciousness is one such important construct that has attracted philosophers, scientists, spiritual leaders and meditationists, and others as a subject matter for description, debate, discussion, and understanding. Yet, there is no universally accepted definition of Consciousness as of now. Eastern part of the world largely believes that attaining higher levels of consciousness requires concerted efforts on the part of a seeker or practitioner and that the realisation of higher levels of consciousness is an experiential phenomenon. However, the Western part of the world is more inclined towards objective and scientific explanation of the term.

Some researchers at the Center for Consciousness Studies, DEI, are making efforts to conduct relevant research and draw inferences from that for better understanding of consciousness. This paper is one from that series of work, to study the importance of spiritual inclinations in shouldering corporate social responsibility with the help of a questionnaire developed for the purpose. Test-Retest reliability method was used to check the reliability of the questionnaire and the coefficient of correlation value was  $r = 0.947$ , which was found to be significant at 0.01 level ( $r = 0.947, p < 0.01$ ). Construct validity was calculated by using inter correlations of each item with the total scores obtained from a select sample. The coefficient of correlation for the Construct Validity ranged from 0.24 to 0.81.

### **76. Pro-Social Science: Bringing together concepts in consciousness studies, emergency medicine, and brain research in a workshop experience**

**Ian Olson**

Some of the most fascinating and relevant concepts in consciousness studies are less glamorous than they are troublesome: brain disease and mental illness. Today these neurological and behavioral disorders pose some of society's most challenging research, clinical, and humanitarian problems. Having a brain disease, especially a severe and persistent mental illness (SPMI), increases the likelihood that an individual will experience setbacks in his work, relationships, and overall health, and have criminal charges, with some disorders having a measurable impact on life expectancy. These problems that brain diseases pose to the individual, families, workforce and economy, healthcare resources, law enforcement, and even educational systems are widespread and increasing. Up to a quarter of the world's population experience some type of mental illness throughout their lives with a huge number of cases going undiagnosed or untreated. Some are especially susceptible to these illnesses, including the elderly, migrant populations and survivors of war, and individuals serving prison time. The W.H.O. suggests further research into mental illness and offers bleak projections for the future. Without further investigation it is certain that these diseases will pose a greater threat to future generations.

Scientific research is perhaps the greatest asset in addressing these dilemmas. Prolific descrip-

tion of epilepsy, mood disorders, and psychotic states exist throughout history and modern efforts to understand them have been substantial. It should also be noted that the diagnostic criteria and parameters for many of these disorders, and also modern treatment options and outcomes, have improved significantly. Despite these forward steps there remain huge gaps in even our basic understanding of the genetic, cellular, and molecular implications of behavioral disorders and adverse conscious states, and how we should best prevent and treat them. So although the societal cost of these diseases is high and their existence well-documented throughout modern times our understanding of them is quite lacking. With increasing pressure on consciousness studies and brain researchers to propagate the entertainment or commercial value of concepts in neuroscience (such as artificial intelligence, virtual reality, technological innovation and cognitive enhancement, etc.) there exist many opportunities for new leadership and discovery in this pro-social area.

## 77. Man Machine Versus Machine Man

### Sriramamurti P

God created a unique man machine in the human form of Supreme Saint (Param Sant) who has access to all the Regions of Creation. Other humans too, by submitting a Prayer to the Param Sant can access the Infinite Source of Consciousness, the Creator God through whom it reaches Him and get a response. The Supreme Being in fact is working out the salvation of all spirit entities through that mechanism only to make them Supermen like Him. Human Brain is evolved by Him through Nature, His creation, in such a way as to contain all the doorways to all the creational regions. When Param Sant incarnated, His Brain was evolved in full. The doors are all kinetic in Him and are there in other humans as potential doorways to be opened when a person is trained in the Surat Shabda Yoga meditation technique by Param Sants. Surat Shabda Yoga technique comprises listening to the unstruck sounds inwardly at various subtle nerve centres of mind and spirit resonating there, under the guidance of a contemporary accomplished teacher. One then becomes a Superman who can control even the so called superintelligent machines.

Scientists are building intelligent machines and even spiritual machines which would act and react emotionally with values as fed to them and create new things and even create the robots anew in their turn. They are not endowed with spiritual entities but with chips highly charged which could act in a way following the value system fed into it. This feeding is being done based on their knowledge of the human brain and their functional capacities in terms of physical and electro-chemical, biological and neurological functions. They are working just at the threshold of brain-mind interface without even recognizing mind-spirit interface. The mind centres in brain located in grey matter and the spirit centres located in white matter on the line of division of left-right lobes of the brain are not only not identified but also the second and third level flows of mental and spirit currents are considered.

One should understand that the neural circuitries of flow of attention currents of mind and spirit in outward and the inward directions have not been fully explored. They are explained only by the organic physiologists of eastern medicines and masters of Yoga techniques of different traditions in the world including Sufi and Sant traditions. It is therefore a desideratum to tackle and apply these methods for exploring mind and spirit which alone enables one to understand the true nature of consciousness. The Universe created by the primeval Consciousness is one indivisible organic whole in which not only energy and matter are deeply entangled but also the mind and the spirit.

It is said that true experiences in living beings belong to the spirit entities residing in them which is directly perceived when a spirit entity turns inwards and establishes harmony with the internal sound produced by the flow of the kinetic spirit current. The faculties of extra-sensory perception in the near death experiences, knowledge of past lives, and inner visions pertain to higher mind and spirit. They cannot be had by chips. It is the prerogative of the spirit entity only. So a machine man without being endowed with the presence of a spirit entity cannot have an experience of the sort of pain and pleasure that embodied humans have. In our quest for Consciousness, we should not ignore this fundamental truth and blindly go after illusions created by pseudo-Science. The human machine designed by nature has this system where all functions are controlled by spirit

force which supervises all activities in creation.

As Bruce H. Lipton has rightly said the intelligent cells should be allowed to propel humanity to go up one more rung upwards the evolutionary ladder so that the living beings endowed with love and higher consciousness not only just survive but thrive. Scientists should try to understand the natural order of things in creation at all levels and live in harmony with it such that the gracious object of creation as enunciated by Saints be realized. Providence has created man in the image of God in an environment designed by nature that is the counterpart of Infinite Reservoir of Spirit Force. Spirit and Science should be united to create a better world. The Super intelligence of the Supreme Spirit Force will certainly take care of the passing phases of our intellectual vagaries in the course of evolution.

