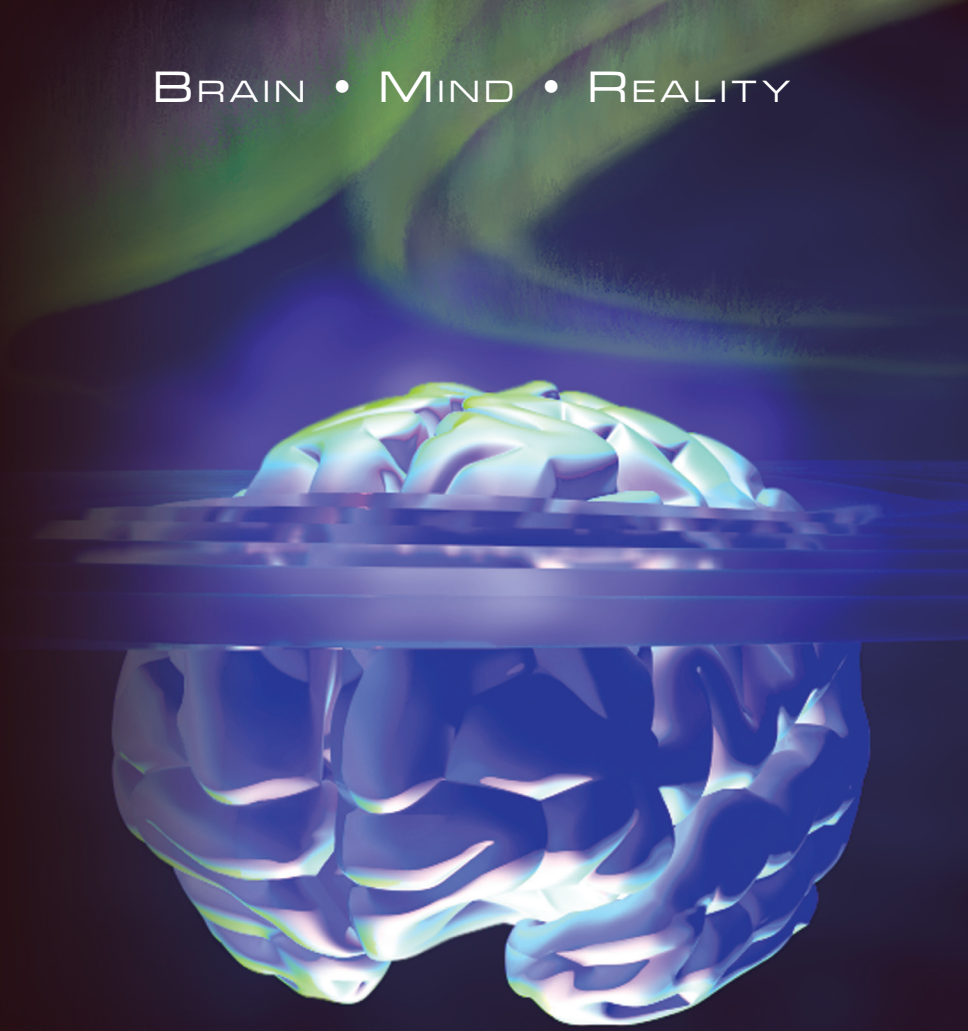
BRAIN • MIND • REALITY



TOWARD A SCIENCE OF CONSCIOUSNESS

STOCKHOLM, SWEDEN · MAY 3-7, 2011 · AULA MAGNA HALL

THE UNIVERSITY OF ARIZONA

Perfjell FOUNDATION

Center for CONSCIOUSNESS STUDIES

Toward a Science of Consciousness

Brain • Mind • Reality

May 3-7, 2011
Stockholm, Sweden
Aula Magna Hall

Sponsored by the

Center for
CONSCIOUSNESS STUDIES
The University of Arizona

Perfjell Foundation
Mind Event, AB

CONTENTS

Welcome 3
Evening Public Forum 6
Evening Features 7
Keynote 8
Program Outline 9
Full Program
- Plenary 13
- Concurrents 15
- Posters 24
- Art-Tech Demo 26

Conference Workshops 27
CCS Taxonomy 28
Abstracts 30
Plenary Biographies 191
Index to Authors 206

Center for
CONSCIOUSNESS
STUDIES

May 3–7, 2011
Stockholm
Sweden

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Toward a Science of Consciousness

Brain • Mind • Reality | May 3-7, 2011
Aula Magna Hall, Stockholm, SWEDEN

Program Committee

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WELCOME

Welcome to 'Toward a Science of Consciousness', the eighteenth annual international, interdisciplinary conference on the fundamental question of how the brain produces conscious experience. Sponsored and organized by the Center for Consciousness Studies at the University of Arizona, this year's conference is supported by the Perfjell Foundation of Sweden and its President, Mr. Christer Perfjell.

Toward a Science of Consciousness (TSC) is the largest and longest-running interdisciplinary conference emphasizing broad and rigorous approaches to the study of conscious awareness. Topical areas include neuroscience, philosophy, psychology, biology, quantum physics, meditation and altered states, machine consciousness, culture and experiential phenomenology. Held annually since 1994, the TSC conferences alternate yearly between Tucson, Arizona and various locations around the world. We are delighted to bring the TSC 2011 to the beautiful city of Stockholm, Sweden and the historic Aula Magna Hall.

The first conference was held in 1994 in Tucson and continues to be held in Tucson in even-numbered years, alternating with TSC conferences in collaboration with groups in various locations around the world: 1995–Ischia, Italy; 1997–Elsinore, Denmark; 1999–Tokyo, Japan; 2001–Skövde, Sweden; 2003–Prague, Czech Republic; 2005–Copenhagen, Denmark; 2007–Budapest, Hungary; 2009–Hong Kong, China; 2011–Stockholm, Sweden.

TSC conferences continue to bring together various fields approaching the issue of consciousness from different perspectives, orientations and methodologies. These include neuroscience, philosophy, medicine, physics, biology, psychology, anthropology, contemplative and experiential traditions, arts, culture, humanities and others. TSC aims to integrate these disciplines, bridge gaps and pursue relevant details without blind alleys. Stockholm and Aula Magna Hall have austere, esteemed and respected scientific traditions on which we hope to build new advances and understanding of this age-old question reflecting on who we are, the nature of existence, and our place in the universe.

As in previous years, we expect hundreds of participants and presenters from 65 countries on 6 continents. Included are: Pre- and Post-Conference Workshops, 14 Plenary or Keynote sessions, 40 Concurrent talk sessions, 2 Poster sessions, 3 Art-Tech Interactive sessions, our traditional Consciousness Poetry Slam/Talent Show, optional Thursday Dinner Boat Cruise Dinner Destination, and the End-of-Consciousness Party.

The TSC Conference, Center for Consciousness Studies and The Perfjell Foundation wish to thank members of the Program Committee, CCS-TSC Assistant Director Abi Behar Montefiore for her conference management and editorial direction, SBS web guru Ed Xia and the team at Arizona Health Sciences Center Biomedical Communications: artwork/illustration David Cantrell, graphic design Roma Krebs, and web development/support Michael Griffith.

We would also like to express our sincere appreciation to Stockholms Universitet Aula Magna facilities, Agneta Hollström, conference liaison. And to Martin Kotte of Big Travel and Kicki Sjöblom of Mind Event AB for all of her work in coordinating the travel and hotel arrangements for our speakers and attendees. Also all printing of materials, managed by Charlotta Mansfeldt at Trydells Tryckeri AB, Laholm, Sweden. And, of course, to all the volunteers at Mind Event AB for providing help and support throughout the conference.

Additional thanks to the Karolinska grad students and post docs and to Valeria Petkova, Karolinska Institutet.

We also thank the University of Arizona, Department of Anesthesiology Business Manager, Jill Gibson and Department Administrator, Tawnya Tretschok and Steven J. Barker, Chair, Department of Anesthesiology, Arizona Health Sciences Center, University of Arizona, College of Medicine. Special thanks also to Dr. Hameroff's colleagues in the UMC surgical operating rooms.

Heartfelt thanks to Nancy Clark for serving as chair of the Art-Tech sessions, and to Maureen Seaberg for organizing the Synesthesia workshop. To all of our artists and exhibitors thank you for sharing your art with all of us.

We wish to thank 2011 Keynote Speaker, Sir Roger Penrose, and featured speakers Luc Montagnier and Deepak Chopra and their staff. Also we express our sincere appreciation to all of the Plenary, Concurrent, Poster and Art-Tech Demo presenters, Workshop facilitators, and Poetry Slam/Talent Show entertainers and all the attendees whose registration fees fund the conference.

To our sponsors, we thank the Fetzer Institute, YeTaDeL Foundation, Deepak Chopra and The Chopra Foundation, The Monroe Institute and Schmid College of Science at Chapman University. Special thanks to Lt. Col. David Sonntag, PhD, Deputy Director, Asian Office Aerospace R&D, Tokyo and the USAF Office of Scientific Research (AFOSR), USAF Asian Office of Aerospace Research and Development (AOARD), USAF European Office Aerospace R&D (EOARD). Additional support provided by the Tibet House, YeTaDeL Foundation, Journal of Cosmology, Elata Foundation, Institute of Noetic Sciences, Journal of Consciousness Studies, Agora for Biosystems, John Benjamins Publishing, Mindville SA, and The Consciousness Chronicles.

Thank you to all participants of the public Evening Forum at Aula Magna Hall. We want to thank our Moderator, Mia-Marie Hammarlin of Lund University and all of our participants, Peter Fenwick, Ignacio Silva, Giorgio Innocenti, Lluis Oviedo, Tarja Kallio-Tamminen, Leonard Mlodinow, Paola Zizzi, Menas Kafatos, Stuart Hameroff, and Deepak Chopra.

Finally, we owe special gratitude to our friend, Swedish businessman, Christer Perfjell whose leadership, vision and perseverance brought TSC 2011 to Stockholm and the celebrated Aula Magna Hall. Thank you for all you have done to make this program a success. Your support, inspiration and encouragement made this dream a reality.

Tack för allt du gjort för att göra detta program till en framgång.
Tack Sverige. Tack Stockholm.

FINDING YOUR WAY AROUND THE CONFERENCE

A full-color map of the Conference site appears on the inside back cover.

AULA MAGNA HALL
Aula Magna Hall, Frescati Campus, Stockholm University

Aula Magna Hall is Stockholm University's main ceremonial space and is home to the Nobel Prize Award Ceremonies for the Nobel Prizes in Physics, Chemistry, Physiology or Medicine, Literature and the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel.

The Aula Magna Hall, designed by British-Swedish renowned architect, Ralph Erskine, offers a beautiful setting for the TSC-2011 conference with spacious foyers, steeply raked seating, beautiful wood and ceiling paneling and is known for its phenomenal acoustics. Meeting rooms at the Aula Magna Main Hall and adjacent buildings (Södra Huset "South House" – Juristernas Hus "Law Students House" – Geovetenskapens Hus "Geo-Science Building") will provide the perfect setting for our Workshops, Concurrents, Art Exhibits, Poster Sessions and informal gatherings.

SESSIONS

Several types of presentation sessions constitute the conference program.

BUILDING AND ROOM LOCATIONS

AM – Aula Magna Hall
SH – Södra Huset (South House)
JH – Juristernas Hus (Law Students House)
GEO – Geovetenskapens Hus (Geo-Science Building)

WORKSHOP LOCATIONS

Sunday, May 1, 2011	Synesthesia	9am-4pm	AM – Bergsmannen
	Neural Correlates	2pm-6pm	AM – Spelbomskan
Monday, May 2, 2011	Deepak Chopra	9am-4pm	AM – Aulan
Saturday, May 7, 2011	Altered States	2pm-6pm	AM – Bergsmannen
	Quantum Biology	2pm-6pm	AM – Aulan
	Binaural Beat	2pm-6pm	GEO – 50-Sal

EVENING PUBLIC FORUM

Science, Consciousness and Spirituality
Aula Magna Hall, Stockholm University
Monday, May 2, 2011, 5pm - 7pm

Scientific accounts of the brain as neuronal computer portray consciousness as epiphenomenal illusion without causal power, free will or spirituality. Subjective reports and spiritual teachings (interconnectedness among living beings, guiding wisdom inherent in the universe, conscious awareness after death) have seemed scientifically impossible, pushing scientists toward atheism or dualism. However in recent decades quantum biology has been considered as a basis for consciousness and spirituality, and end-of-life brain activity defies conventional explanations. Can quantum physics bridge science and spirituality?

Moderator: Mia-Marie Hammarlin
Assistant Professor, Department of Communication and Media, Lund University

PROGRAM

5:00-5:15pm – End-of-Life Conscious Experience
Peter Fenwick
Institute of Psychiatry, Southampton University, Kings College, London

5:15-5:30pm – God and Quantum Mechanics
Ignacio Silva
Theology, Harris Manchester College, University of Oxford

5:30-5:45pm – Quantum Physics and Eastern Philosophy
Tarja Kallio-Tamminen
Physicist, philosopher, author, Helsinki, Finland

5:45-6:00pm – Consciousness and Ultimate Reality
Deepak Chopra
Physician, author, spiritual leader, The Chopra Center, Carlsbad, CA

6:00-6:30pm – Panel/Commentary
Leonard Mlodinow, Physicist, Co-author of "Grand Design" with Stephen Hawking
Lluis Oviedo, Franciscan Theologian, Rome
Paola Zizzi, Astrophysicist, University of Padua
Giorgio Innocenti, Neuroscientist, Karolinska Institutet
Menas Kafatos, Physicist, author, Chapman University
Stuart Hameroff, Physician, Consciousness researcher, The University of Arizona

6:30-7:00pm – General Discussion

Sponsored by: The Center for Consciousness Studies, The University of Arizona, The Chopra Foundation, Perfjell Foundation

WELCOME RECEPTION – Aula Magna Plaza

Tuesday, May 3, 6:30-9pm

Meet outside Aula Magna Hall on the plaza to mingle with food and drinks.

ART-TECHNOLOGY DEMO SESSIONS – Aula Magna Lobby

Tuesday, May 3, 7-10pm | Wednesday, May 4, 7-10pm | Friday, May 6, 7-10pm

More interactive and experiential than concurrent sessions, the Art-Tech demo sessions occur in the evenings, demonstrating art, media, sculpture, and experiential techniques with PowerPoint presentations, body and canvas. Thank you to all the artists: Koei Endo, Ikuyo Endo, Jol Thomson, Ole Hagen, Jack Sneh, Werner Pans, Carrie Firman, Fiammetta Rubin, Jason Padgett and Dave Cantrell *(refreshments will be served)*.

POSTER SESSIONS – Aula Magna Lobby

Wednesday evening, May 4, 7-10pm | Friday, May 6, 7-10pm

Poster presentations will be held over 2 evening sessions. Presenters stand by their material posted on a large poster board as audience circulates *(refreshments will be served)*.

AFTERNOON CONCURRENT TALK SESSIONS

Tuesday, May 3, 4:30-6pm | Wednesday, May 4, 4:30-6pm | Friday, May 5, 4:30-6pm

EVENING CONCURRENT TALK SESSIONS

Wednesday, May 4, 7-10pm | Friday, May 6, 7-10pm

CONFERENCE DINNER – meet at Aula Magna Lobby

Thursday, May 5, 5-10pm | Aquaria Restaurant and Water Museum

Enjoy a boat ride from the Stadshuset, the City Hall of Stockholm, across Lake Mälaren through the locks to the Baltic Sea and the beautiful arcipelage/ archipelago of Stockholm passing the island of Riddarfjärden (a part of Mälaren) to the island of Djurgården and the picturesque Aquaria Restaurant and Water Museum. Enjoy a wonderful meal and light entertainment in the Stockholm tradition *(ticket required)*.