### **86. Modelling the neuro-psycho benefits of Eco- human interaction: Integrating Eastern beliefs and Western Science**

**Pooja Sahni, Jyoti Kumar**

Scientifically we know, there is a close interdependence between ecosystem and its inhabitants. On the other hand eastern religions are based on an environmentally sensitive philosophy. Confucianism (China), Shintoism (Japan) is based on nature worship (Konohanasakuya-hime). Buddhism and Jainism teach peaceful coexistence. Hinduism lays emphasis on environmental ethics.

But in the past few decades perceived worth of nature and the human contact with the natural world has diminished. There is both a physical (e.g. experiential) and psychological (e.g. perceptual, emotional) disconnect leading to many cognitive dysfunctions. On the other hand being in the natural environment has a unique positive effect on our body and mind. It can yield conscious experiences that can potentially alter our process of thinking. Studies show that experiences (i.e. patterns of neuronal activity) can modify the synaptic circuitry of the developing brain. Such changes in neural activity of brain and in behavior can be measured using EEG and through cognitive experiments of psychology (Price and Barrel, Inner Experience and Neuroscience). EEG studies have provided evidence of enhanced structural plasticity, brain synchrony and neural oscillations. In the first phase of the research, we used psychological tests to study the correlation between nature connectedness, Consciousness Quotient (measuring seven aspects of life: physical, emotional, cognitive, social-relational, self, inner growth and spiritual) and pro-environment behaviour. Significant correlations between Consciousness Quotient and the pro-Environmental behaviour ( $r=0.738$ ,  $p<0.01$ ) was demonstrated. The results were presented in TSC 2016. Further analysis deduced that pro- environment behaviour among subjects correlated positively with the spiritual consciousness ( $r=0.761$ ,  $p<0.01$ ) inner growth ( $r=0.736$ ,  $p<0.01$ ) and cognitive or mental consciousness ( $r=0.641$ ,  $p<0.01$ )- sub-factors of Consciousness Quotient. To understand the neural mechanisms involved, in the second phase, we are studying the effect of natural surroundings on the brain oscillations. Preliminary results show that on EEG measurements of participants immediately after a 60 min walk in natural environment dominated areas (nature parks) elicit increased power at the alpha frequency band known for creative thinking and consciously practicing mindfulness and meditation than the participants subjected to a walk in urban settings for the same time. Systemic models for eco-human interaction, based on the General systems theory and empirical data from the studies have been proposed that could explain the neuro-psycho pathways that are functional while engaged in natural environment.

### **87. Quantum Operator Formulation of Consciousness based on Integration of East-West Perspectives**

**Sukhdev Roy**

In this paper, we integrate East-West approaches to Consciousness and propose a quantum operator formulation. We consider the spiritual functional space as an infinite dimensional Hilbert space, with the human mind as a quantum field of information in this space. A pure quantum Consciousness operator  $C$  is considered to be a product of  $S$  (self) and  $M$  (mind) operators ( $C=SM$ ). This operator creates excitations in the mental domain (Vrittis- subtle vibrations) - mind particles and generates a coherent macroscopic information field.  $C$  reflects our basic identity and is considered to be a

bosonic and non-Hermitian operator, as the spirit, mind and brain are open quantum thermodynamic systems, not isolated from the surroundings. As the non-zero average  $\langle C \rangle$  is a complex quantity, it is designated as the cognitive self or the first-person I, with which we identify ourselves. It increases as the brain interacts with the environment and the synaptic activity between neurons increases. This is in excellent agreement with the recent neurophysiological study that shows that normal wakeful states are characterized by the greatest number of configurations of interactions between brain networks, representing highest entropy values, and hence larger information content associated to conscious states [R.G. Erre et al., Phys. Rev. E 94, 052402, 2016]. To correlate it with the neural synaptic states in the brain to elicit response, a local field operator  $\Psi_{ii}$  is defined that generates excitations at neuronal synaptic sites  $i$ , and the identity of  $\langle \Psi \rangle$  with  $\langle C \rangle$  is imposed. The state of unconsciousness is a phase coherent ground state of the information field and excitation from this state is constituted as embodied consciousness.

It is necessary to consider any arbitrary information to consist of both objective and subjective parts. For this, we consider a non-physical Hilbert space to include non-measurable reality, which is a tensor product of information vectors in objective and subjective spaces. The fundamental excitations in the general Hilbert space are quantum particles that carry energy and momentum and exist simultaneously in objective and subjective spaces, as a non-Hermitian Hamiltonian gives rise to twin eigenvectors and a twin mirror space. An arbitrary information vector is a completely entangled state of the physical and the mental. Hence, the non-Hermitian Hamiltonian qubit gives meaning to information. We consider the brain to generate a coherent state that can accommodate large number of these bosonic particles. The creation operator  $C^+$  creates an information bit by operating on the quantum vacuum state in the Fock number space, which is a fundamental particle of awareness. The destruction operator  $C$  acts on the coherent state to give the measurement value, whereas, the number operator  $N$ , which is the preservation operator, counts the bits of information in the cognition channels. The cognitive consciousness operator  $C$  which creates, destroys and also preserves, is in consonance with the observation of the great particle theorist J.J. Sakurai that quantum creation, destruction and preservation operators correspond to the Creator (Brahma), the Destroyer (Shiva), and the Preserver (Vishnu) in Hindu mythology. The operators do not commute with each other and hence satisfy the generalized uncertainty principle. When the uncertainty in  $M$  is zero, uncertainty in  $S$  is infinity, i.e., there is an expansion experienced in the self or spiritual domain. This conforms to the quietening of the mind through self-reflection by yoga-meditation. Also, when  $M$  is a unitary operator,  $C=S$ , i.e., the self becomes pure consciousness. The proposed formulation is important, as it develops a spiritual-psycho-physical quantum theory of consciousness.