Poetry Slam/Talent Show

Friday, May 6, 10pm to Midnight

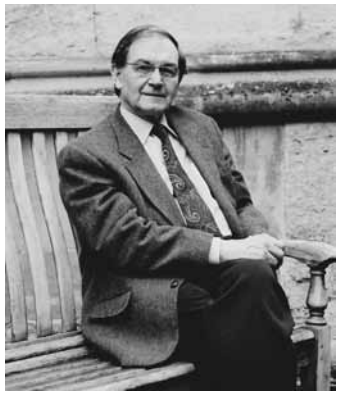
As in previous conferences, a Poetry Slam/Talent show will take place on Friday evening from 10pm to Midnight *(cash bar)*. Conference attendees are invited to perform for a cheering and sometimes jeering audience.

END-OF-CONSCIOUSNESS PARTY – Brain-Berg at the Ice Bar

Saturday night, May 7 (7:30pm - ???)

This is a TSC Conference tradition. The party will start at the famous Nordic Sea Absolut Ice Bar. Enjoy food, drinks, cash bar, and music.

Keynote Speaker | Sir Roger Penrose



Sir Roger Penrose, OM, FRS is Emeritus Rouse Ball Professor at the Mathematical Institute at Oxford, and Emeritus Fellow at Wadham College. He is an historic and world-wide authority on the nature of reality, and renowned for pioneering work in black holes, twistors, spacetime geometry, cosmic censorship, Penrose tilings, quantum gravity and other areas. In 1989 he proposed consciousness as a particular form of quantum state reduction intrinsic to the universe, and later teamed with Stuart Hameroff to formalize the process in brain microtubules. His awards include the 1988 Wolf Prize (shared with Stephen Hawking). He has authored numerous books including *The Road to Reality* and *Shadows of the Mind*. His most recent book, *Cycles of Time* proposes serial universes preceding the Big Bang.

Sir Roger Penrose

Consciousness and Physical Law

Friday May 6, 11:10am to 12:30pm

Aula Magna Hall

Abstract: A profound puzzle of quantum mechanics is that the discontinuous and probabilistic procedure adopted for measurement is in blatant contradiction with the continuous and deterministic unitary evolution of the Schrödinger equation. An inanimate measuring device, being made from quantum particles, ought to follow the unitary laws, so many physicists take the view that consciousness is ultimately needed for measurement. I here express the almost opposite view that the unitary law must be violated for massive enough systems, and that it is consciousness itself that depends upon this violation, requiring new physics and exotic biological structures for its manifestation. The issue of what kind of universe history could provide laws fine-tuned enough for consciousness to arise will also be raised.

Program Outline

Toward a Science of Consciousness
May 3-7, 2011
Frescati Campus, Stockholm University
Aula Magna Hall | Stockholm, Sweden

Tuesday May 3

Registration — Aula Magna Hall

8:30am to 10:40am — **PLENARY 1**
Brain Electromagnetic Fields and Consciousness
David A. McCormick, Yale – Endogenous Electric Fields Guide Cortical Network Activity
Susan Pockett, Auckland – Electromagnetic Field Theory of Consciousness
Johnjoe McFadden, Surrey – The Cemi Field Theory: Gestalt Information and the Meaning of Meaning

10:40am to 11:10am — Break

11:10am to 12:30pm — **PLENARY 2**
Time and Consciousness I
Harald Atmanspacher, Freiberg – Temporal Nonlocality in Bistable Perception
Sara Gonzalez Andino, Geneva – Backward Time Referral in the Amygdala of Primates

12:30pm to 2:00pm — Lunch

2:00pm to 4:10pm — **PLENARY 3**
Consciousness and Reality I
Deepak Chopra, The Chopra Center, Carlsbad – Vedic Approaches to Consciousness and Reality
Leonard Mlodinow, Pasadena – The Grand Design of Our Universe
Paola Zizzi, Padua – Consciousness in the Early Universe

4:30pm to 6:35pm — **Concurrent Sessions 1-8 / Locations**

C1 Representation/HOT	GEO, 50-Sal
C2 Knowledge/Hard Problem	GEO, 40-Sal
C3 Free Will/Libet	GEO, Allamn/Högbomssalne
C4 Synesthesia	AM, Aulan
C5 NCC I	SH, E-10
C6 Medicine I	SH, F-11
C7 Quantum I	GEO, 35-sal
C8 Altered States	AM, Bergsmannen

6:30pm to 9:00pm — **Welcome Reception** – Aula Magna Plaza

7:00pm to 10:00pm — **Art-Tech Exhibits** – Aula Magna Lobby

AM Aula Magna – **JH** Juristernas Hus (Law Student's House) – **SH** Södra Huset (South House) – **GEO** Geovetenskapens Hus (Geo-Science Building)

WEDNESDAY MAY 4

8:30am to 10:40am **PLENARY 4**

Transcranial Therapies

Eric Wassermann, NIH – Transcranial Stimulation and Consciousness
Allan Snyder, Sydney – Accessing Information Normally Beyond Conscious Awareness
W. Jamie Tyler, Virginia Tech – Mechanical Waves and Consciousness

10:40am to 11:10am Break

11:10pm to 12:30pm **PLENARY 5**

Neural Correlates of Consciousness I

Rafael Malach, Weizmann – Local Neuronal Ignitions and the Emergence of Perceptual Awareness
Dietmar Plenz, NIH – Neuronal Avalanches, Coherence Potentials, and Cooperativity

12:30pm to 2:00pm Lunch

2:00pm to 4:10pm **PLENARY 6**

Consciousness and Reality II

Menas Kafatos, Chapman – Consciousness and The Universe
Tarja Kallio-Tamminen, Helsinki – Quantum Physics and Eastern Philosophy
Paavo Pylkkanen, Helsinki – Bohmian View of Consciousness and Reality

4:30pm to 6:35pm **Concurrent Sessions 9-16 / Locations**

C9 Phenomenology/Content	SH, C-6
C10 Panpsychism	SH, B-5
C11 Time	SH, E-10
C12 NCC I	SH, D-8
C13 Medicine II	JH, Reinholdsalen
C14 Quantum II	SH, F-11
C15 Religion	AM, Bergsmannen
C16 Experiential I	AM, Aulan

6:35pm to 10:00pm **Poster Session** – Aula Magna Lobby

6:35pm to 10:00pm **Art-Tech Exhibit** – Aula Magna Lobby

7:00pm to 10:00pm **Concurrent Sessions 17-24 / Locations**

C17 Language/Reporting	SH, C-6
C18 AI/Computationalism	AM, Aulan
C19 TBA	SH, B-5
C20 Microtubules I	JH, Reinholdsalen
C21 Altered States II	AM, Bergsmannen
C22 Integrative Models I	SH, F-11
C23 Experiential II	SH, D-8
C24 Eastern Approaches I	SH, E-10

THURSDAY, MAY 5

8:30am to 10:40 am **PLENARY 7**

Varieties of Religious Experience

Mario Beauregard, Montreal – Neuroscience of Transcendent Experiences
Alexander Moreira-Almeida, Juiz De Fora – Spiritual Experiences and Mental Disorders
Padr. Paulo Roberto, Rio de Janeiro – Sacred Plants of Amazonia

10:40am to 11:10am Break

11:10am to 12:30pm **PLENARY 8**

Time and Consciousness II

Dick Bierman, Amsterdam – Presentiment
Moran Cerf, NYU – Time Effects in Human Cortical Neuronal Firings

12:30pm to 2:00pm Lunch

2:00pm to 4:10pm **PLENARY 9**

Quantum Biology

Luc Montagnier, Nobel Laureate, Paris – DNA, Waves and Water
Giuseppe Vitiello, Salerno – DNA: On the Wave of Coherence
Gustav Bernroider/Johann Summhammer, Salzburg – Quantum Properties in Ion Channel Proteins

5:00pm **CONFERENCE DINNER CRUISE**
Dinner participants meet at the Registration Desk in the AM lobby
(optional event, ticket required)

FRIDAY, May 6

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

Microtubules

Jack Tuszynski, University of Alberta – Information Processing Within Dendritic Cytoskeleton
Anirban Bandyopadhyay, NIMS – Quantum States in Microtubules and Topological Invariance
Rudolph E. Tanzi, Harvard University – "The Amyloid Trap" Hypothesis of Alzheimer's Disease

10:40am to 11:10am Break

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

Keynote – Sir Roger Penrose, Oxford
Consciousness and Physical Law

12:30pm to 2:00pm Lunch

2:00pm to 4:10pm PLENARY 12

Neural Correlates of Consciousness II

Germund Hesslow, Lund – The Inner World As Simulated Interaction With The Environment
Henrik Ehrsson, Karolinska – How We Come To Experience That We Own Our Body
Fredrik Ullén, Karolinska – The Psychological Flow Experience

4:30pm to 6:35pm **Concurrent Sessions 25-32 / Locations**
C25 Materialism/Physicalism SH, E-10
C26 Self/Identity SH, D-8
C27 NCC III AM, Bergsmannen
C28 Body Consciousness AM, Aulan
C29 Biology/Microtubules II SH, C-6
C30 Experiential III SH, B-5
C31 PSI/Altered States III JH, Reinholdsalen
C32 Eastern Approaches II SH, F-11

6:35pm to 10:00pm **Poster Session** | Aula Magna Lobby

6:35pm to 10:00pm **Art-Tech Exhibit** | Aula Magna Lobby

7:00pm to 10:00pm **Concurrent Sessions 33-40 / Locations**
C33 Medicine III SH, E-10
C34 Embodiment SH, F-11
C35 Integrative Models SH, B-5
C36 Experiential IV AM, Aulan
C37 Ontology/Panpsychism SH, D-8
C38 Mental Imagery AM, Bergsmannen
C39 Physics/Integr Models II SH, C-6
C40 Language II/Integr Models JH, Reinholdsalen

10:00pm to midnight **Poetry Slam/Talent Show**

SATURDAY, MAY 7

8:30am to 10:40am **PLENARY 13**
Anesthesia and Consciousness
Anthony Hudetz, Milwaukee – Anesthetics and Gamma Synchrony
Nicholas Franks, London – Molecular Actions of Anesthetics
Stuart Hameroff, UMC Arizona – Meyer-Overton Meets Quantum Physics

11:10am to 12:30pm **PLENARY 14**
End-of-Life Brain Activity
Lakhmir S. Chawla, GWU – Surges of Electroencephalogram Activity at the Time of Death.
Peter Fenwick, London – Death and the Loosening of Consciousness

2:00pm to 6:00pm **Optional Workshops**

7:30pm to ??? **End-of-Consciousness Party**
Brain-Berg at the Ice Bar
Nordic Sea Hotel Absolut Ice Bar

Index to Plenary Sessions

PL 1 – PL 14
AM Aulan | Aula Magna Hall

PLENARY SESSIONS

Tuesday-Saturday, May 3-7
(PL 1-3 Tues. – PL 4-6 Wed. – PL 7-9 Thurs. – PL 10-12 Fri. – PL 13-14 Sat.)

All Plenary Sessions will be held in the historic Aula Magna Hall. Fourteen plenary and keynote sessions will be presented to the entire conference audience.

PL 1 BRAIN ELECTROMAGNETIC FIELDS AND CONSCIOUSNESS
David McCormick, Endogenous Electric Fields Guide Cortical Network Activity **[111]**
Sue Pockett, Electromagnetic Field Theory of Consciousness: The Shape of Conscious Fields **[224]**
Johnjoe McFadden, The Cemi Field Theory: Gestalt Information and the Meaning of Meaning **[64]**

PL 2 TIME AND CONSCIOUSNESS I
Harald Atmanspacher, Temporal Nonlocality in Bistable Perception **[189]**
Sara Gonzalez Andino, Backward Time Referral in the Amygdala of Primates **[98]**

PL 3 CONSCIOUSNESS AND REALITY I
Deepak Chopra, MD, Vedic Approaches to Consciousness and Reality **[204]**
Leonard Mlodinow, The Grand Design of our Universe **[205]**
Paola Zizzi, Consciousness in the Early Universe **[203]**

PL 4 TRANSCRANIAL THERAPIES
Eric Wassermann, Transcranial Stimulation and Consciousness **[226]**
Allan Snyder, Accessing Information Normally Beyond Conscious Awareness by Non-Invasive Brain Stimulation: Opening the Doors to Perception and Memory? **[170]**
William Tyler, Mechanical Waves and Consciousness **[136]**

PL 5 NEURAL CORRELATES OF CONSCIOUSNESS I
Rafael Malach, Local Neuronal Ignitions and the Emergence of Perceptual Awareness **[110]**
Dietmar Plenz, Neuronal Avalanches, Coherence Potentials, and Cooperativity: Dynamical Aspects that Define Mammalian Cortex **[113]**

PL 6 CONSCIOUSNESS AND REALITY II
Menas Kafatos, Consciousness and the Universe: Non-Local, Entangled, Probabilistic and Complementary Reality **[210]**
Tarja Kallio Tamminen, Quantum Physics and Eastern Philosophy **[197]**
Paavo Pylkkanen, Bohmian View of Consciousness and Reality **[41]**

AM Aula Magna – **JH** Juristernas Hus (Law Student's House) – **SH** Södra Huset (South House) – **GEO** Geovetenskapens Hus (Geo-Science Building)

PL 7 VARIETIES OF RELIGIOUS EXPERIENCE
Mario Beauregard, Neuroscience of Transcendent Experiences **[100]**
Alexander Moreira-Almeida, Differential Diagnosis Between Spiritual Experiences and Mental Disorders **[264]**
Padrinho Paulo Roberto, Sacramental Plants of Amazonia: Consciousness Expansion, Self Knowledge and Religious Experience **[241]**

PL 8 TIME AND CONSCIOUSNESS II
Dick Bierman, Presentiment **[273]**
Moran Cerf, Time Effects in Human Cortical Neuronal Firings **[101]**

PL 9 QUANTUM BIOLOGY
Luc Montagnier, DNA, Waves and Water **[135]**
Giuseppe Vitiello, DNA: on the Wave of Coherence **[202]**
Gustav Bernroider/Johann Summhammer, Quantum Properties in Ion Channel Proteins and their Effect on Neural Signal Segregation and Perception **[193]**

PL 10 MICROTUBULES
Jack A. Tuszynski, Information Processing within a Neuron via Electrodynamic Signaling by the Dendritic Cytoskeleton **[225]**
Anirban Bandyopadhyay, Direct Experimental Evidence for the Quantum States in Microtubules and Topological Invariance **[191]**
Rudolph E. Tanzi, "The Amyloid Trap" – Hypothesis of Alzheimer's disease **[125]**

PL 11 KEYNOTE
Sir Roger Penrose, Consciousness and Physical Law **[201]**

PL 12 NEURAL CORRELATES OF CONSCIOUSNESS II
Germund Hesslow, The Inner World as Simulated Interaction with the Environment **[105]**
H. Henrik Ehrsson, How We Come to Experience that We Own Our Body: The Cognitive Neuroscience of Body Self-Perception **[121]**
Fredrik Ullén, The Psychological Flow Experience: From Phenomenology to Biological Correlates **[185]**

PL 13 ANESTHESIA AND CONSCIOUSNESS
Anthony Hudetz, Anesthetics and Gamma Synchrony **[132]**
Nicholas Franks, Molecular and Neuronal Mechanisms of General Anesthesia **[130]**
Stuart Hameroff, Meyer-Overton Meets Quantum Physics: Consciousness, Memory and Anesthetic Binding in Tubulin Hydrophobic Channels **[131]**

PL 14 END-OF-LIFE BRAIN ACTIVITY
Lakhmir S. Chawla, Surges of Electroencephalogram Activity at the Time of Death: A Case Series **[128]**
Peter Fenwick, Death and the Loosening of Consciousness **[274]**

Index to Concurrent Sessions

C 1 – C 40

Afternoon Concurrent Sessions – 4:30pm to 6:35pm
Tuesday, May 3 | Wednesday, May 4 | Friday, May 6

Evening Concurrent Sessions – 7:00pm to 10:00pm
Wednesday, May 4 | Friday, May 6

Concurrent talks are 20 minutes each, with 5 minutes for questions. There are 5-6 speakers per session, covering focused areas of the same theme. LCD projectors and lap tops available. There is additional time at the end of each track for general discussion. The following list consists of the Section Number, Session Name, Order of Speakers, Corresponding Abstract Index Number and the Building/Room Location.

C 1 Representation/HOT **GEO, 50-Sal**
Geovetenskapens Hus, Geo-Science Building
Jordan Pop-Jordanov, Brain electric field and consciousness level **[114]**
Mette Kristine Hansen, Do higher-level properties influence the phenomenal character of visual experiences? **[93]**
George Seli, The utility of perceptual consciousness on higher-order theory **[58]**
Sean Allen-Hermanson, A critique of pure representation **[91]**
Andrea Borsato, A counterexample for weak representationalism **[246]**

C 2 Knowledge/Hard Problem **GEO, 40-Sal**
Geovetenskapens Hus, Geo-Science Building
Noel Boyle, Jackson's dual stipulation: The incoherence of the description of Mary **[49]**
Shigeki Sugiyama, Between knowledge and consciousness (II) **[20]**
José M. Matías, The Meta-structure of knowledge: Object, meaning, reference and the explanatory gap **[72]**
Ståle Gundersen, Epistemic pessimism and the mind-body problem **[61]**
Krzysztof Swiatek, The problem of content and self-knowledge of one's mental states **[76]**

C 3 Free Will/Libet **GEO, Allamn/Högbomssalne**
Geovetenskapens Hus, Geo-Science Building
Eva-Maria Leicht, Free Will: A question of personality and self-involvement? Hints from interindividual differences in the lateralized readiness potential **[89]**
Michael Franklin, Using retrocausal practice effects to predict random binary events in an applied setting **[275]**
Andrew Westcombe, Decisions, Decisions **[90]**
Anastasia Karpukhina, Generalization in human thinking **[56]**
Stephen Whitmarsh, Meditation, mindfulness, visualization and retroactive recall **[256]**

AM Aula Magna – **JH** Juristernas Hus (Law Student's House) – **SH** Södra Huset (South House) – **GEO** Geovetenskapens Hus (Geo-Science Building)

C 4 Synesthesia — AM, Aulan
Aula Magna Hall

Maureen Seaberg, Reading synesthesia between the lines **[272]**
Patricia Lynne Duffy, The landscapes of synesthesia (filling out the definition of synesthesia--it's more than just color) **[155]**
Michael Sollberger, Synaesthesia and the structural approach to perceptual content **[95]**
Alexandra Kirschner, Synesthesia and singing: a challenge **[287]**
Berit Brogaard/ Jason Padgett, The superhuman mind: From synesthesia to savant syndrome/ Geometric Synesthesia **[126] [176]**

C 5 NCC I — SH, E-10
Södra Huset, South House

Hans Liljenstrom, Consciousness and mesoscopic brain dynamics **[108]**
Shawn Hayley, Neural correlates of massage therapy in healthy adults: Role of the default mode network **[127]**
Frederick Travis, Quantum effects, brain functioning, consciousness, and meditation practice **[99]**
Zoran Josipovic, Default to nonduality **[106]**
Juliana Yordanova, Increased Alpha (8-12 Hz) activity during slow-wave sleep as a marker for the transition from implicit knowledge to explicit insight **[116]**

C 6 Medicine I — SH, F-11
Södra Huset, South House

Heather A. Berlin, Implicit self-esteem in borderline personality and depersonalization disorder **[165]**
Ovidiu Brazdau, Validation studies of the Consciousness Quotient Inventory (CQI) **[149]**
Leanna J. Standish, Using fMRI to evaluate the non-local, 'entangled' mind hypothesis: The effects of distant Qi Gong on blood flow in gliomas and healthy human brains **[242]**
Ahmed Abdel-Khalek, Mental health in the East and West: Four Arab countries and the USA **[158]**
Orlando Castejón, Synaptic plasticity and synaptic degeneration in unconscious patients with severe traumatic brain injuries. A transmission electron microscopic study using cortical biopsies. **[134]**

C 7 Quantum I — GEO, 35-Sal
Geovetenskapens Hus, Geo-Science Building

Andrei Khrennikov, Quantum-like open system dynamics and the process of decision making in Prisoner's Dilemma games **[139]**
Athanassios Nassikas, Theorem required for a minimum contradictions theory of consciousness **[222]**
Franz Klaus Jansen, Quantum mechanics A model for consciousness also showing uncertainty, superposition and timelessness **[196]**
Takaaki Musha, Possibility of quantum computation in the brain from the standpoint of superluminal particles **[199]**
Marta Sananes, Superluminality as possible explanation of quantum non-locality **[212]**
Muniyappan Annamalai, Localized wave modes in tubulin lattices **[219]**

C 8 Altered States I — AM, Bergsmannen
Aula Magna Hall

Pim van Lommel, Nonlocal consciousness: a concept on the continuity of our consciousness **[259A]**
Adrian Parker, Zombies do not have psychedelic trips **[14]**
Paul Evans, Singularity, entrainment and consciousness enhancement **[54]**
Shawn Tassone, Medical materialism, shamanic healing and the allopathic paradigm **[51]**
Klaus Alberto, Research on mediumistic experiences and the mind-brain relationship **[47]**

C 9 Phenomenology/Content — SH, C-6
Södra Huset, South House

Ivan M. Havel, Counting and human number sense **[157]**
Peter Sjöstedt Hughes, Schopenhauer and the philosophy of mind **[42]**
Tobias Schlicht, Phenomenal unity and the science of consciousness **[19]**
Joel Parthemore, The limits of concepts and conceptual abilities **[15]**
Roma Hernández, Empathizing with the unconscious: A point of relevance of phenomenology for the cognitive sciences **[247]**

C 10 Panpsychism — SH, B-5
Södra Huset, South House

Peter Ells, Introducing an idealist conception of panpsychism **[27]**
Igor Nevvazhay, Dual nature of consciousness **[38]**
Tom McClelland, Science, consciousness and the Russellian speculation **[37]**
Neil Theise, Sentience everywhere: Complexity and evolutionary emergence of sentient activity across all scales of existence **[217]**

C 11 Time — SH, E-10
Södra Huset, South House

Olga Maksakova, Chronotop consciousness versus time consciousness: Kinetographic approach **[180]**
Jürgen Kornmeier, EEG correlates of stable and unstable mental object representations **[117]**
Sharon Avital, Language, time, and subjectivity: lessons learned from rhetorical analysis of religious experiences **[78]**
Francis Steen, A testable model for quantum effects in cognitive framing **[182]**
Mario Martinez Saito, Functional mechanisms underlying the perception of subjective time flow **[181]**

C 12 NCC II — SH, D-8
Södra Huset, South House

Johan Eriksson, On the complexity of consciousness: An fMRI study of the intersection between auditory conscious perception, working memory content, and task difficulty **[102]**
Andrew Fingelkurts, Operational architectonics of consciousness: EEG study in patients with severely injured brain **[103]**
John Russell Hebert, Alpha EEG In-phase standing wave: Evidence for a quantum source of consciousness **[138]**
Maie Bachmann, Effect of low-level electromagnetic field on the balance of the EEG rhythms **[146]**
Hee-Sup Shin, Involvement of the mediodorsal thalamus in control of arousal and cognition in the mouse **[145]**

C 13 Medicine II — JH, Reinholdsalen
Juristernas Hus

Ross Grumet, Mindfulness versus medication in treating ADHD and a related hypothesis that the brain does not produce conscious mental experience **[239]**
Amna Alfaki, Cardiac neurons firing precedes cortical neurons firing by variable time equivalent to RP or Libet`s Latency Period in goal directed behavior or action in conscious state **[97]**
Paola Brugnoli, The techniques of clinical hypnosis and 'altered states of consciousness' in pain and suffering relief, at the end of life **[257]**
Csaba Szabo, Changes of subjective experiences during voluntary hyperventilation: An experimental study of the holotropic breathing **[269]**
Lars-Eric Uneståhl, Systematical and long-term training of alternative states of consciousness for excellence in sport and life **[258]**

C 14 Quantum II — SH, F-11
Södra Huset, South House

Gerard Blommestijn, Quantum reduction connects subjective I with the world of objective matter **[194]**
Matti Bergstrom, The statistical dispersion of particles in quantum physics is an error **[192]**
Casey Blood, Quantum mechanics and the origin of consciousness **[195]**
David Longinotti, Qualia as a biological form of energy **[52]**
Shantilal Goradia, Considerations concerning the overall unification **[221]**

C 15 Religion — AM, Bergsmannen
Aula Magna Hall

Lluis Oviedo, Religion As Conscious Behavior **[289]**
Antoon Geels, Altering consciousness in religion **[288]**
Jon Cape, Naked Emperor **[300]**
Heather Christ, A correlation analysis of transformational leadership and spiritual intelligence **[183]**
Janette Simmonds, Spirituality and the mind space of the psychotherapist **[270]**

C 16 Experiential I — AM, Aulan
Aula Magna Hall

Robert Pepperell, Art and externalism: How artists understand the relationship between themselves and the world **[285]**
Koei Endo, The 90 degree topological transformation with Ikosolid – The unifying revolution to the foundations on quantum mechanics **[137]**
John Jupe, The experiential field: A novel approach to representing perceptual experience **[153]**
Guy J Ale, It is in our DNA to sense how long we can live **[231]**
Sukhdev Roy, Higher levels of consciousness beyond Vedas and their attainment in religion of Saints and Radhasoami faith **[245]**
Sergey Kuprijanov, The Holoscendence Method for psychotherapy and for advancing personal and spiritual growth **[211]**

C 17 Language / Reporting — SH, C-6
Södra Huset, South House

Sergio Basbaum, Performing towards sense: The perception-language loop **[92]**
Christina Behme, The emergence of linguistic consciousness **[159]**
James Moir, Language, Consciousness and performative action **[94]**
Jon Goodbun, Rheomode and aesthetics: Towards an ecological cybernetics of mind **[282]**
Maxim Stamenov, Lies, theory of mind, and the structure of consciousness **[161]**
David Gamez, Reporting conscious states: A neuro-phenomenological analysis **[104]**

C 18 AI/Computationalism — AM, Aulan
Aula Magna Hall

Hartmut Neven, Learning with quantum annealing in the presence of incorrectly labeled training examples **[200]**
J.F. Nystrom, On some theoretical problems with brain emulation **[39]**
Anders Tunevi, Learning how an object functions by experimentation **[175]**
Peter Breznay, Artificial consciousness: A computational approach to understanding consciousness **[215]**
Victor Argonov, Is machine able to speak about consciousness? Rigorous approach to mind-body problem and strong AI **[55]**

C 20 Microtubules I — JH, Reinholdsalen
Juristernas Hus

Giuseppe Vitiello, To-be-in-the-world: The action-perception cycle and the dissipative many-body model of brain **[143]**
Travis Craddock, Volatile anesthetic interactions with tubulin and coherent energy transfer **[129]**
Jesper Ronager, Data flow and functional design of the brain. A model based on the assumption that electrons exist in a quantum state located to the lumen of tubular proteins of the cytoskeleton. **[141]**
Massimo Pregnolato, Altered states of consciousness. Molecular hypothesis and experimental approach from membrane to quantum cytoskeleton nanowire network **[16]**
James Beran, Microtubules in yet another role? Transient cytoskeletal electrical currents and change in conscious experience **[133]**
Vahid Salari, Investigation of biophotons emissions, microtubule activity and action potentials in the human brain **[142]**

C 21 Altered States II — AM, Bergsmannen
Aula Magna Hall

Luis Eduardo Luna, Know Thyself. Ayahuasca as a tool for self-knowledge, creativity and the study of consciousness **[263]**
Kersti Wistrand, New altered states of consciousness (ASC) at childbirth **[265]**
E**tzel Cardena**, Altering consciousness: Setting up the stage **[259]**
Dimitri Spivak, Religiosity and alterations of consciousness related to aging and longevity, and their genetic correlates **[179]**
Reginald Humphreys, Consciousness magic: Quantum entrainment of the autonomic nervous system **[262]**
Brigitta Zics, The concept of cognitive feedback loop: Applying eye tracking and affective visualisation for new states of consciousness **[266]**

C 22 Integrative Models I — SH, F-11
Södra Huset, South House

Søren Brier, C. S. Peirce's phenomenologically triadic semiotic theory of science and religion as non-fundamentalistic inquiries of thirdness and firstness **[24]**
Milena Sotirova-Kohli, Psyche as a complex adaptive system: Analytical (Jungian) psychology and complexity theory **[171]**
Ashley Willis, Feeling through the field: How understanding acts of perception may help constrain the properties of the conscious field **[115]**
Julia Shaw, Emergent consciousness from self-organized dimensions of meaning through intercoordination of perspectives **[87]**
Piero Benazzo, Empirical virtuality and transcendental consciousness: A paradigm about two approaches to life **[208]**
Taras Handziy, Consciousness: New paradigm in philosophy **[233]**

C 23 Experiential II — SH, D-8
Södra Huset, South House

Hasmukh Taylor, How consciousness forms the quantum hologram **[43]**
Lothar Schäfer, Can trans-material and trans-empirical theories of consciousness be scientific? **[18]**
Amalia Tsakiri, Artificial "Consciousness Wells" – An approach of autopoietic exegesis on fabricating and sustaining prescribed "Weltanschauungen" in closed groupings **[292]**
Dirk Proeckl, Hypnagogic light experience **[17]**
Yulia Ustinova, Altered states of consciousness and mystery cults in Ancient Greece **[291]**
Mary Lee-Woolf, Dreams, visions and mystical revelations: The mechanics of imagination **[118]**

C 24 Eastern Approaches I — SH, E-10
Södra Huset, South House

Henk De Weijer, Consciousness and energy in an evolving universe **[8]**
Marek Bronislaw Majorek, Consciousness: Expanding horizons **[35]**
Dhanjoo N Ghista, Consciousness and cosmology: Unified theory of consciousness, matter and mind **[10]**
William Bushell, The universe in an atom: Quantum/fractal self-similarity in yoga, perception, and cosmology **[252]**
Ole Hagen, Towards an ontology of immanence and introspection: An Indo-tibetan Buddhist response to the post-phenomenological critique of introspection in continental thought **[30]**
Abdellatif Abujudeh, What it's like to be 'Abdu'- Ed.(1) **[244]**
Shyamala Mruthinti, Sense-trapped mind can cause various mind-related diseases, while sense-released mind charged with infinite consciousness can cure all ailments of body and mind **[112]**

C 25 Materialism/Physicalism — SH, E-10
Södra Huset, South House

Saulo Araujo, Materialism's eternal return: Recurrent patterns of materialistic explanations of consciousness and other mental phenomena **[48]**
Jan Pilotti, What can a brain really do? Mind-body question is either undecidable or materialism is false. Solving the problem of consciousness by transforming the hard problems to easy ones **[62]**
Carissa Veliz, Can physicalism explain consciousness? **[63]**
Laurentiu Staicu, How can we reality-check our concept of "reality"? **[2]**
Reinaldo Bernal, Materialism and the subjectivity of experience **[1]**