## 95. Schrodinger's cat and Pavlov's mouse: employing photons to interrogate interactions between quantum and cognitive systems

**Konstantin Anokhin**

Photons are particles that appeared to be particularly effective as experimental tools in quantum physics. More recently they also paved a way for a set revolutionary optical technologies in neuroscience. In the present report, I will expand this opportunity space of photonics with two new applications. First, I will suggest that photons can be used to illuminate operations of not just neural, but of cognitive systems. This is made possible by novel techniques that combine Cre-loxP recombinant and transgenic reporter technologies with in vivo two-photon microscopy and fiber-optic recording of neuronal activity in the brain of conscious behaving mice. Basically, this approach which we dubbed "cognitive indexation" of neurons allows us to identify and analyze assemblies of neurons responsible for subjective animal experiences. I will illustrate this novel approach with several experiments currently carried out in our lab. I will then build on these developments to propose an original experimental paradigm that replaces a human observer in quantum measurement experiments with a "mouse observer" specifically conditioned to detect and behaviorally report the readings of quantum measurement apparatus. Since the cognitive processes of "mouse observer" are made transparent with the described neurophotonics techniques, this paradigm allows us to explore empirically a set of questions on the role of observer's consciousness debated in alternative interpretations of quantum mechanics.

## 97. The extent of involvement of corporate employees in CSR activities: An International



### Survey Based Study

**Anoop Srivastava, Karan Narain, Kavita Kumar, Mukti Srinarain, Dayal Pyari Srivastava**

Executives in Commercial organisations have always had profit as the chief motive in the entire gamut of their business practices. However, consciousness of non financial determinants of success in the domains like Human Rights, environment, corporate contributions, community development and workplace issues has acquired considerable significance during the last few decades. For that matter, organisations of any nature are expected to support such non profit pursuits.

Success or failure of organisations and their employees is assessed by stakeholders, analysts, investors, consumers, regulators, activists, labor unions, employees, community organizations and news media on the basis of their performance in important non financial domains, particularly, in shouldering Corporate Social Responsibility. Higher levels of consciousness are expected to result in greater involvement in CSR activities.

The present research is an attempt to study the extent of involvement of corporate employees in CSR activities using a questionnaire developed at the Center for Consciousness studies, DEI. The results obtained from across the globe and select cities of India are presented and discussed after relevant statistical analysis.

## TSC 2017 INTEGRATED EAST-WEST FORUM POSTER ABSTRACTS

### 3. Mystical Experiences – Protocols of Experiment

**Sona Ahuja**

Mystical experiences are hard to believe by scientific perception. Science nevertheless cannot shirk away from the responsibility of looking to answers of questions irrespective of the area in question. Science has predefined ways of conducting experiments for reproducibility. In order to carry out scientific investigation of mystical experiences and to ensure the validity of results, a reliable instrument is required which can procure the report of experiences. The only instrument for such an experiment is the mystic himself. Quantum theory has abolished the notion of fundamentally separated objects and has introduced the concept of the participator to replace that of the observer. The notion of the participator is basic to the mystical traditions of the East also. Hence, the investigator and co-investigators have to be part of experiment to produce a reliable report on mystical experience and become the instrument of measurement.

### 4. Human Consciousness measurements through Chakra Energy and Related issues

**D.K. Chaturvedi, Lajwanti C, Tsai Hui Chu**

The earlier studies show that the human consciousness is perfectly correlated with the chakra energy in the human body frame. It is also well established that the chakra energy measurement at four different chakras (namely the navel center, the heart center, the throat center and the center of the line between the two eyes) of human beings using DEI Meridian Analysis System (DEI-MAS) shows that the eye center energy is highest and navel center energy is lowest in the measurements. This study is performed on industrial workers, college students and health care center staff for the measurement of their work performance based on their consciousness measured in terms of their chakra energies. In this paper, an experimental study is conducted on the persons who perform meditation to increase their consciousness (chakra energy) and remain there. It is concluded from the results obtained that the consciousness does not remain high for a long time (or we are not able to find the continuously increasing trend in the consciousness). This is due to anxieties and problems of the physical world which force us to decrease the consciousness, which means we are not able to remain in resonance state for a long time to keep ourselves at high conscious state. Also whenever we take measurement with a contact type sensor, the sensor itself disturbs the consciousness of human being under consideration.

Hence, non-contact type measurements of consciousness are better than contact type. Also to keep oneself in high conscious state, it is necessary to train the human mind (which is similar to a wild horse in the beginning) to remain focused to get better results not only on this physical plane but beyond that also.

## **16. A comparison of near birth and near death observations and experiences: A striking similarity?**

**Anjoo Bhatnagar, Phool Chand Bhatnagar, Vijai Kumar**

We have, in this study compared the clinical signs, symptoms, reflexes and EEG findings at the time of beginning and end of life. There are certain unusual and striking similarities in these which makes us think of phenomenon beyond physical and mental planes of consciousness. This phenomenon can be explained by correlating it with eastern philosophy of birth, death and rebirth, existence of spirit, its descent and ascent in the human frame and attaining higher form of consciousness at the time of death according to Religion of Saints(Radhasoami Faith).

## **21. Enhancing Ethical Consciousness in Management Students: A perceived impact model using Analytical Hierarchy Process (AHP)**

**K.Santi Swarup, Mukti Sri-Narayan, Karan Narain**

A perceived impact model of enhancing ethical consciousness in management students is proposed. The model combines the impact of person related variables and situation related variables on the ethical decisions of management students. The past studies conducted in this area focused on how individuals may think in a particular ethical dilemma situation. We have focused on studying the behavior and variables affecting the behavior in a particular ethical decision situation.

A short organizational situation requiring an ethical decision is first presented. The students were then asked to take a decision. A questionnaire to study the impact of person related and situation related variables on the decision taken were filled by the students, following which they were asked whether they would like to modify the decision taken earlier. The sample size consisted of 172 students from the under graduate, post graduate and doctoral management programs. The inter group analysis was carried out and the hierarchy of variables and groups was identified.