C 26 Self/Identity — SH, D-8
Södra Huset, South House

Manos Tsakiris, The other in me: Interpersonal multisensory stimulation changes the representation of one's identity **[88]**
Yao Wen Hsieh, Are schizophrenic experiences exceptions to the Shoemaker's principle of immunity to error through misidentification? **[82]**
Marie-Christine Nizzi, The feeling of personal identity in the locked-in syndrome is deeply rooted in the body representation **[85]**
Ling-Fang Kuo, Is personal identity the wrong question to ask? **[83]**
Hui-Ming Chin, Does self reference require the capacity of using the first-person pronoun 'I'? **[7]**

C 27 NCC III — AM, Bergsmannen
Aula Magna Hall

Giorgio Ascoli, Gated Learning: Much ado about background information **[124]**
David Silverstein, Is attentional blink a byproduct of neocortical attractors? **[152]**
Artin Arshamian, Olfactory Imagery – Sniffs, Dreams and Memories **[162]**
Yoshi Tamori, A neural correlates of creativity: MEG study for Japanese-syllogistic-riddle (JSR) solving tasks **[184]**
Alexis Mourenza, Potentialities and the Indeterminacy of Nonhuman Animal Minds **[65]**

C 28 Body Consciousness — AM, Aulan
Aula Magna Hall

Valeria Petkova, Do I need a body to know who I am? Perceptual and neural correlates of body ownership **[123]**
Tom Froese, Enacting the body? Use of distal-to-tactile sensory substitution interface does not lead to extension of body image **[156]**
Arvid Guterstam, The illusion of owning a third arm **[147]**
Leanne Whitney, Beyond conception: The pivotal role of the deep feminine in the awakening of consciousness **[150]**
Ted Lougheed, The effects of attentional load on self-consciousness **[84]**

C 29 Biology/Microtubules II — SH, C-6
Södra Huset, South House

Jiří Pokorný, Collective electrodynamic field in the brain **[140]**
Slobodan Zdravkovic, A Torsional model in nonlinear dynamics of microtubules **[220]**
Konstantin Korotkov, Non-local consciousness influence to physical sensors: Experimental data **[57]**
Hunter Adams, III, Shadows of thought: Soliton brain dynamics and consciousness **[218]**
Emil Annabi, Transcranial ultrasound (TUS) effects on chronic pain and mood: A double blind crossover study **[237]**

C 30 Experiential III — SH, B-5
Södra Huset, South House

Ana Leonor Rodrigues, What I draw I know **[249]**
Donivan Bessinger, Verse, Universe **[280]**
Alexander Jon Graur, A Chalmerian poem: Translating David Chalmers' The Extended Mind Revisited into music **[160]**
Fiammetta Rubin, The art of conscious tunneling through the microtubules of the mind **[168]**
Keisuke Suzuki, Substituting "here and now" – Using virtual reality technology **[172]**

C 31 PSI/Altered States III — JH, Reinholdsalen
Juristernas Hus

Marcelo Mercante, Ayahuasca, spontaneous mental imagery, and the treatment of drug addiction and alcoholism in Brazil and Peru **[295]**
Imants Barušs, Apparent anomalous effects of intention on physical manifestation: Experiments in remote healing using techniques derived from matrix energetics **[271]**
Melvin Morse, A triple blind study of remote viewing a virus in tomato plants **[240]**
Eugene Pustoshkin, Online networking as a way to catalyze and coordinate a transdisciplinary community of scientists studying altered states of consciousness **[277]**
Shoichiro Komaki, Consciousness Causes Real Magnetic Fields **[223]**

C 32 Eastern Approaches II — SH, F-11
Södra Huset, South House

Richard Koenig, Towards a better understanding of 'consciousness': An analytical approach to the most prominent positions within the philosophy of mind **[70]**
Madeea Axinciuc, Hierarchies of consciousness and the principle of unity: Is there ultimate reality? **[4]**
Gary Weber, Living without conscious thought; What happened and how functioning is affected **[255]**
Puran Bair, Five stages of mystical consciousness in two dimensions **[251]**
Chandraprakash Trivedi, Vedic science: The origin and evolution of consciousness **[235]**

C 33 Medicine III — SH, E-10
Södra Huset, South House

Walter Osika, The Swedish Association for Contemplation in Education and Research: A collaboration with researchers from various faculties using meditation as contemplative inquiry on research questions **[253]**
Daniel Beal, Human microbiota and consciousness **[227]**
Nancy Clark, Demystifying energy healing **[238]**
Alice Kyburg, Action and perception in pain experience **[96]**
Rebecca Semmens-Wheeler, Alcohol increases hypnotic susceptibility **[169]**

C 34 Embodiment — SH, F-11
Södra Huset, South House

Feifei Zhou, From 'feel' to 'feeling': The enactive approach reconsidered **[250]**
Shanti Ganesh, The oscillatory nature of embodied cognition **[174]**
Sara Vollmer, A model of the evolution of morality, on the basis of neo-classical models figuring trustworthiness toward unknown others, in which open cooperation in learning is the basis for increased fitness [296]
Joel Krueger, Empathy, behaviorism, and the perception of other minds **[248]**
Zoltan Veres, (Re)presentational potential and consciousness **[22]**
Hao Pang, Does proprioception constitute self? **[86]**

C 35 Integrative Models — SH, B-5
Södra Huset, South House

William H Kautz, Science's future role in resolving the mysteries of consciousness **[69]**
George Hathaway, SETI by telepathy **[276]**
Donald Poochigian, On the nature of scientific mind **[74]**
Basim Alahmadi, New Lamps for academic courses in Saudi Arabia: Realism and consciousness of implementing culture-core materials **[278]**
Vlljo Martikainen, Consciousness as concept based and dynamic mental state **[13]**

C 36 Experiential IV — AM, Aulan
Aula Magna Hall

Daniel Meyer-Dinkgrafe, Ethical implications of theatre practice from a consciousness studies perspective **[283]**
Jennifer Kanary Nikolov(a), Hallucinations, An existential crisis? **[187]**
Georg Franck, What kind of being is mental presence? On the ontology of consciousness **[28]**
Martin Curtis, Rehearsing Chekhov: Rehearsal techniques informed by wider reading of neuroscience; cognitive exercises **[297]**
Naama Kostiner, Hemisphere – Discovering the benefits of consciousness expansion **[177]**

C 37 Ontology/Panpsychism — SH, D-8
Södra Huset, South House

Uziel Awret, On quantum mechanics and panpsychism **[190]**
Alexander J. Buck, Panpsychism reloaded: The concept of the self **[80]**
Alexander Georg Mirnig, Towards a better understanding of 'consciousness': An analytical approach to the most prominent positions within the philosophy of mind **[73]**
Kathrine Elizabeth Anker, Consciousness – A Multi-scaled Flux of Communication **[279]**
Nildson Alvares Muniz, The fabric of the relativistic cosmos=new interdisciplinary perspectives on relative space-time and the texture of Einstein's Relativistic Cosmology **[293]**
Jaison Manjaly, Panpsychism and the evolution of experience **[36]**

C 38 Mental Imagery — AM, Bergsmannen
Aula Magna Hall

Sara Bizarro, Mental imagery and the method of loci **[163]**
Bruce Katz, What makes blue blue? **[107]**
Charles Whitehead, Mind wandering, happiness, and human spirituality **[164]**
Jack Sneh, Gazing into infinity: An eight-year observational and photographic study of wave patterns, light transmission, fractals, and evolving consciousness **[286]**
Carrie Firman, Multimedia synesthetic art: Creativity as research **[281]**
Natalie Geld, Activating mastery by demonstrating the resonance of consciousness science to life. Building global community to synthesize past, present & developing science in consciousness studies **[299]**

C 39 Physics/Integrative Models II — SH, C-6
Södra Huset, South House

Robert E. Haraldsen, How consciousness creates matter, relativity, quantum mechanics and self similarity: The oscillating universe of consciousness **[31]**
Thomas Droulez, Conscious perception, reality and the nature of space: Indirect realism and the relation between phenomenal space, neurophysiological space and physical reality **[60]**
Mohammad Reza Raeisi, In Iranian myths time has historical and vague meaning: Avesta (Iranian Holy Book) said more time about the special God, his name is Zarvan **[207]**
Wolfgang Baer, Operations in the first person perspective **[59]**
Marcus Abundis, Beyond cosmology, consciousness, and the "quantum" – Toward general information theory & spontaneous creative systems **[3]**
Colin Morrison, Psi-psychism: The most likely explanation of consciousness and quantum phenomena **[198]**

C 40 Language II / Integrative Models — JH, Reinholdsalen
Juristernas Hus

Wolfgang Hebel, Functional physics of life; functional physics of biomolecular self-organization **[228]**
Peter Burton, Cognitive system theory: Mapping the structural relationship between conscious experience and cognitive processing in human cognition **[25]**
Kay Thomas, Australian indigenous people's dreaming consciousness **[45]**
Julia Bystrova, A relational model for the nature of consciousness **[209]**
Caglan Cinar Dilek, Can we understand self-consciousness through analyzing primitive self-awareness? Agency vs self-consciousness: A discussion of phenomenological approaches towards self-consciousness **[9]**
Johann Ge Moll, Temporal Waves and Thought Waves **[66]**

Index to Poster Sessions

Wednesday, May 4 and Friday, May 6 – 6:35pm to 10:00pm

P 1 Philosophy

Tatiana Bachkirova, Three conceptions of the self for applied purposes **[79]**

Sergey Bulanov, An outline project of homogenous non-computational cognitive system **[53]**

Barry Caulley, Consciousness discovery from the spiritual thought system, A Course In Miracles **[5]**

Emma Chien, Reason, emotion, and the theory of mind **[6]**

Alla Choifer, The three perspectives of consciousness **[26]**

Silvia Gáliková, Reconsidering the reality of consciousness and its metaphors **[29]**

Ida Hallgren Carlson, 'I' as a truth maintenance system: Consciousness integrates information in order to arrange coherent structures **[81]**

William Hohenberger, Epistemological reasoning and structural solutions for defining the human psyche **[67]**

Dwight Holbrook, Some implications of the everyday out-of-body experience **[68]**

Matthew Houdek, Consciousness, enlightenment and existential evolution **[32]**

Paul Kulchenko, De/constructing Consciousness **[11]**

Tamar Levin, Holographic trans-disciplinary framework of consciousness: An integrative perspective **[12]**

Kristjan Loorits, The Hard Problem of Existence **[34]**

F. N. Vanessa, "Jubi" O'Connor, From darkness to light: The way of Divine Reason **[40]**

Sandeep Sharma, Knowledge: Scientific analysis using set theory **[75]**

Sandra Tereshko, New understanding of nature of human beings **[44]**

Jussi Tuovinen, To be and not to be - Choice and semiosis as the basis of consciousness **[46]**

Laura Weed, What is most metaphysically basic in science; laws, sealing wax, cabbages, structures or things? **[77]**

P 2 Neuroscience

Dallas Bell, Applying the bounded variable of Ethic's Sigma Summation to the Goldman-Hodgkin-Katz Equation for binding consciousness with societal migration **[144]**

Michael Lipkind, In principle impossibility of the thoughts' reading experiment **[109]**

Richard Mazer, The illusion of sensory consciousness **[122]**

Jhone Moore, An integrated theory of consciousness **[166]**

Varsha Sharma, Exposure to low dose irradiation-alleviation of experimental epileptic seizures in experimental post-traumatic epilepsy of rats **[148]**

P 3 Cog Sci/Psychology

Shiau-hua Liu, The influence of craving on attention bias **[151]**

Ruggero Rapparini, The oneness of reality **[178]**

Liliana Lorna Villanueva, The mental impasse (total absence of thoughts) and its relation to the dilation of individual consciousness as result of spiritual awakening **[173]**

Stephen Waldon, The non-computability of creative processes **[186]**

P 4 Physical and Biological Sciences

Yoriko Atomi, Science-based understanding of the consciousness at two levels: Own life system and own brain system. Lesson from the education program of Gnothi Seauton, knowing yourself through your body. **[214]**

Alexander Egoyan, Elastic membrane based model of human perception **[188]**

John Grandy, DNA consciousness **[232]**

William McDougal, The physics of perception and redefining the human body as literally a specialized type of star, or solar form **[229]**

Mojtaba Omid, Time dilation and Em wavelength variations as the consequence of temperature changes in body and brain for affect life signals and time perception **[206]**

Anders Wallenbeck, Self-navigating signals **[243]**

John Waterworth, The sense of presence: Reflections on ontogenic and phylogenic changes in the nature of consciousness **[236]**

P 5 Experiential

Dan Booth Cohen, Systemic Family Constellations: Perceiving how consciousness transmits the effects of severe trauma across generations without direct sensory input **[267]**

Rosemary De Castella, Religious and spiritual growth following trauma **[268]**

Ingrid Fredriksson, The Anatomy of the invisible **[260]**

Lisa Romero, On perception of "reality" **[254]**

Danny Sandra, Integral leadership and the role of entrainment: Synchronizing consciousness **[213]**

P 6 Humanities

Jerry Josties, A 1962 encounter with Thomas Kuhn, Revolution, and a 1968 "Aha" Experience: Are the descriptional categories of physics sufficient for an understanding of consciousness? **[301]**

Marvin Kirsh, Mirroring, Need and Symbolism : A Two Timing Nature or a Whole Concept **[294]**

Haymo Kurz, Educating medical doctors about evolution of consciousness **[298]**

Ramon Penha, The expression of the spiritual dimension of nursing care in a Brazilian intensive care unit: A communicational study **[290]**

Art-Technology Demo Exhibit

Lobby | Aula Magna Hall
The Jol Thomson Installation: Polstjanan Room

Interactive | Innovative | Evocative

CURATORS

Nancy Clark, Chair

Maureen Seaberg

Abi Behar Montefiore

ARTISTS

Koei Endo & Ikuyo Endo

Jol Thomson

Fiammetta Rubin

Dave Cantrell

Jack Sneh

Werner Pans

Ole Hagen

Carrie C Firman

Jason Padgett

Endo (137), Thomson (21), Rubin (168), Cantrell, Sneh (286), Pans (284), Hagen (30), Firman (281) and Padgett (176

Conference Workshops

Workshop 1 **AM**, Bergsmannen
Sunday, May 1, 2011
9:00am – 4:00pm
SYNESTHESIA
Moderator, Maureen Seaberg *Participants: William C Bushell, Neil Theise, Patricia Lynne Duffy, Michael Sollberger, Nancy Clark, Daniel Meyer-Dinkgrafe, Alexandra Kirschner, Jason Padgett, Carrie C Firman, Ezgi Sorman, Berit Brogaard, Dick Proeckl, Engelbert Winkler*

Workshop 2 **AM**, Spelbomskan
Sunday, May 1, 2001
2:00pm – 6:00pm
NEURAL CORRELATES
Facilitators: Ron Chrisley and David Gamez

Workshop 3 **AM**, Aulan
Monday, May 2, 2001
9:00am – 4:00pm
DEEPAK CHOPRA
Consciousness: The Ultimate Reality

Workshop 4 **AM**, Bergsmannen
Saturday, May 7, 2011
2:00pm -6:00pm
ALTERED STATES
Moderator, Etzel Cardena
Participants: Charles Whitehead, Yulia Ustinova, Antoon Geels, Pehr Granqist