A sample of students from the various programs with opposite views was then involved in group decision making using Analytical hierarchy Process (AHP). The results have indicated that ethical decisions are affected by the level of education, personal and situational factors. The perceived impact of any decision has the potential to enhance the ethical consciousness of students and the Analytical Hierarchy Process (AHP) is an effective tool in this process.

## **30. The Illusion of Perceiving Reality: A Study of Luigi Pirandello's 'Six Characters in Search of an Author'**

**Sonal Singh, Ram Singh**

Shattering the notion of reality and blurring the line between truth and illusion, Luigi Pirandello's play 'Six Characters in Search of an Author' (1921) came as a great shock to both the theatre lovers as well as thinkers. Many of the creative writers, under the influence of scientific theory of relativity, had attempted to bring the aspect of the relativity of truth through their works. This brilliant piece of dramatic creation attains its objective of disintegrating the notion of absolute realism by using the theatre itself as a tool. Right from the level of the dramatist's vision, including script, dimensions of the characters, role of the actors, setting, directorial instructions, lights, expressions, masks, stage props, curtain fall, up to the presence of the audience, each element of theatre has been Six Characters and metaphorically used to bring out the ambiguity of truth. The dichotomy present between illusion and reality is precisely expressed by one of the characters in the play, "How can we ever come to an understanding if I put in the words I utter the sense and value of things as I see them; while you who listen to me must inevitably translate them according to the conception of things each one of you has within himself." Pirandello firmly believed that the quality of one's experience is the outcome of the richness of one's consciousness and so he has insisted upon the belief that in art there is no fixed reality, its only perception, which in turn is governed by the level of our consciousness. Thus a writer may project one level of reality while an actor will interpret it differently as per his own perception and a person sitting in the audience may have entirely diverse view towards it. So, the thought swings between different levels of consciousness beginning from the author's mind and ultimately reaching the perception of the reader or the audience.

### **38. Fractal Geometry and Information transmission in brain – Is consciousness capable of understanding itself?**

**Swati Idnani, Sneha Idnani, Pushpa Idnani**

The fractal architecture of nature is most evident in the human brain. An object is Fractal when it has the property that the structure of its constituent parts reflect the structure of the whole and at various scales. Fractals are the products of reiterative processes. The product of a simple multiplication is fed into a new operation. As a result, self-similar structures appear.

Given the fractal architecture of the brain, it is most likely that neuronal processes occur across a scale of magnitude, from neuronal networks, to single neuronal membranes, and within – to the information processing systems of macromolecules. Essentially, it is being said that the statistical properties of the gyral pattern of small cortex structures are similar to those of large ones. This approach refers to average or approximated characteristics of the brain in contrast to the precise anatomic description of individual structures. If the human cerebral cortex can be shown to be a fractal structure, then geometrical abnormalities of the overall gyral pattern, which is difficult to assess by standard morphometric tools, may be studied by fractal analysis.

As more and more nonlocal quantum mechanical phenomena are discovered within the biological system, there are two extremes emerging - the spiritual / metaphysical perspective on one side, in which consciousness is primary; and on the other side the scientific / materialist perspective, in which consciousness is an epi-phenomenological state that emerges from the complexity of neurons and plays no part in the dynamics of the Universe at large.

### **41. Tunneling within brain tubulin heterodimer provides in silico evidence for quantum entanglement**

**Amla Chopra, Raag Saluja**

Nancy Woolf (2006) hypothesized various levels of quantum entanglement in brain i.e. quantum entanglement (1) between tubulin molecules within a microtubule, (2) between two microtubules in a single neuron, (3) between neurons in a module, (4) in highly interconnected cortical areas and (5) among cortical areas with negligible axonal connections.

In this paper, we propose another subtler level of quantum entanglement, that is within the tubulin molecule itself. This is based on the fact that (i) proteins are folded in multiple dimensions (ii) unique folding of the proteins depending on the sequence of amino acids enables the interaction of reactive groups in the empty spaces (iii) presence of groups like phenyl and indole ring (tryptophan) have the property to function as “qubit”(iv) Such qubits operate with simultaneity (electrons and protons disappearing from one couple reactive groups and appearing instantly at another position without passing the gap in between.(v) amino acids with intrinsic ability of electron transfer arrange themselves in beta sheet while amino acids involved in proton transfer lie in alpha helices (vi) amino acids involved in electron and proton transfer align in a straight line.

This is fundamentally based on our in silico preliminary result that indicated the possibility of quantum tunneling in the tubulin heterodimer. We further elucidated the patterns in tubulin molecule demonstrating unique interactions at subatomic levels. Tunnels are completely void pathways, within the protein, that lead from a cavity buried in the core to the environment, i.e. the solvent. These tunnels are visualised using CAVER. The amino acids known to participate in electron and in proton transfer were taken as the origins. Amino acids involved in electron transfer are Trp, Tyr, Phe and His and those involved in proton transfer are Asp, Glu, Lys, Asn and Gln. Tunnels originating from only one of the above mentioned amino acids are observed. The tunnels originated in the tubulin molecule are compared. Apolipoprotein E4 (APOE4) and mannose receptor have been taken as negative controls and Fenna-Matthews-Olsen complex (FMO) and haemoglobin as positive controls. The number of tunnels and the ratio of number of tunnels to number of residues were calculated for each amino acid for tubulin. The number of tunnels involved in electron transfer and in proton transfer are also compared.

### 51. Spectral Analysis of a Conscious Experience

**Nagma Markan, Bhakti Kapur, Priti Gupta, CM Markan**

Conscious experiences are not only experienced as first person but are often known to have third person experimental correlates that help to characterize them. Studying some of these inner experiences in association with its neural correlates, one can learn about the computational methods used by the brain to construct such a 'qualia'. Spectral properties of spontaneous brain activity have been found to be of  $(f^{\alpha}-1)$  nature indicating self-symmetry and scale free processing in the brain. Interestingly, while perceived sensation experienced as a first person appears to be directly related to stimulus intensity, its associated frequency correlate seems to have  $(f^{\alpha}+1)$  behavior. The question is what processes could constitute subjective experience (or Qualia) which appear to have  $(f^{\alpha}+1)$  behavior? This paper delves on this question considering brain as a dynamical system, which is able to oscillate at multiple frequencies, modeled as a cascade of filters. Neural network response of brain that has  $(f^{\alpha}-1)$  behavior seems insufficient to explain sensation experienced during cognitive experience.