Workshop 5 **AM**, Aulan
Saturday, May 7, 2011
2:00pm – 6:00pm
QUANTUM BIOLOGY
Facilitator: Gustav Bernroider
Participants: Anirban Bandyopadhyay, Jack Tuszynski, Travis Craddock, Vahid Salari, Stuart Hameroff, Johann Summhammer, Giuseppe Vitiello, Hartmut Neven

Workshop 6 **GEO**, 50-Sal
Saturday, May 7, 2011
2:00pm – 6:00pm
BINAURAL BEAT
Facilitator: Hillary Webb (Monroe Institute)
Trainers: Carl Österberg, Edward Visse

AM Aula Magna – **JH** Juristernas Hus (Law Student's House) – **SH** Södra Huset (South House) – **GEO** Geovetenskapens Hus (Geo-Science Building)

Consciousness Research Abstracts

1. Philosophy

1.1 The concept of consciousness
1.2 Ontology of consciousness
1.3 Materialism and dualism
1.4 Qualia
1.5 Machine consciousness
1.6 Mental causation and the function of consciousness
1.7 The 'hard problem' and the explanatory gap
1.8 Higher-order thought
1.9 Epistemology and philosophy of science
1.10 Personal identity and the self
1.11 Free will and agency
1.12 Intentionality and representation
1.13 Miscellaneous

2. Neuroscience

2.1 Neural correlates of consciousness (general)
2.2 Vision
2.3 Other sensory modalities
2.4 Motor control
2.5 Memory and learning
2.6 Blindsight
2.7 Neuropsychology and neuropathology
2.8 Anesthesia
2.9 Cellular and sub-neural processes
2.10 Quantum neurodynamics
2.11 Pharmacology
2.12 Neural synchrony and binding
2.13 Emotion
2.14 Sleep and waking
2.15 Specific brain areas
2.16 Miscellaneous

3. Cognitive Sciences and Psychology

3.1 Attention
3.2 Vision
3.3 Other sensory modalities
3.4 Memory and learning
3.5 Emotion
3.6 Language
3.7 Mental imagery
3.8 Implicit and explicit processes
3.9 Unconscious/conscious processes

3.10 Sleep and dreaming
3.11 Cognitive development
3.12 Artificial intelligence & robotics
3.13 Neural networks and connectionism
3.14 Cognitive architectures
3.15 Ethology
3.16 Self-consciousness and metacognition
3.17 Temporal consciousness
3.18 Intelligence and creativity
3.19 Miscellaneous

4. Physical and Biological Sciences

4.1 Quantum theory
4.2 Space and time
4.3 Integrative models
4.4 Emergent and hierarchical systems
4.5 Nonlinear dynamics
4.6 Logic and computational theory
4.7 Bioelectromagnetics/resonance effects
4.8 Biophysics and living processes
4.9 Evolution of consciousness
4.10 Medicine and healing
4.11 Miscellaneous

5. Experiential Approaches

5.1 Phenomenology
5.2 Meditation, contemplation & mysticism
5.3 Hypnosis
5.4 Other altered states of consciousness
5.5 Transpersonal and humanistic psychology
5.6 Psychoanalysis and psychotherapy
5.7 Lucid dreaming
5.8 Anomalous experiences
5.9 Parapsychology
5.10 Miscellaneous

6. Culture and Humanities

6.1 Literature and hermeneutics
6.2 Art and aesthetics
6.3 Music
6.4 Religion
6.5 Mythology
6.6 Sociology
6.7 Anthropology
6.8 Information technology
6.9 Ethics and legal studies
6.10 Education
6.11 Miscellaneous

1. Philosophy

1.1 The concept of consciousness

1 **Materialism and the subjectivity of experience** Reinaldo Bernal <reynaldobernalv@yahoo.com> (École Doct. Philosophie Paris, Institut Jean Nicod - Université Paris, Paris, France)

The phenomenal properties of conscious mental states happen to be exclusively accessible from the first-person perspective. Consequently, some philosophers consider their existence to be incompatible with materialist metaphysics. In this paper I criticize one particular argument that is based on the idea that for something to be real it must (at least in principle) be accessible from an intersubjective perspective. I argue that the exclusively subjective access to phenomenal contents can be explained by the very particular nature of the epistemological relation holding between a subject and his own mental states. Accordingly, this subjectivity does not compel us to deny the possibility that phenomenal contents are ontologically objective properties. First, I present the general form of the argument that I will discuss. Second, I show that this argument makes use of a criterion of reality that is not applicable to the case of subjective experience. Third, I discuss a plausible objection and give an argument for rejecting observation models of self-knowledge of phenomenal contents. These models fall prey to the homunculus illusion. **C25**

2 **How can we reality-check our concept of "reality"?** Laurentiu Staicu <laurentiu.staicu@gmail.com> (Theoretical Philosophy, University of Bucharest, Bucharest, Romania)

Ever since Antiquity, philosophers have tried to find the royal way of discovering what is ultimately real, and to conceive a world vision based on these final bricks of the existence. From that time on, strong traditions appeared, emphasizing one or another trait of our experience as being the ultimate source of knowing what is really out there or, simply put, what is real. However, starting with Kant's transcendental idealism, this confidence in our ability to discover what is real and to construct a vision of reality as it is in itself began to decline. Today, we no longer believe in the possibility of knowing the world as it is, apart from our shared subjectivity. All we can ever hope to achieve is a knowledge of the world as it appears to any human being, apart from his or her individual biases. But how can we be sure that this knowledge within the limits of our species'-subjectivity is no more than just that: a subjective point of view over the world? How can we reality-check our concept of reality, to see if it is not more than just a subjective point of view, a characteristic of just one species among many others? This is the question I intend to address in my paper and to which I will try to offer a possible answer. **C25**

3 **Beyond cosmology, consciousness, and the "quantum" – Toward general information theory & spontaneous creative systems** Marcus Abundis <55mrcs@gmail.com> (Stanford Graduate School of Business, Santa Cruz, CA)

Chalmers concludes The Conscious Mind by suggesting a successful model of consciousness likely incorporates basic psychophysical laws. Hameroff & Penrose then suggest quantum facets as critical to understanding consciousness, again pointing to universal laws. Yet Taleb in The Black Swan notes a hurdle to such "global rules:" the missing presentation of Life's naturally creative events. He suggests a fractal structure for this basic issue, aligned with Wolfram in A New Kind of Science. These matters all challenge our notions of consciousness in diverse ways, while also calling for a cohesive solution. Yet human consciousness and Cosmos serve as ready proxy for crafting a solution, since both are unarguably existential and profoundly creative. From this, I now name an integrated structural view to span these issues of consciousness, creativity, Cosmos, and a "science of the future." My approach begins with Hegelian dialectics for "first-pass proxy," as its common triune form already holds inherent creative traits. This simple triune view is then extended in a practical account of creativity, cosmos, and consciousness, with clear implications for any "afforded consciousness." This narrative is catalyzed by the notion consciousness demands practical description, in advance of any other informational headway (see early work: http://vimeo.com/evolv).This new structural view is conveyed as General Information Theory. As example of its logical extension: for Cosmology, three classes of dark matter (cold, warm, hot) interact with three classes of standard matter, to manifest a visible Cosmos (a triune, of triunes). This view then turns to subatomic realms and the inherent triune-logic of minimal quantum operations. These triune "framing concepts" then support a more specific integrated creative hierarchy of: geology, biology, behavior, intelligence, etc., within broader extenuated events. This notion of extended creativity is then honed via three principal forces of natural selection (purifying, divisive, and directional). A "principle of destructive force" thus arises to selectively bind infinite creativity within a coherent order, to finally yield common "ordinary reality." **C39**

4 **Hierarchies of consciousness and the principle of unity: Is there ultimate reality?** Madeea Axinciuc <mail@madeea-axinciuc.eu> (Religious Studies, University of Bucharest, Bucharest, Romania)

The lecture aims at suggesting that there is a link between the understanding of consciousness and the understanding of the principle of unity (as employed and theorized within the framework of different religious and/or philosophical traditions) on one hand, and between different states of consciousness and different levels of reality, on the other hand. Particular contexts will be brought into discussion, by referring, from a comparative perspective, to texts pertaining to Biblical literature, Jewish mysticism, Tibetan Buddhism, Islam and/or Taoism. The access to different states of consciousness through practice, ritual or specific techniques, reflects at the same time the access to particular worlds, realms or dimensions. The guiding line is represented by the tight relationship established between the states of consciousness attained in the mystical experience and the apprehension of the divine hierarchies. Specific ways of producing, interpreting and utilizing representations as means of mapping or vehicles of transgressing different states/realms of consciousness will be taken into consideration. The approach will focus on the relation among different states of consciousness and the correspondent levels of reality. Special attention will be paid, in this light, to reappraising the possible meanings and significances of the 'ultimate reality'. The 'unity' of the M-theory - claiming to unify all the other universe/multiverse 'versions' envisaged by now in the field of (super)string theories - is sustainable only in terms of being itself the reflection of an intrinsic unity or fluidity of the considered dimensions regarded in their connectedness. The problem is not to find a theory uniting or encompassing all the preceding theories, but to demonstrate the existence of (the means of) 'communication' among these dimensions. The simple fact they can be counted one after another gives us a hint of their being somehow connected and/or correlated. The question is whether the M-theory really offers a key or it rather brings together the (pre)existing theories by indicating, in a philosophical manner, toward a principle of unity. Could the hierarchies of consciousness offer a possible answer? But what is consciousness? Is consciousness definable? Can it be measured since it assumes no particular form, shape, substance, configuration, direction or property? It is usually referred to or recognized as a 'state' or a 'happenstance'. At the same time, we talk about 'passages' from one state of consciousness to another. Is consciousness the unchained continuum separating and bringing together its 'happenings'? Emphasis will be further laid upon discussing the relation between subjectivity and objectivity as articulated in the religious, philosophical and scientific approaches. The subjective experience of traveling 'beyond' expressed, in different religious traditions, through diverse and equivocal terminological constellations, is replaced, in the scientific approach, by the objectivity of the experiment expressed through univocal languages. The shift operated in philosophy between transcendent and transcendental could still reframe the debate regarding consciousness in an interface approach trying to bridge between science and spirituality. **C32**

5 **Consciousness discovery from the spiritual thought system, A Course In Miracles**
Barry Caulley <publishing@endeavoracademy.com> (Theology, Endeavor Academy, Wisconsin Dells, WI)

The model of this presentation for consciousness discovery is A Course in Miracles. Our goal is to present a clearer starting point from which to understand consciousness and a foundation for testing of its abilities. Spiritual scriptures of every nation point to the existence of Self or Mind in all things. Comparison or other direct scientific methods of examination of consciousness could not be possible if mind is omnipresent in all things. Mind or consciousness is what the universe is. What does this mean for our minds apparently narrowly confined to three dimensional space and time and separate from it? How can we start to understand it? If direct methods of inquiry are doubtful, perhaps indirect methods (of effects) can be used for a new appreciation of the consciousness. If we follow many world scriptures including A Course in Miracles we are presented with the idea that the world or time/space is an illusion and our identities or egos within that illusion also have a doubtful reality. Yet to take a cue from physics, the anthropic principle indicates a human centric organizing principle of the universe. The anthropic principle does not go far enough, however. Perception, or time/space, is not a cause but an effect. Therefore, not only should we propose that the universe is organized according to the benefit of mankind, but that the mind of man is cause. This follows from the spiritual teaching that the universe is a dream. Man is the dreamer, the perceiver, the organizing source. If the several world spiritual scriptures, such as A Course in Miracles, contain true ideas of consciousness and the world, can we begin to set true tests or experiments to reveal heretofore hidden aspects of consciousness? If the mind of man is the cause of perception can we validate that experimentally? If the universe is thought, it would have to be so. From this radical vision as a starting point, traditional methods of spiritual practice; prayer, speaking in spirit, and meditation, perhaps even music could be enhanced to have more consistent and recognizable results. If the foundation of space/time is the awareness of separation and differences, omnipresent Mind recognized and used in a true context of cause would have the effect(s) of union and universal commonality. In other words, the idea of joining, love or intensified relationship that represents Mind beyond the time/space constraints would have the effect of altering time itself or the release of laws such as gravity. Miracles or this rejoining of mind(s) should have the additional effect of healing, undoing the laws of sickness. Physics is already beginning to toy with ideas such as the unreality of time or the flexible nature of gravity. If the revealing of consciousness can be begun by a clearer appreciation of what it is, the effects must surely testify to that new appreciation, if true. **P1**

6 **Reason, emotion, and the theory of mind** Emma Chien <emmapchien@gmail.com> (Department of Philosophy, University of Alberta, Edmonton, Alberta Canada)

Our ability of everyday psychological understanding of other people is called the theory of mind. Two opposed theories, simulation theory and the theory theory, are proposed to explain our theory of mind. According to simulation theory, mental simulation plays a key role in our understanding of other people. Mental simulation is the simulation or replication of the emotional responses, thinking, decision-making, and other mental aspects of other people. The same mental faculties that are used in our emotional responses, thinking, and decision-making are redeployed when we simulate others in order to provide an understanding of other people. Recent researches of mirror neurons provide neurological supports for simulation theory. When observing others performing certain acts, our own brain regions that are responsible for initiating these acts are being activated. Scientists suggest that the activation of our own brain regions serves as the basis of our understanding of other people. On the other hand, the theory theorists propose that the basis of our everyday psychological understanding of other people depends on deployment of empirical theory about human psychology, such as how people normally think, make decision, or respond emotionally. The tension between these two theories is that the theory theorists presuppose that our understanding of other people is based on pure reasoning and deny the deployment of the first-person knowledge in understanding others, while simulation theorists disagree with these

two aspects. However, in this paper, I will argue that the tension between these two theories can be dissolved if we introduce the view about the relationship between reason and emotions based on Damasio's (1994) researches. Furthermore, I will argue that simulation theory is more fundamental than the theory theory which underlies our theory of mind. According to Damasio (1994), when a person loses his emotions due to brain damages, this person also loses his ability to perform rational decision-making. The disruption of almost all aspects of the patient's life also suggests the key role of emotions in maintaining our daily life. Damasio (1994) suggests that we can have reason only when we have emotions. The cooperation between emotions and rational thinking are what underlies our everyday rational decision-making. Thus, the pure reasoning which underlies the theory theory does not exist. Instead, it is the cooperation of reason and emotions that underlies our abilities to understand other people. Since our own emotions are involved in our understanding of other people, I suggest that these emotions are resulted from the functioning of our mirror neurons. That is to say, when observing others, we have similar emotional response as the person we observe because our brain regions that produce similar emotional responses are being activated by the emotions of the people we observe. However, after we know others' emotions and mental states by mental simulation, we can also deploy the third-person knowledge of how human minds work in order to provide further explanations. Thus, both theories are used to understand other people. Furthermore, simulation theory is more fundamental because of the primitive role of emotions. **P1**

7 **Does self reference require the capacity of using the first-person pronoun 'I'?**
Hui-Ming Chin , Allen Y. Houng <vhmchin@gmail.com> (Taipei, Taiwan)

Bermudez calls thoughts that involve self reference 'I-thought'. In his definition, 'I-thought' is a thought whose content can only be specified by the first person pronoun 'I'. Creatures can have self-consciousness if they have such content, which he terms first-person contents. In addition, some philosophers will claim that the capacity to think of thoughts is the capacity of the linguistic expression of those thoughts. In his book,"The paradox of Self-Consciousness", he argues that the paradox of self-consciousness would be raised if we accept the above arguments. The way he solves the paradox is to argue that there are non-conceptual first person contents. However, the paradox will be raised because he claims that the content of 'I-thoughts' is specified by the first person pronoun 'I'. For an organism to be able to use the first-person pronoun, the organism must be capable of using the linguistic concept 'I'. Bermudez's argument presupposes the view that concepts are linguistic. According to this view, the capacity of self reference must presuppose the ability of using linguistic concept. Hence, the organism which does not have 'I-thought', has no concept of self. Therefore, it has no consciousness. In this paper, I will argue that self reference does not require the linguistic concept 'I'. In the first half of my paper, I will argue against the view that concepts are linguistic. The main target is Fodor's view that concepts are the smallest units of mental representations. In his famous paper, 'Concepts; A Potboiler', he provides lengthy argument against the ability view of concepts. Fodor's core idea is that compositionality is an essential property of cognition, and the linguistic theory of concepts is the only theory that can explain the compositionality of thought. But, much evidence suggest that the ability theory can explain compositionality equally well. Thus, I will argue that there is a sense of self that does not require linguistic concept, i.e., the first-person pronoun 'I'. The strategy of my argument is to adopt Damasio's distinction of the core self and the autobiographic self. Bermudez's and other similar views are good for the autobiographic self. But the core self does not require linguistic concepts. Thus there is a sense of self reference that does not presuppose linguistic capacity. Therefore, I claim that there is a rudimentary kind of self consciousness that requires no linguistic concept. This hypothesis has an advantage of supporting the claim that infants and animals have self consciousness. **C26**

8 **Consciousness and energy in an evolving universe** Henk De Weijer <weije265@planet.nl> (Microvita Research, NERI, Ydrefors, Amsterdam, Netherlands)

Science supposes the ultimate basis of all matter to be Energy. Expressed Consciousness is considered to be an epiphenomenon of, so subordinate to, matter. But persons with a deep insight in Life clearly express Consciousness as the ultimate base of reality. They put the stress exactly on the other side of the balance: a dilemma! A third way is to consider both Energy and Consciousness as intrinsic qualities of the universe. Then, the underlying principle of our universe will be Bipolarity. In addition to this, Samkhya, which is atheistic, states that Energy is non-intelligent, while Consciousness is intelligent. Yoga philosophy, or theistic Samkhya, adds the principle of God. If both Energy and Consciousness are ultimate and inseparable, we could assume that moments exist in which their full characteristics come to full bloom. With the Big Bang one of the two, Energy, first became dominant. Waves and wavicles arose out of this pressure and Consciousness remained dormant. At the cosmological moment of 'recombination', Energy had reached its fullest expression with the birth of hydrogen, and later also heavier atoms. Since time is involved, this development can be called 'evolution'. After this moment evolution does not stop, as Darwin so accurately elaborated, but continues to gradually increase the expression of Consciousness, ultimately culminating in a conscious realization of Consciousness. This evolution can be represented as a quantitative circle, in which each pole performs its specific, attractive force. As Newton already realised, a force is an abstract concept. It is beyond sensory perception, but its effect can be predicted, experienced and calculated. Force fields are uniform and relatively simple; they and their particles are not intelligent or creative, but can only perform one straightforward fact. Morphogenetic fields supposedly explain the repetition of forms in chemical and biological forms, but the properties of those fields are only vaguely described. Moreover the particles, of which these fields are composed, like e.g. photons in the electro-magnetic force, are neither mentioned nor described. Morphogenetic fields also do not explain what creative force(s) lie(s) at the origin of new forms. New forms could be ascribed to randomness, a natural inherent property of nature or a creative agency, but how to come to a decision? The intelligence of Consciousness, evolved subatomic wavicles and the smallness of field particles, could be combined and lead to the presumption of elementary, conscious, intelligent and creative particles. Such tiny little elements, microvita, with their built in intelligence, will play an important role in what is called non-living and living, even in mind. Physical and mental forms then not only possess Energy, but an internally related structure, where either Energy or Consciousness is partly or completely expressed or dormant. The Cartesian dualism of Matter versus Mind would end here and a new paradigm, regarding the nature of Nature, will open. Tests are needed, and are being designed, to investigate whether this speculation makes sense or not. **C24**

9 **Can we understand self-consciousness through analyzing primitive self-awareness? Agency vs self-consciousness: A discussion of phenomenological approaches towards self-consciousness** Caglan Cinar Dilek <caglandilek@gmail.com> (Istanbul, Turkey)

In my presentation, I want to analyze phenomenological accounts of self-consciousness present in Merleau-Ponty, Husserl, Sartre and Zahavi. In these accounts we can see an attempt to understand self-consciousness through a study of primitive, unreflective, minimum kind of self-awareness, as a One-Level Account, and this is supported through psychological research on animals and infants, showing how they can show awareness of their own actions, and how they can discriminate between themselves and others/the world. The notions of the self and conscious experience are established not as different entities, but they are taken as the essential properties of the experiences. Thus, according to the phenomenological tradition,it seems that what shall be done is to study experience-as-such; we can understand what conscious perception is by understanding what perception and cognition is. I believe that this kind of approach is very useful as it focuses on the experience-itself, which enables us to understand the notions like self and consciousness through understanding perception and cognition, rather than as separate entities or mechanisms; but I am skeptical, if we can illuminate what self-consciousness is through minimum accounts of self-awareness.

I believe that the way we are conscious of ourselves cannot really be understood through unreflective self-awareness. Maybe it is useful to make a distinction between "agency" and "self-consciousness", where phenomenological accounts like primitive and unreflective self-awareness might explain the former, but not the latter. This is also the reason, why I am also skeptical if the use of psychological research, used by phenomenologists to support their ideas, adequate for our aim to understand what really self-consciousness is, especially the studies on infants and animals. To establish these points, I will go through Dan Zahavi's analysis of "phenomenal self-consciousness" as an integrated study of self,experience and self-awareness, which is based on ideas like those of phenomenologists Merleau-Ponty, Husserl and Sartre, where I will analyze the minimum self-awareness. I am aiming to reach to the conclusion that understanding a minimum kind of self-awareness, even understanding conscious awareness, does not really help us to understand self-consciousness as we talk about human-beings. Also, although consciousness seems to be a first-person phenomenon, maybe a third-person explanation for self-consciousness is more suitable, as it is mostly constituted through such an attitude. Thus, to understand self-consciousness, we need to focus on being a person, and the alienating effect of language on ourselves, on the narrative self. This does not diminish the value of the studies of conscious awareness as conscious perception or as a minimal awareness, but that should be seen as an attribute of being an organism and agent. In this sense, I agree with phenomenologists that experience in itself has this attribute. **C40**

10 **Consciousness and cosmology: Unified theory of consciousness, matter and mind** Dhanjoo N Ghista <d.ghista@gmail.com> (Framingham, MA)

In this paper, we are presenting a new Science paradigm of the Unified Theory of Consciousness, matter and mind, to propound how Cosmic Consciousness expresses into the Cosmic Mind (or God, in religious parlance), and explain how this leads to (i) the occurrence of the Big-bang and Grand Design, as the starting point of universe, (ii) formation of visible and invisible universes, and (iii) the origin of life by the formation of the primitive mind. --- The Fundamental Entity: In this new Science paradigm, as indicated by Max Planck and Prabhat Sarkar, the foremost concept is that Absolute consciousness (or Consciousness) is the fundamental entity from which emanates the universe and life, based on its Cognitive and Operative Principles. --- Cosmic Mind and development of the Fundamental Factors of the Universe: In stage 1, Consciousness gets expressed (through its Operative Principle) into the Cosmic Mind. Under the influence of the Operative Principle, the Cosmic Mind emanates microvita (the carriers of life in stars and planets), and gets expressed into the five fundamental factors (5FFs: ethereal, aerial, luminous, liquid and solid factors), providing the constituents of the universe. This process may be deemed to be the thought process of the Cosmic Mind. --- Formation of Life (as primitive mind): As the 5FFs get expressed, they form structures which are (i) visible if they contain all the 5FFs, and (ii) invisible if they contain only the ethereal, aerial and luminous factors. Now, as a result of the Operative Principle's pressure on a structure made up of all the 5FFS, vital energy is produced within the structure, as a result of which (i) a nucleus is formed within the solid factor, and (ii) a portion of the physical solid structure gets transformed (by the action of microvita) into a subtler factor than the 5 FFs; this subtler factor is the 'ectoplasm or crude mind'. In this way, a unit mind evolves from matter, as the origin of life. --- Big-Bang: If the exterior force dominates on the physical structure, a stage is reached when there is explosion of the physical structure. As a result of this explosion, the physical structure gets disassociated into the five fundamental factors and its constituent solid structural portions explode as the Big-bang. --- Cosmology, the Birth of the Visible and Invisible Universes: This big bang explosion results in the formation of the visible universe of galaxies. Likewise, from the disassociation of structures that are made up of only the other more subtler factors (such as the ethereal, aerial and luminous factors), we have the development of the invisible universe of dark matter and dark energy. --- Thus this new Science Paradigm's Cosmology theory explains: (i) how Consciousness expresses into cosmic mind (ii) how Big-bang occurs, which conventional physics is unable to provide, (iii) the formation of the visible universe as well

as the invisible universe made up dark matter and dark energy, and (iv) the formation of life in the form of the primitive mind. **C24**

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

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

12 **Holographic trans-disciplinary framework of consciousness: An integrative perspective** Tamar Levin <tami1@post.tau.ac.il> (School of Education, Tel Aviv University, Tel Aviv, Israel)

The paper suggests an integrative theoretical framework for human consciousness and validates-compliments it with existing research data. Building on different views of consciousness and their interdependence in approaches to mind-body relationships, the framework seeks to improve our understanding of the "hard problem" of consciousness. This three-layered theoretical framework comprises: I. A trans-disciplinary holographic rationale as a holistic scientific worldview; II. theoretical principles and information categories affecting/affected by consciousness; III. human and universe factors involved in consciousness functioning and meaning. I. Grounded in a unified scientific worldview, complex system theory and the holographic paradigm, trans-disciplinary covers four complimentary multi-dimensions of human endeavor: ontology (being-becoming) epistemology (knowledge-knowing), methodology (perceiving-doing), and axiology (value-valuing). Referring to the different levels of reality (physical, quantum, and spiritual), the approaches to epistemological methodologies (logical positivism, dynamic-nonlinear-systems, and hermeneutics) and the processes characterizing the movement/transition between them, trans-disciplinary encompasses multi-dimensional interconnections between the nature of reality and multi-dimensional human nature. This dialectic conceptualization of different paradigms complements a comprehensive, multidimensional understanding of consciousness, its states and flows, while not being restricted to a particular/preferred/habitual paradigmatic lens or limited by either's shortcomings. II) Trans-disciplinary perceives all phenomena only in relation to each other and binary distinctions (physical-mental; subject-object) as transcendent, not dichotomic, where one aspect reflects an external manifestation and the other an internal manifestation. Since holographically that which is implicate results in the manifest, human beings are connected to each other and nature in ways more subtle than those that stimulate the senses. Furthermore, consciousness is viewed not as a brain product or byproduct of brain-biochemistry processes, but as a fundamental "nonphysical"/subtle force/power of the universe. Existing within the levels of interconnected realities, consciousness is conceptualized as an autopoietic knowing-becoming-participating-valuing system functioning within a "space-time" context described by the synergetic collaboration between information within a system and information from outside systems, being simultaneously influenced and influencing past, present, and future experiences/information. This view links consciousness to individual and universal sub-consciousness, to biological/genetic, historical/generational/incarnational, cultural and educational experiences, and to the physical and metaphysical energy/information universe. It reveals human consciousness as a small part of a greater, undivided whole reflecting the diverse qualities of all realities. III) Contrary to accepted ideas that consciousness originates/is rooted/emerges or is manifested through the brain, this framework sees consciousness as related to heart-brain relationship. According to neuro-cardiology research, the heart is a sensory organ and information encoding and processing center with an intrinsic nervous system, enabling it to learn, remember, decode intuitive information that affects emotional processes in the brain, making functional decisions and communicating information to the brain and throughout the body via electromagnetic field interactions. Furthermore, based on heart transplant studies, this framework regards the subtle/inner layer of the heart as representing the quality of the spiritual self-being or spiritual personal-identity thus playing a meaningful role (with the brain) in conceiving human consciousness. Implications for the survival and evolution of humans and the universe. **P1**

13 **Consciousness as concept based and dynamic mental state** Vlljo Martikainen <viljo.martikainen@tkk.fi> (Industrial Engineering, Aalto Univercity School of Science and Technology, Espoo, Finland)

I am approaching the eternal problem of consciousness as a scientific mental realist. As a realist I see man as a mentally steered biological, social, and rational actor created by the physical, chemical, biological, and cultural phases of the evolutionary processes. As a scientist I am trying to make an understandable description, a logical explanation, and reliable proof of the substance, structure and functions of consciousness. In my dissertation work (Martikainen, V (2004) I maintained that human concepts are our memory representations functioning as dynamic and situation relevant sets of attributes connected with the subject's object of attention. I am supposing also that our concepts are formed and used processually and in most cases situation relevantly without any greater conscious attention. This processual formation and situation relevant use of concepts has made it so difficult to find out what consciousness is. I see consciousness as a concept-based mental state, which is our normal everyday mental state enabling us to perform our daily duties without any greater problems. The processual is made possible by our brains' ability to transform the afferent action potentials or the electrochemical information our senses are encoding from the energies they meet. This transformation means that the material is transformed into a new ontological form or to mental experiences, cognitive, emotional, volitive, etc. The brain's ability to make this transformation on line has been the key criteria when the survivals have been selected in the processes of evolution. The sensory information must become interpreted and fast. That's why the human concepts are dynamic and in most cases also situation relevantly covered with those attributes which explain the different meanings of the subject's object of attention. References. Baars, B. (1988) A Cognitive Theory of Consciousness. Cambridge, Cambridge University Press Baddely, Allan.(1997) Human Memory: Theory and Practice. Hove, UK: Psychology Press Ltd. Martikainen, Viljo. (2004) Concepts and Mind as Dynamic Memory Systems Structuring the Human Mental. http//lib.tkk.fi/Diss/list. Martikainen, Viljo. (2007) Article in Futura 3/2007 pp49-59, The Finnish Society for Future Studies. Title in English: The Substance, Structure and Functions of Consciousness. Seager, William.(1999) Theories of Consciousness: An Introduction and assessment. London Roudledge. **C35**

14 **Zombies do not have psychedelic trips** Adrian Parker <adrian.parker@psy.gu.se> (Psychology, University of Gothenburg, Gothenburg, Sweden)

Psychic phenomena often evoke irrational reactions because they can be see as the ultimate battle ground for different theories of the mind-body relationship. The recent development of research on non-local effects and the claims of entanglement being found at neural and biological levels, may change this by giving a theory of consciousness that requires paranormal phenomena to exist. A skeptical but nevertheless a positive review of some of

challenging claims in these areas is made. Several of the areas reviewed, in particular the Libet effect, presentiment, hypnotic regressions, and cases of savant intelligence, which may revise our contemporary view of how consciousness functions. At the same time, theories of cognitive functioning are showing how reality is largely constructed from memory and how awareness is only partial selection of perceptual processes. Research consensus appears to conform a Jamesian view of consciousness as pluralistic and transliminal. Yet, the major weakness of research concerns lack of both findings and predictions relating to entanglement at the biological and psychological level. Our current work with the Department of Twin Research at Kings College, London attempts to rectify this. We are studying monozygotic twins (with various stages of splitting and formation of placental membranes) and recording the concordances in the physiological and psychological functions including illness, crisis and apparent psi phenomena. C8