### 64. Consciousness perspective of Ashtavakra Geeta

**Ranjeet Satsangi, Arti Singh, Neha Goswami**

Ashtavakra geeta is an ancient Indian scripture which is written as a dialogue between the self realized sage Ashtavakra and philosopher king Janaka of mithila on the nature of soul, reality and consciousness. It insists on complete unreality of external world and absolute oneness of existence. It depicts consciousness as unconditioned, changeless, formless, immovable, unfathomable awareness, not bound by anything. It emphasizes that truth is that which never gets superseded at any point of time. Thus the reality or truth lay beyond all the three states viz. waking, dream and deep sleep. Self is pure consciousness, always liberated, an uninvolved witness of all events and happenings, all pervasive and perfect like a super conductor and has nothing to do with the body (Puri 2008). World is super imposed on pure consciousness and the self looks as if bound and subject to miseries, life and death. Ashtavakra Geeta shows path of an effortless quantum flight to absolute consciousness and truth or liberation which is devoid of rituals, control of breath japa or chanting sacred syllables. The paper will discuss nature of consciousness and the simple ways and means to attain absolute consciousness as revealed in Ashtavakra Geeta.

### 68. Evolution of Yoga Systems in the Indian Religious Philosophy

**Sumir Devaguptapu, Sabitri Ragini Akella**

Yoga is a tool developed in Indian Religious Philosophy for realizing the Spiritual Consciousness. It explores the possibilities of realizing the soul in solitude and silence of the mind under the guidance of a Teacher who had already attained the goal. The method purifies the body, mind and soul and prepares one for the beautiful vision of the world by the separation of the soul from every object of sense and thought, by suppression of all desires and passions, and the elimination of all personal sense. Yoga system is an appropriate tool evolved over centuries of toil, trial and error, strengthening from epoch to epoch right from the Epic Period (600 BC to AD 200) to modern day Religion of Saints (Sant Mat). The present paper attempts to review briefly some of the developments.

### 83. Sigma 6Q way of Life in the Dayalbagh community and its Impact on Mental Well-Being of the residents

**Saurabh Srivastava, Hansini Bhatnagar, Shruti Saini, Charan Narain, Purnima Bhatnagar**

The Dayalbagh community continuously strives to live a sustainable way of life which is aptly coined in the word Sigma 6Q with its focus on innovation and renewable energy, water and air quality, education and healthcare, agriculture and dairy, as well as inculcation of human values. It has aptly demonstrated that sustainable community living is not merely a dream in today's world, beset with the ordeal of finding a way to meet one's needs amidst scarce resources.

The present study aims to find the relationship between Sigma 6Q way of life and mental well being by analysing the difference between two groups of respondents – residents and non-res-

idents of Dayalbagh. The Warwick-Edinburg Mental Well-Being Scale was used as a measure of well-being. The sample size used in the study is 64 respondents, of which 34 lived within Dayalbagh and the remaining were from areas adjoining Dayalbagh. The sample was selected on the basis of convenience sampling technique. Analysis of Variance (ANOVA) was used to check whether there was a significant difference in the mental well-being of the respondents.

The results indicate that there is a statistically significant difference in the mental well-being of the residents from that of non-residents and the results are significant at 1% level of significance, with p value being 0.00. The study highlights the benefits of sustainable Sigma 6Q way of life on one's mental well-being and is an example for other communities to follow.

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## **ADDITIONAL CONCURRENTS ABSTRACTS**

**501 The Origin Of Consciousness.** Balson, Dennis, Email: danian.b@bigpond.com  
Consciousness and evolution Abstract: Researchers at the University of British Columbia have identified a common ancestral gene that enabled the evolution of advanced life over a billion years ago. New research, published in the Journal of Biological Chemistry, identifies the gene that gave rise to protein kinases. On a cellular scale, these highly interactive signalling proteins play a role similar to the neurons in the brain by transferring information throughout the cell process. This ability to transmit signals from one part of a cell to another not only enabled cells to become more complex internally, but also allowed cells to come together to form systems, paving the way for the evolution of intelligent life. This confirms my own research that eventually single cells evolved into multi-cellular organisms; they had the ability to communicate and cooperate with each-other, therefore they possessed some form of intelligence, yet this original intelligence was devoid of mental properties. Living cells are the basic materials of life and some amazingly are able to replicate themselves endlessly. When brains eventually came into existence then these organisms evolved within different forms of life and the brain neurons of each species became altered by their own environment and by the information each individual brain contained. The consciousness resulting from mental activities is different and separate to the proto-consciousness within brain neurons. The former is dependent on acquired knowledge and the latter is devoid of mental properties and is relative to the creative and evolutionary forces of nature. This implies that the self-sustaining proto-consciousness entity would continue to exist even if brains became extinct. This universal proto-consciousness is an emergent property that may have existed before or after the Big Bang, but it certainly existed when living cells came into being on this Planet. The Australian philosopher, David Armstrong (1926-2014) stated that mental states are nothing more than brain states. Mental states cannot function in any animal without the 'silent' and primary proto-consciousness that exist within brain neurons. When mental activity functions then that is a mechanistic and different form of consciousness. It seems we are not in complete control of our minds because we are influenced by our genes, the environment and individual knowledge. The conscious mind cannot know the unknown and as Socrates said, "True knowledge exists in knowing that you know nothing." If minds are mostly conditioned by parents, teachers and preachers and by false information, then it is inevitable that minds will overvalue what they know and believe, therefore, what may true or real to one mind may not be true or real to another. If brain neurons are related to the entities that existed long before brains came into being then proto-consciousness does not end when individual brains end because it would continue to exist probably throughout the universe. Without this mystical entity, life would not have come into being and without energy manifesting itself within living cells and within temporal matter then the universe would not exist, therefore Energy and Consciousness are the fundamental properties of the universe. Key Words: protein kinases, proto-consciousness. C

**502 Overview of Mouse Cortical Neuronal Ultra-structure Using Transmission Electron Microscopy** Robert Schafer, Colton Smith, David Lowry (Arizona School of Life Science, Arizona State University).

The brain arguably represents the most complex organic system in the known universe. The mouse brain contains roughly one billion neurons and roughly one trillion connections, while the human brain contains around 100 billion neurons with 100 trillion connections. Consciousness, that single moment of coherent experience of subjective reality, somehow emerges from this architecture of complex circuitry. This project aimed to take numerous micrographs in order to construct a general overview of the densely compact cellular architecture that composes the mouse cortical network on the ultra-structural level using transmission electron microscopy. It serves as the starting point for several future neuroimaging projects to probe and search for the molecular basis of the psychedelic experience. The micrographs obtained revealed a wide range of ultra-structural aspects into the structure and function of neurons, how they transmit and process information, neuronal cytoarchitecture, glial cells, and much more. Key Words: transmission electron microscopy.

**292 A Model of Consciousness Explains Spirituality** Frank Heile <frank@heile.org> (Retired, Santa Clara, CA)

A human is an agent that has goals, senses the world, and can change the world to achieve its goals. A theorem proved in: "Every Good Regulator of a System Must Be a Model of That System" (Conant & Ashby, *Int. J. Systems Sci.*, 1970, vol. 1, No. 2, 89-97), demonstrates that a human is a model of the world. Now, a human is part of that world, so the world model must also contain a self-model of the human. This presentation will show that we are self-models living in and experiencing our model of the world - that we are not humans experiencing the world directly. Dual process theory (DPT) in psychology gives evidence that the human agent can be divided into two systems that I rename as the Thinker and Doer agents. According to DPT, the Thinker is conscious, and the Doer is subconscious. Since each agent can access both a sensory and a language model of the world, I posit that a third agent, the Experienter, constructs those shared models of the world (and the self-models for the Thinker and Doer agents). The Experienter can be seen to either not contain a self-model at all, or that its self-model is equal to the world model. Thus, the Experienter is the non-dual agent, and a human experiencing non-duality must be identified with the Experienter. Animals have essentially no Thinker at all since they lack the complete language world model that modern humans have. The development of the Thinker in humans caused living problems, and spirituality was invented to fix those problems. I will describe the living problems caused by the Thinker and the spiritual solution to those problems. **C7**

**503 A New Approach To Causality Based On Compression-Complexity** Kathpalia, Aditi Also by Nithin Nagaraj Organization: National Institute of Advanced Studies (NIAS)

To study brain connectivity at the level of neurons, neuronal populations or different anatomical regions in the brain, causal interactions between different units need to be understood. Much of brain's dynamics are internally generated and many a times not capable of selective physical manipulation to characterize these causal relationships. Thus, we need measures that can work on acquired neuro-physiological/imaging data and predict causation and its direction. Such measures help to move neuroscience beyond identification of regional activations, towards characterization of functional circuits underlying cognition, perception, behavior and consciousness. At present, mainly two types of directional causality measures are used in neuroscience - those which model the data as a particular process, e.g. - Granger Causality (Granger, 1969) and those which are relatively model-free, based on information-theoretic approaches, e.g. - Transfer Entropy (Schreiber, 2008). These measures have also been extended to capture the coexistence of integration and differentiation in neuronal circuits that is central to 'complexity' theories of consciousness. For instance, Seth et al. (2005) have proposed a measure of Consciousness known as Causal Density, which is calculated as the fraction of interactions among a system's elements that are causally significant, as identified by Granger Causality. In this work, we propose a new measure of causality based on 'Compression-Complexity' (complexity measures based on lossless compression algorithms, e.g., Lempel-Ziv Complexity (Lempel et al., 1976) and Effort-to-Compress (Nagaraj et al., 2013)). The idea behind our approach is that if a time series Y causes a time series X, then incorporating knowledge of Y in X (by appending Y to X) should reduce the compression-complexity of the resulting series as the redundancy in the augmented series increases. Our measure is model-free and expected to encompass a greater range of non-linear interactions compared to info-theoretic measures such as Transfer Entropy. We evaluate the performance of our new measure in comparison with Granger Causality and Transfer Entropy on three examples - a) simulated coupled autoregressive processes, b) a network of coupled non-linear chaotic maps, and c) coupled neuronal activity simulated using Hindmarsh Rose spiking neuronal activity model. In each case, we consider the presence of additive noise, effect of finite data size and asynchronous measurements and demonstrate the efficacy of our approach. Key Words: Causality; Brain Connectivity; Complexity; Compression.



## BERYL BIRCH

**Author and Yoga Teacher**

Beryl Bender Birch, eRYT, Founder and Director of The Hard & The Soft Yoga Institute (the internationally renowned and highly respected teacher certification school), has been teaching yoga since 1974. She is the best-selling author of several books on yoga, including Power Yoga and the recently released Yoga for Warriors: Basic Training in Strength, Resilience & Peace of Mind— a book on yoga for veterans.

**Courtesy of:**

Beryl Bender Birch,  
Director/Founder  
The Hard & The Soft  
The Give Back Yoga Foundation  
Great Barrington, MA  
<https://www.power-yoga.com>

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\*Wed June 7 - Beryl Birch will  
give a Concurrent Talk at the  
C – 13 Session - Meditation and  
Consciousness - 5:00-7:00 pm

### **\*\*Meditation – 40 minutes**

Please be in your chairs or on your  
cushions at least a few minutes  
before start time. Please enter  
quietly without conversation AND

**DO NOT COME IN AFTER  
THE START TIME.**

*Thank you.*

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The Science of  
Consciousness Conference  
San Diego 2017

Tennis as a Mind/Body Discipline:  
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Tennis Teaching Professional/  
Science of Consciousness Student  
USPTA

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# THE SIXTH INTEGRATED EAST-WEST FORUM The Science of Consciousness Conference

# TSC 2017

**JUNE 5, 2017, SAN DIEGO, USA**

*"Oh, East is East and West is West, and never the twain shall meet,  
Till Earth and Sky stand presently at God's great Judgment Seat;  
But there is neither East nor West, Border, Nor Breed, nor Birth,  
When two strong men stand face to face, though they come from the ends of the earth!"*

Rudyard Kipling (1889) : The Ballad of East and West



The Integrated East-West Forum is now a familiar feature at the TSC series of conferences, starting with TSC 2012 at Tucson, TSC 2013 at DEI, Dayalbagh, India, TSC 2014 at Tucson, TSC 2015 at Helsinki, Finland and the landmark TSC 2016 at Tucson at the first conference of the series rechristened as 'The Science of Consciousness'. The Sixth Integrated East-West Forum at TSC 2017 will be yet another landmark integration effort as part of the TSC-series. The above quote rather prophetically captures these momentous events, when not just two strong men from East and West stand face to face, but in fact, two galaxies of strong men from East and West meet at San Diego (USA) and Dayalbagh, Agra (India) also through video-conferencing.