15 **The limits of concepts and conceptual abilities** Joel Parthemore <joel.parthemore@lucs.lu.se> (Philosophy, University of Lund, Lund, Sweden)

Concepts are the building blocks of our consciousness and cognition in general. A proper account of consciousness requires a proper account of concepts. This paper argues that a too-complete account, one that attempts to account for everything fully, invites inconsistency -- but that, in the end, relative completeness matters more than strict consistency. What we perceive as lying beyond concepts' (or consciousness') grasp may be as revealing as what lies within. As with the Sufi story of the blind men and the elephant, conflicting accounts need not mean that those involved are talking past each other, or that one is right and the other(s) wrong. The blind men are all discussing the same thing: an elephant; and, as it happens, their accounts are all equally right -- and equally incomplete (and in that way, wrong). Like us, they lack the ability to take in the whole picture: they because they are visually blind, we because of our conceptual "blindness": our inability, even for a moment, to set aside our conceptual nature. The main thesis of the paper is this: concepts by their nature are a kind of necessary fiction, simplifying the world in order to make it comprehensible, distorting in pursuit of understanding. To confuse the fiction with the reality -- to fail to perceive our inability to step outside the fiction -- is to invite paradox. Paradoxes arise wherever one presses too hard against the boundaries of conceptual abilities. To explore the paradoxes is to explore the boundaries. If the negative thesis of the paper is that concepts are a kind of necessary fiction and that conceptual understanding is, contra Roger Penrose, necessarily bounded, then the positive thesis is this: acknowledging and understanding our boundaries extends our conceptual reach. It absolves us of duties we cannot fulfill and allows us to see the value in (certain) competing and seemingly mutually exclusive perspectives -- mutually exclusive only because we cannot step outside our conceptual perspectives to resolve them. If concepts are necessary fictions, then any theory of concepts, as itself a conceptual entity, can be no more. Extreme care must be taken: inconsistency is generally considered a bad thing. An account that relies upon it must be approached cautiously, by small steps, if the resulting inconsistency is to be shown to be (to borrow a phrase from David Chalmers) an innocent one. First, I re-frame the negative thesis with inspiration from Chalmers' classic paper on consciousness, using it to explore the limitations on the reach of either concepts or consciousness. Thus framed, I take it as a puzzle to break apart and re-assemble piece by piece, driving toward the conclusion that the inconsistency is both unavoidable and non-fatal. The prize by paper's end is a powerful conceptual tool for toggling between competing pairs of perspectives on concepts, showing them first as representations, then as non-representational abilities; first as world-directed, then as self-directed; on the one hand private and personal, on the other public and shared; and so on. **C9**

16 **Altered states of consciousness. Molecular hypothesis and experimental approach from membrane to quantum cytoskeleton nanowire network** Massimo Pregnolato , Massimo Cocchi <maxp07@gmail.com> (Drug Sciences, University of Pavia, Pavia, Italy)

Are the perception detached from reality and the altered states of consciousness modulated by the same molecular pathway? The different levels of consciousness (Morin, 2006) may

be connected to the quantum cytoskeleton nanowire network as assumed in psychopathological conditions such as depression (Cocchi, 2010) or schizophrenia (van Woerkom, 1990; Benitez-King, 2004). Both antidepressant and antipsychotic drugs need time to alleviate symptoms and it is only the first part of the therapy (two weeks) that corresponds to the reorganization of the neuronal cytoskeleton, suggesting that pharmacological agents exert their therapeutic effect through the cytoskeleton (Woolf, 2009, 2010). We recently described a precise sequence of events that occur through the transfer of arachidonic acid from platelets to brain and vice versa, which modifies the molecular steps of the psychopathological disorder, i.e. the membrane viscosity and the interaction protein Gs and tubulin, thus involving consciousness. The above-described coherent framework reflects the meaning of the ability of a quantitative approach to psychopathology. Is there any correlation between hallucination and cell-molecular interactions, or any cause for changing the conscious state that may be detected by measuring the gamma synchrony, which is better correlated to consciousness and which has already provided a variability of responses in different psychopathological conditions and meditation? (Flynn 2008, Hameroff 2010). Studies on molecular modifications during anesthesia might become a model of comparison within hallucination, dream and psychiatric pathologies characterized by different levels of consciousness (depression, bipolar, etc.). Probably, it would be possible to understand whether different consciousness conditions do exist under different conditions of detachment from realty. The first experimental evidence about this model will be presented. Benitez-King G, Ramirez-Rodriguez G, Ortiz L, Meza I. The neuronal cytoskeleton as a potential therapeutical target in neurodegenerative diseases and schizophrenia.Curr Drug Targets CNS Neurol Disord 2004; 3(6):515-33. Cocchi M, Tonello L, Rasenick MM. Human depression: a new approach in quantitative psychiatry Annals of General Psychiatry 2010; 9:25. Flynn G, Alexander D, Harris A, Whitford T, Wong W, Galletly C, Silverstein S, Gordon E, Williams LM. Increased absolute magnitude of gamma synchrony in first-episode psychosis. Schizophr Res. 2008 Oct;105(1-3):262-71. Hameroff SR: The "conscious pilot"-dendritic synchrony moves through the brain to mediate consciousness. J Biol Phys 2010; 36:71-93. Morin A. Levels of consciousness and self-awareness: A comparison and integration of various neurocognitive views. Consciousness and Cognition 2006; 15(2):358-371. van Woerkom AE. The major hallucinogens and the central cytoskeleton: an association beyond coincidence. Towards sub-cellular mechanisms in schizophrenia. Med Hypotheses 1990; 31(1):7-15. Woolf NJ. Travis JAC. Friesen DE. Tuszynski JA. Neuropsychiatric Illness: A Case for Impaired Neuroplasticity and Possible Quantum Processing Derailment in Microtubules, NeuroQuantology 2010; 8 (1):13-28. Woolf NJ: Bionic microtubules: potential applications to multiple neurological and neuropsychiatric diseases. J. Nanoneurosci 2009; 1: 85-94. **C20**

17 **Hypnagogic light experience** Dirk Proeckl , Engelbert Winkler <neurologe-proeckl@aon.at> (Neurologische Praxis, Wörgl, Austria)

In the theoretical part of the workshop, Dr. Proeckl and I would speak about the development of the Hypnagogic Light Experience. Current (interdisciplinary) knowledge about light and consciousness. Therapeutical (light) approaches from past to present. Altered states of consciousness as a therapeutical tool. More impressive surely will be the demonstration of the lamp - for which should be enough time because this always is the part people can't get enough of. For synesthesia: As Lucia N-03 nearly immediately induces an altered state of consciousness, one can see (with closed eyes) colors and forms of indescribable beauty which also activates relating emotions and cognitions. Therefore the Hypnagogic Light Experience is in itself a kind of fundamental synesthesia-experience as it confronts the subject with a holotropic way of perception. **C23**

18 **Can trans-material and trans-empirical theories of consciousness be scientific?** Lothar Schäfer <schafer@uark.edu> (Chemistry and Biochemistry, University of Arkansas, Fayetteville, AR)

In Brain Science the monist perspective is the ruling paradigm. According to it, "brain and mind are inseparable events ... The brain ... generates well-defined electrical activity ... In

the wider context of neuronal networks, this activity is the mind" (Llinas 2002). The monist view is a materialistic view in that the neuronal networks are primary, while consciousness and its images are secondary. This paradigm prevails at a time, when Quantum Physics has lead to paradigm change in science. In contrast to the world view of Classical Physics, the basis of the material world is non-material, and a trans-empirical domain of reality exists, which consists of invisible forms, which are real, because they can act in the empirical world. I describe some simple phenomena which I show that the virtual (empty) states of molecules and their wave functions are real, albeit trans-empirical, because they can affect empirical phenomena: behind their measurable and observable surface, chemical processes are guided by hidden waveforms, like by internal images. Neurologist Gerald Huether (2010) has called 'internal images' all those factors, which are hidden behind the measurable and observable phenomena of the living brain and direct the actions of human beings. In chemistry, the power of the internal images is absolute in that molecules undertake nothing without the participation of a virtual state. In the realm of consciousness, too, the power of the internal images is absolute, because human beings undertake nothing that is not first initiated by an internal image. Absolute power is not determinism: there is a certain freedom of choice in quantum events and in human acts. Molecular state vectors belong, on the one hand, to a specific molecule; on the other hand, they are identical for all molecules of a type, so that their logical order must be viewed as a constitutional aspect of the universe. The internal images of consciousness, too, belong to a specific brain, in which they appear, and, apart from minor perturbations, are identical in all brains of a species. This equivalence of the psychic and the physical leads to the question, whether the internal images of our consciousness, too, are transpersonal and part of the essential order of the universe, and, if so, how it was possible that that order found a way to express itself in our consciousness? The answer that should be explored concerns the possibility that, in the course of evolution, the evolving neuronal structures were selected for their ability to receive and understand increasingly complex signals from the non-empirical realm of physical reality. The intent of these considerations is not to set the clocks back to magical thinking of archaic ages, but to open our minds to all levels of reality. Modern Neurology must answer the question, why, when ordinary chemical processes are instructed by a trans-empirical order, the processes of the brain are excused from this principle. **C23**

19 **Phenomenal unity and the science of consciousness** Tobias Schlicht <tobias.schlicht@rub.de> (Philosophy, Ruhr-Universität Bochum, Bochum, Germany)

The scientific and philosophical investigation of consciousness has focused largely on the task of explaining what differentiates individual conscious states from unconscious ones, but, until recently, neglected the various forms of unity that characterize our conscious experience: The subjectivity of consciousness that gives rise to the 'hard problem' (Chalmers 1996), and the function of consciousness (Dehaene et al. 2006) are not the only explananda that a theory of consciousness must address. Consciousness also exhibits various forms of unity: it is subjectively unified in the sense that, typically, one experiences oneself as a single subject of thought and action, and it is phenomenally unified in the sense that one's simultaneous experiences typically occur as modifications or components of a single global conscious state (Bayne & Chalmers 2003). The fact that consciousness is subjectively and phenomenally unified puts important constraints on any persuasive theory of consciousness. Moreover, in light of pathological conditions, the question of what differentiates unified conscious states from disunified conscious states is an important one. Despite these important explananda, most current theories of consciousness tend to be atomistic both in methodology and scope; i.e. they take what Searle (2000) calls a building block approach to consciousness and attempt to explain particular conscious states individually. But by focusing on single representations (as of motion, say) and their neural correlates (activation in MT/V5, say), this strategy can only address certain qualitative characters of conscious experiences but not consciousness as a global unified single state. The task of this paper is to prioritize the unity of consciousness and to put forward a 'holistic' (Bayne 2010) account of consciousness. Conceptually, it is proposed here to map the qualitative character of an experience

to its core correlate and the subjectivity of consciousness to that part of the total correlate of consciousness that overlaps in many different experiences. Such an activation may be responsible for the 'me-ishness' (Block 1995) pertaining to conscious states. The central notion of the proposed account is that of 'integration': a mental representation is conscious if it is integrated into the single global unified conscious state of the organism at a time (like the dynamic core suggested by Tononi 2004). A representation is not conscious independently of so being integrated. Thereby, the account provides an answer to the question what makes a conscious state conscious while at the same time respecting subjective and phenomenal unity. Importantly, this account is not a version of representationalism or higher-order theory and can thus bypass their problems and shortcomings. Finally, the alternative model that is proposed here can nicely integrate philosophical theorizing with empirical models from the cognitive neurosciences. For example, in order to address the subjective point of view of the organism that goes with creature consciousness and is a precondition of having individual representations, we need to take into account phylogenetically older structures like certain brainstem nuclei and the hypothalamus among others, and more generally, what Damasio has dubbed 'proto-self' structures. **C9**

20 **Between knowledge and consciousness (II)** Shigeki Sugiyama <shigeki_sugiyama@ccy.ne.jp> (School of Engineering, University of Gifu, Yamagata, GIFU Japan)

We know that a human consciousness phenomenon occurs inside a brain and that it is something related with brain activities. The brain consists of neurons, so that the brain activities are fundamentally neurons' activities in the first sight. As far as we know at present, there is not any magic about the neurons' activities in the brain. Through these neurons' activities, a consciousness will come up to as an existence of its entity. And we can feel it through the five senses. But, at present, nobody knows of its mechanism, its system structure, its internal behaviour, and even a definition of Consciousness, exactly and clearly yet. However, as a fact that we know and as a fact that we experience through looking into ourselves, it is true to say that human consciousness grows potentially in a baby age towards an adult age and that a consciousness happens/occurs inside the brain. A potential capacity of consciousness will expand according to an expansion of quantity of Knowledge of ourselves that the brain has taken from the outer world. That is to say, this may show us that the consciousness is raised and grown inside the brain by the brain activities of its own. These are very rough and crucial analysis but these are the facts what we are able to see about a consciousness phenomenon on human. And so are for the living creatures. On the other hand, we can make Knowledge by using a computer. For example, we can make a voice recognition system, a touch sensor, a visual sensor, odor sensor, etc. that will behave like a part of living creatures. But we can recognize that Knowledge by computer is different from Knowledge in human Consciousness instinctively. In another word, we know that Knowledge by computer cannot have a consciousness state so far. From these facts, here introduces fundamental elements that are closely related with a consciousness and conjectures that are linked with a basic behaviour of consciousness. And a simple model of Consciousness State will be introduced by comparing Knowledge by computer and Knowledge in Consciousness. 1 Consciousness Phenomenon and Definition, 2 Conjecture, 3 Consciousness Mechanism, 4 Knowledge in General, 5 Between Knowledge by computer and Knowledge in Consciousness, 6 A Simple Model of Consciousness. **C2**

21 **Towards a coherent broadening of our understanding: Perspectives from an artist** Jol Thomson <communicate@jolthomson.ca> (www.jolthomson.ca, Frankfurt Am Main, Hessen Germany)

An analytical and critical approach to the organizational superimposition of patterns onto 'reality' in all fields and the interpretive projections of phenomenal experience lead me to research into diverse fields such as cosmology, theoretical physics, phenomenology, neuroscience, geometry, and communications in a tremendous effort to build a discourse bridge. This bridge is simultaneously a hybrid and synthesis between art, science and philosophy. Admittedly somewhat of a naive enthusiast, I do believe that this particular stance holds

qualities that allow me to ask questions and consider relations that would otherwise not be asked or made do to traditional prejudices. The creative act of observation and measurement iteratively functions as in a dream made concrete. The sciences may, and occasionally but seldom, do succeed through recognizing their own oneiric status and perspective. The grand epoch of 19th century German philosopher Edmund Husserl's phenomenology, is the first step towards recognizing that the conditions for the possibility of experience are fundamentally iterative loops as can be understood plainly in his tripartite notion of time-consciousness. Things only always appear, and fold over through themselves, which are simultaneously ourselves, and so we can jettison our belief in considering our observations as being based on any objective 'reality'. Instead, of course, we create our own realities, our cosmos collectively, through our intrinsic and extrinsic tools, thereby yielding great power and control. As an example, they say that subatomic particles do not actually exist, yet the amount of data, power, and information that stems from projects at high-energy particle physics labs is unquestionable, but if we were not looking for these tiny, minuscule elements of nature they are not there - they appear when we look for them. Similar to wave-particle duality and the collapse of the wave-function, these and other conundrums stemming out of theoretical physics lead us down a mysterious and intriguing hole that I understand to be an iterative function system. The seemingly omniscient aspects of the feedback relationship throughout all observation and experience of the stuff of the cosmos, for example the self-referral loops in the electromagnetic field theory of consciousness, leads me to consider the structural and reflexive component of omniscient feedback in all systems. Mediating between nature and abstraction, conscious experience and theoretical considerations of its constituents ought to continue to undermine traditional assumptions of what constitutes reality: inversions of determinism turn to a dissolute field of indeterminism, which seems all the more curious - reality through the 'as if' as opposed to the 'as-is'. This is one of the main focuses of my practice, but also the impression that we, each of us, separately and collectively, create our own life, our lives, to be as we should wish - political ramifications withholding, magnifying and amplifying these conceptions is my project and passion. Using lenses, mirrors, optical and aural feedback projections, light and geometrical frames, the artist creates complex environments that model and reflect consciousness, highlighting the act of experience and observation as a creative act in itself. **Art-Tech Demo**