## EMERITUS CHAIRS

### East

**Revered Prof. P.S. Satsangi**

Chairman, Advisory Committee on Education  
Dayalbagh Educational Institutions, India

### West

**Prof. Stuart Hameroff**

Director, Centre for Consciousness Studies  
University of Arizona, USA



## CHAIRS

- Prof. Anirban Bandyopadhyay, NIMS Japan
- Prof. Subhash Kak, Oklahoma State Univ., USA
- Prof. Mani Lal Bhaumik, UCLA, USA
- Dr. Bani Dayal Dhir, DEI, India

- Prof. Jack Tuszyński, Univ. of Alberta, Canada
- Prof. Thomas Bever, Univ. of Arizona, USA
- Prof. Rocco J. Gennaro, Univ. of Southern Indiana, USA
- Prof. Paavo Pykkanen, Univ. of Helsinki, Finland

**Forum Coordinator :** Dr. Bani Dayal Dhir, Dayalbagh Educational Institute (Deemed Univ.), India

**Forum Coordinator and Organizer – Video-conferencing :** Mr. Prem Prashant, Member, Divinity Forum (Dayalbagh/@DEI-location)

**Forum Organizer :** Dr. Vishal Sahni, Dayalbagh Educational Institute (Deemed Univ.), India

### WEBSITE FOR SUBMISSION OF ABSTRACTS FOR THE EAST-WEST FORUM

<https://easychair.org/conferences/?conf=tsc2017>

Contact email :

[tsc2017forum@gmail.com](mailto:tsc2017forum@gmail.com)

Last Date for Submission of Abstracts :

November 30, 2016

### Discounted Registration Fee for DEI, India group :

to be conveyed by San Diego organizers  
(Special Discounted Fee for attending both  
Integrated East-West Forum and TSC event)  
(to be submitted to TSC 2017 organizers at  
San Diego – for further details, refer to  
<http://consciousness.arizona.edu>)

### Receipt, Acceptance Letter and Visa Facilitation

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# DEI, DAYALBAGH AND THE EAST-WEST FORUM AT TSC SERIES

The tradition in the TSC series of conferences has been to hold meetings in alternate years at Tucson and every other year elsewhere in the world. The conference has been aptly renamed as 'The Science of Consciousness' from TSC 2016 onwards in tune with the growing acceptance of consciousness studies among the scientific community all over the world.

A meaningful East-West dialogue seems feasible as has been increasingly evident from TSC-2012 through TSC-2016. To meet these challenges, the landmark Sixth Integrated East-West Forum at TSC-2017 is intended to be a place where one presents key ideas from both approaches, and where these ideas can interact in the spirit of constructive mutual criticism, evaluation and enrichment. It appears plausible to evolve a science of inner experience (which is repeatable and verifiable) by attempting to integrate Eastern and Western scientific approaches and philosophy by verifying inner spiritual phenomenology of consciousness through well-established scientific epistemology, including three important stages of observation (awareness), report (description) and analysis (understanding) (Price and Barrell, 2012) while also availing of modern techniques of fMRI and MEG scans in capturing repeatable physiological / physical parameters of neural correlates accompanying inner spiritual experience during meditational practices. Invoking higher and higher level of unified quantum field theory, with correspondingly subtler and subtler particle size of fine grained geometry will lead to a significant jump in the level of fineness (fine-grained quantum geometry) which should enable us to access, at least in the abstract world of mathematics and physics, the primary ultimate source of consciousness in the whole Universe.



TSC 2013 at DEI, Dayalbagh, India

We need to resolve the inextricably linked problems of sublight particles smaller than  $10^{-35}$  metres Planck's length and large distances more than  $10^{10}$  light years, and approach zero and infinity by application of logic and induction in the right way.

Dayalbagh and DEI are closely associated with Radhasoami philosophy, which centers upon a type of meditation practice arising from the spiritual philosophy of Eastern Saints known as "*Surat Shabda Yoga*". *Shabda* is referring to a spiritual current which can be perceived in meditation as inner light and particularly unstruck rhythmic sound. *Yoga* is referring to the uniting of our real essence (*soul*) through an inner listening with focused mental and spiritual concentration (*surat*) upon an inner sound (*Shabda*) which, it is maintained, emanates from *Radhasoami* the Supreme Being representing the macrocosm i.e. unity. It is therefore taught as the unchanging and primordial technique for uniting the soul with the Supreme Being via the sound-current of *Shabda* in order to experience oneness with macrocosmic consciousness at multiple levels. India is in many ways still a spiritual society and the Radhasoami philosophy (based on 'Saar Bachan') has a consistency with other

extant spiritual meditational practices of the world (to name a few, Buddhism (Buddhavadana), Jainism (Agamas), Christianity (Bible), Islam (Koran), Sufism (e.g. the Masnavi of Maulana Rumi), Sikhism (Guru Granth Sahab) and Hinduism (as represented by Vedas, Upanishads and Gita). In contrast, much of Western scientific and philosophical study of consciousness takes place in a secularized setting. There was consensus among eastern philosophers and western scientists at the TSC 2016 Panel Discussion that, on one side, for internal experiences or human experience, a protocol has to be necessarily followed. Following that protocol is very difficult for western nations as they will have to leave alcohol and non-vegetarian food. So consensus emerged on studying environment around those who perform *yoga*, *mahayoga* or *Surat Shabda Yoga* and we pin our hope on Corporate Social Responsibility as a measure, that those who perform *Surat Shabda Yoga* have greater sense of Corporate Social Responsibility. The author of one of the latest books, 'Our Mathematical Universe' (Prof. Max Tegmark, MIT) is like us, is in the quest for the ultimate nature of reality. We are trying to explore ultimate nature of reality from two ends, from the ends of science as well as inner or human experience. Therefore, we believe our approach to the problem of consciousness is more complete since we do not only view it from physical science perspective. Moreover, we combine conceptual insights with practical applications which lead to real practical experience of what this inner reality is, and what the human experience is like. Hence, this is where we believe we can offer profound insights in terms of growing ultimate human consciousness.



DEI Group at TSC 2016, Tucson



Sir Roger Penrose at DEI (2013)

For further details, refer to [www.dei.ac.in](http://www.dei.ac.in)





**Alvin J. Clark is Professor Emeritus of Molecular Biology and Genetics** at the University of California, Berkeley. At present he is associated with the laboratory of Professor of Neuroscience Linda Restifo at the McKnight Brain Institutes, University of Arizona. Professor Clark's interest in consciousness studies stems from his exposure to a monistic philosophy that was part of the Shaivism taught and practiced in 10th and 11th century Kashmir. As he understands it, that philosophy asserts that consciousness is the ultimate source of all that is. Professor Clark is therefore curious about the relationship of that ultimate consciousness with the consciousness that he experiences as a human. His main interest at the moment is to understand what influence human genetic diversity has on human consciousness.

**T H A N K Y O U**  
**ALVIN J. CLARK**



# *Special Thanks*

**TO GEORGE MASHOUR, MD**

*Director,  
and the staff  
of the Center for Consciousness Science  
Anesthesiology Department  
Michigan Medicine  
University of Michigan*

**M** CENTER FOR CONSCIOUSNESS SCIENCE  
UNIVERSITY OF MICHIGAN MEDICAL SCHOOL

# The Science of Consciousness

Interlaken, Switzerland

June 25-28, 2019



## Welcome to The Science of Consciousness 2019

The Science of Consciousness (TSC) 2019 is the 23rd annual international interdisciplinary conference on fundamental questions and cutting-edge issues connected with conscious experience. TSC is the largest and longest-running interdisciplinary conference emphasizing conceptual, empirical, cultural and even artistic approaches to the study of consciousness. Key areas include the philosophy of mind, cognitive science, neuroscience, anthropology, biology, physics, computer science and mathematics. Held annually since 1994, the TSC conferences alternate yearly between Tucson, Arizona, and various locations around the world.

TSC conferences continue to bring together various perspectives, orientations, and methodologies within the study of consciousness. These include not only academic subjects within the sciences and humanities, but also contemplative and experiential traditions, culture and the arts. TSC aims to integrate viewpoints and bridge gaps, appreciates constructive controversy, and pursues the spirit of genuine dialogue. The format of the conference includes plenary sessions, pre-conference workshops, concurrent sessions, poster sessions, arts and book exhibits, and social events.

### **Organizers**

Harald Atmanspacher (Collegium Helveticum, ETH and University Zurich)

Stuart Hameroff (Center for Consciousness Studies, University of Arizona at Tucson)

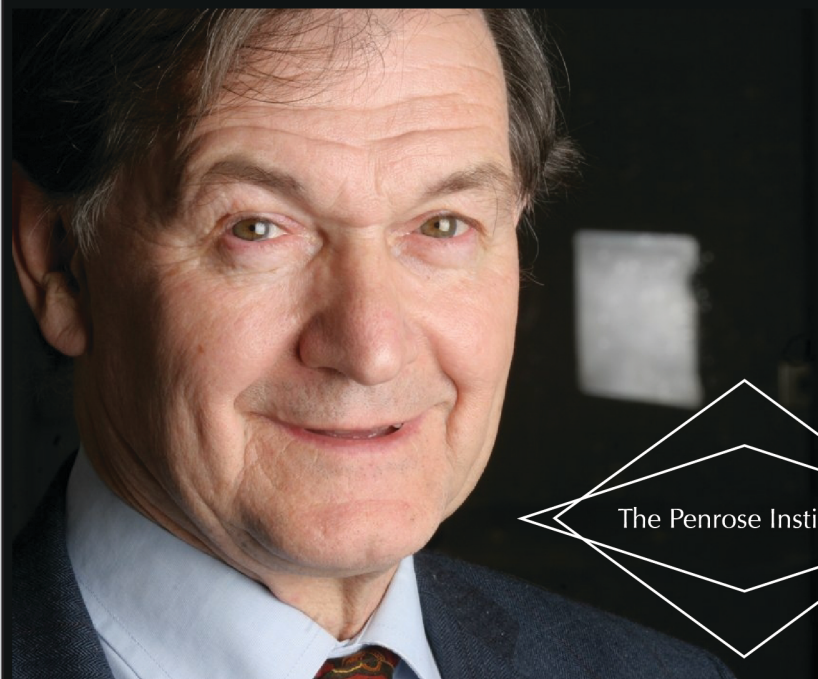
### **Local Organizing Committee**

Harald Atmanspacher (chair)

Norman Sieroka (co-chair)

Gundel Jaeger (conference manager)

# The Penrose Institute



**“To understand the human mind, the cosmos and the laws of physics that govern them, and to spread the wonder of science and mathematics.”**

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**Tucson, Arizona**

**April 1-8, 2018**

**Loews Ventana Canyon Resort**

**See our website for details**

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### Bicentennial Celebration of Founding of **Radhasoami Faith-** **The Ultimate Reality**



Theme  
*Evolution of Dayalbagh  
Radhasoami Satsang Way of Life:  
A New World-Order  
(Economy, Polity and Spirituality)*

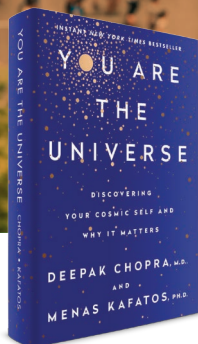
&  
*The Life and Teachings of  
Param Purush Puran Dhanu  
Huzar Soami Ji Maharaj*  
**August 24, 2017**



Organized by  
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