22 **(Re)presentational potential and consciousness** Zoltan Veres <veresz@chello.hu> (Social Sciences, College of Dunaujvaros, Budapest, Hungary)

Representational models of consciousness are an infinite source for reconsiderations. My paper will be yet another attempt in this direction, with respect to some of Uriah Kiegel's ideas (Uriah Kriegel: Personal-Level Representation, and Precis of Subjective Consciousness: A Self-Representational Theory) The simplest way to describe the model of representation will involve three components and their relation: x representing y to a z. It is well possible that x=z (x representing y to its z self), and the semantic difference between x and z will tell about a separate mental state for x that is described by z. The underlying identity problem might lead us to models that deal with 'loopy' types of representations. The main theoretical issue with 'loopy' models is that they suggest a qualitative identity between x and z, hence the possibility of a regressus ad infinitum. If we stop at the idea of a semantic difference, as it is suggested by the scheme itself, we still have to try and look for a common qualitative denominator that makes it possible for us to conceive of a dynamic unity between the mental states (in this case x and z) such that we don't lose the concept of consciousness on the way. Also, we need a qualitative common denominator that lets us build a dynamic model instead of having a regressus ad infinitum. Let us take the case of a complete difference between x and z, that is, to take the case of representation. It must be stated here that such a difference can be hold only with a theoretical purpose since every act of representation is at the same time an act of self-representation. The common qualitative denominator gives an explanation for the identity of self-representation and presentation. Supposing that z, as Berkeley puts it, is an active spiritual substance, then the very same z by being a subject

of representation will in itself represent the act of representation, therefore the ontological position of z will shift, because as a possible receiver of x's representation of y will already become a possible constitutive element of x's representational act. Therefore, ontologically speaking, the subjective feature that characterizes every experience as a representational act can never be described only as a relation between a qualitative character (bluishness) and the subjective character of for-me-ness. The subjective character always already entails an attitudinal component that shapes the representational act, or the experience itself. The attitudinal component is an ontological disposition of representing or being represented, and I would call it, for want of a better term, representational potential. It serves the purpose of the above mentioned common qualitative denominator with a flexible explanatory content. Starting from this concept we may reach neighboring ideas with panpsychism/panexperientalism, or to further explore the potential hidden in representational potential, we might offer a substitute for the problematic concept of 'causality' understanding it as a representational process. **C34**

23 **Hypnagogic light experience** Engelbert Winkler , Dr. Dirk Proeckl <engelbertwinkler@gmx.at> (CEO, R&D, Dr. Engelbert Winkler OG, Wörgl, Austria) **Exhibitor (17)**

1.2 Ontology of consciousness

24 **C. S. Peirce's phenomenologically triadic semiotic theory of science and religion as non-fundamentalistic inquiries of thirdness and firstness and how firstness through secondness becomes thirdness** Søren Brier <sb.ikk@cbs.dk> (International Culture and Comm, Copenhagen Business School, Fredriksberg, Denmark)

In C.S. Peirce's fourth period of his pragmatistic triadic semiotic transcends the usual boundaries between philosophy, religion and science in modernity after Kant and Hegel and especially goes beyond William James pragmatism and theory of religion. Peirce's mature semiotic philosophy is especially focusing on the connection between faith, love, knowledge, truth, signification and ethics as means to obtain the Summum Bonum. This is done in a way that suggest a new understanding of science and religion as well as a relation between them that transcends our usual way of thinking of these matters in the West. His metaphysic is a Panentheistic sort of Agapistic knowledge mysticism, where science is the only road to common knowledge about the world as Thirdness and the divine and personal religiosity is a matter of the experience of the Firstness of pure feeling in free musing. Peirce suggests that the universe is the immanent part of the divine and that the other 'part' is a transcendental emptiness (Tohu va Bohu) 'behind and before' the manifest world. The transcendental part of the divine is not conscious, but obtains consciousness through creating the concrete manifest world in time, space and energy (Secondness) as well as laws and signification (Thirdness). Creation happens through three different kind of evolution relating to Firstness, Secondness and Thirdness. The divine is a Firstness of Firstness and can therefore in its own nature not be investigated scientifically and/or formulated more precise in words or signs. There can be no self-evident dogmas about 'God', 'the Gods' and so forth. The religious as phenomenon is about intuitive pure feeling. This has nothing to do with the social form the various religions has taken and they way power is veiled in these. But according to Peirce God is in the world (immanent) as Agapistic evolution towards the Summum Bonum, in which the universe becomes more and more orderly, loving and rational. Order and love seems to support each other in his evolutionary semiotic rationality. Thus Peirce's evolution is not 'intelligent design'. It is real evolution of the 'pure feeling' through 'the law of mind' in the process of which the divine becomes conscious and we - as selves - are the imperfect fallible dialogical symbols in that development. It is an integrated non-reductionist and a non-fundamentalist global vision for the cooperation of science and religion through a semiotic theory of consciousness. **C22**

25 **Cognitive system theory: Mapping the structural relationship between conscious experience and cognitive processing in human cognition**. Peter Burton <pburton@uow.edu.au> (Neuroscience & Cognition, University of Wollongong, Wollongong, NSW Australia)

The difficulty in understanding consciousness derives from the lack of an adequate 'first-principles' scientific basis of explanation. I argue that our failure to investigate the structure, range and diversity of human cognition is the source of this difficulty. However, developing an explanatory framework capable of integrating what we know of (i) modularity in the brain, (ii) case-management of learning, (iii) reflection and tasking processes which need time and resources in addition to learning; (iv) knowledge representation issues; and (v) acquisition and role of the self-model, represents a significant challenge. I will outline the structured development of Cognitive System Theory as the explanatory description of Human Cognition, and argue that this description has adequate complexity to explain in detail the role consciousness takes in cognition as well as resolve the major mysteries of mind-brain interaction, the acquisition of an objective self-model from within subjective experience, and the changing morphology of consciousness and refined cognitive representation as we gain cognitive experience and perspective. In this context, with a detailed model of cognition intermediating largely incoherent neuronal activity and phasically coherent bursts of cognitive coherence which form the basis of our conscious mental experience, it becomes clear that the conjecture of any direct basis of consciousness in neuronal activity has to fail. **C40**

26 **The three perspectives of consciousness** Alla Choifer <choifer@filosofi.gu.se> (University of Gothenburg, Västra Frölunda, Sweden)

A renewed interest and an extensive amount of work during the last three or four decades in the field of consciousness studies did not bring us much nearer to a solution of the basic enigma of consciousness. Researchers from different scientific disciplines have tried to grasp, explain and give an adequate theoretical account of what today still remains one of the most bewildering mysteries of modern times. In spite of all the disparities in the methodological approaches of psychology, psychiatry, philosophy, as well as the neurocognitive and biological sciences, there are only three known pathways along which consciousness can be studied: those are from the first-, the second- and the third-person perspective. However, all attempts to give an exhaustive account of consciousness from these perspectives have been confronted with a seemingly insurmountable problem - the nature of the correspondence between descriptions of consciousness from a first- and third-person perspective, respectively. It is what many researches would refer to as one of the basic problems in developing a consistent theory of consciousness, the so-called problem of "epistemic asymmetry". But the "problem" of finding any correspondence between knowledge acquired from the first-person perspective and knowledge acquired from the third-person perspective exists only as long as one assumes that the first-person and the third-person approaches are dealing with the same object. An underlying assumption here is that consciousness understood as existing independently of the perspectives can be seen from different - first-personal or third-personal - points of view. I shall argue that it is not the case. Items of knowledge acquired from the two different perspectives are irreconcilable simply for the reason that they concern two essentially different ontological types of objects, where each type is definable exclusively by the perspective taken. This is what makes unsuccessful any attempt to bring the two types of knowledge into accord with each other. The fact of there being two different types of objects (understood in the sense mentioned) for two perspectives of consciousness has been overseen because of the confusion in understanding of these perspectives. The state of affairs where researchers (while troubled with "asymmetrical" approaches to consciousness) cannot rely on any scientifically worked-out rigorous definitions of the perspectives of consciousness is unacceptable. The understanding of these perspectives in modern research is instead provided by means of the everyday use of the terms "first-person," etc., which, in scientific applications, is exceedingly unsatisfactory and misleading. I shall suggest definitions of the perspectives that will highlight why "epistemic asymmetry" should not be understood as an insoluble problem to be confronted with but rather as a starting point for understanding two perspectives. I shall then substantiate the proposed definitions by reflecting on the gradual development of the three perspectives during ontogenesis. **P1**

27 **Introducing an idealist conception of panpsychism** Peter Ells <peterells@hotmail.co.uk> (Oxford, United Kingdom)

In my presentation I will introduce a particular idealist and qualia-realist conception of panpsychism (IP) and show how it may be used to resolve many of the problems in the philosophy of mind. Among these are: 1. How IP finds a place for mind-body, body-mind, and mind-mind causation alongside the body-body causation seemingly determined by physical laws. 2. IP is an identity theory, yet without an explanatory gap. With IP there is a lucid and straightforward explanation as to how a particular pain can be identical to a particular pattern of neural firings for example, despite their having distinct properties. 3. Any theory of mind in which admits the possibility of zombies is in deep trouble, because this indicates that consciousness, where it exists, must be a useless epiphenomenon. Physicalists (e.g. Dennett) tend to assert that zombies are inconceivable by fiat. IP gives a specific, clear reason for the assertion that zombies are inconceivable within the theory. 4. IP gives a fully-reductive account of mind without reducing it to an epiphenomenon. There are other problems that IP can solve, but these are the ones that I would hope to be able to cover in my presentation. Reference: Ells, Peter (2011 - forthcoming), "Panpsychism: the philosophy of the sensuous cosmos" (O Books: Winchester UK & Washington DC). **C10**

28 **What kind of being is mental presence? On the ontology of consciousness** Georg Franck <franck@iemar.tuwien.ac.at> (Inst. of Architectural Science, Vienna University of Technology, Vienna, Austria)

Mental presence is the mode in which phenomenal consciousness exists. In the Eastern philosophy of Being, presence as such is hailed as the ultimate mode of existing. According to Western standards, however, presence seems to miss the mark of ontological dignity. The reason is that presence is observer-dependent, related to a viewpoint and enclosed by a horizon. Moreover, it is not a yes-or-no mode of existing, but a matter of degree; it varies in intensity. Mental presence oscillates in a daily circle between a maximum (full vigilance) and a minimum (dreamless sleep). Accordingly, mental presence not only, but presence as such is suspected of being a subjective mode of existing, thus not deserving of being taken seriously in scientific contexts. Scientific disregard of presence goes as far as even dismissing the temporal present as being of subjective a nature. The general view today of science and scientifically minded philosophy alike is that nowness and the experienced passage of time are subjective illusions. We thus find, ex negativo, identified mental presence and the temporal present. This identification is of utmost significance for the ontology of consciousness. The Now, in contrast to mental presence, is socially objective. People agree on living in one and the same Now not only, but on the time slice of spacetime also that presents itself in the Now. We find mental presence thus synchronized intersubjectively. If presence were purely subjective, i.e. brought forth exclusively by the individual brain, this synchronization came up to a miracle. We are thus led to look out for something capable of performing the synchronization. The paper speculates that the measuring process, understood quantum theoretically, is a candidate in point. Measurement, thus understood, does not happen only in labs, but as a universal process of constituting facts. The so-called collapse of the state vector is to be deemed responsible for the coming forth of the actual state of macroscopic reality that presents itself to experience. The measurement process, turning entangled ontic states into localised epistemic states is not prevented by the speed of light from establishing universal simultaneity. A universal Now, thus constituted, would not be forbidden by relativity theory. Might it thus be that nervous systems, in the course of evolution, have learned to make use of a universal process of actualisation, elaborating actuality, as generated by the transition from ontic to epistemic states, into mental presence as we know it from our being experiencing subjects? In this case, Eastern philosophy would be right, even scientifically. The paper relates to quantum brain dynamics, to Henry Stapp's thesis of quantum Zeno effects in the brain, to the discussion of panpsychism and to that about a time observable. **C36**

29 **Reconsidering the reality of consciousness and its metaphors** Silvia Gáliková <silvia@libris.sk> (Philosophy, Slovak Academy of Sciences, Bratislava, Slovakia Slovakia (Slovak Republic))

The intimacy of our conscious life filled with joys, desires, pains and sorrows is self evident. Experimental research brings novel insight into the workings of our memory, perception, learning etc. Physicians identify and assess clinical dimensions of the presence and absence of conscious states. For common sense, science and clinical practice, thus, consciousness fits perfectly into the physical world. However, many philosophers are less optimistic and are concerned rather with arguing why consciousness transcends the natural order or resists a reductive explanation (Searle, Chalmers). This trend is supported by a variety of metaphysical, logical and epistemological arguments (Nagel, Jackson, Kripke). In my presentation, I will argue against nonreductive views, on which consciousness involves something irreducible in nature, and requires expansion or reconception of a physical ontology. I claim, further, that the recent revival of dualism in philosophy of mind is the main theoretical obstacle in making any progress towards a science of conscious life. Theoretical chaos in the contemporary field of consciousness research is in my opinion due to a resistance to consider consciousness as a natural phenomenon and a neglect of the metaphorical character of the language about the "inner". Firstly, treating consciousness as natural like any other phenomena (sunsets, rainbows, diseases) is a necessary starting point in any inquiry. Whether consciousness arises at the physical, computational or quantum level is a matter for further research and theorizing. Secondly, describing states of conscious experience in metaphorical language - as metaphors does not make them less "real" as some philosophers suggest. Moreover, contemporary metaphor research (Lakoff, Ortony) demonstrates the crucial role of metaphors in both philosophical and scientific thinking. I will develop arguments on the logical and creative functions of metaphors in explaining consciousness. In order to understand the nature of our conscious lives we do not have to transcend the surrounding world or revise our conception of nature. To bring clarity into the meaning of the concept of psychical, mental and conscious would be a good start. **P1**

30 **Towards an ontology of immanence and introspection: An Indo-tibetan Buddhist response to the post-phenomenological critique of introspection in continental thought** Ole Hagen <olehagen@btinternet.com> (BIAD/Research, Birmingham City, Birmingham Institute of Art & Design, Birmingham / London, United Kingdom)

From a holistic understanding of the Indo-Tibetan Buddhist tradition; together, Madhyamaka philosophy's denial of an inherently existing basis for subjective consciousness and the Dzogchen view of non-dual awareness as a reality principle constitute the ontology of a complete mystical empiricism. I will use this perspective to refute some fundamental objections to the idea that 'the mind can observe the mind', as formulated by Jacques Derrida and other poststructuralist philosophers. In relation to cognitive science it is particularly the problems of 'duplication' and 'alteration' that relate to the epistemological position of Derrida; that consciousness is always divided from any immediate presence. I will start by showing that the distinction David Chalmers has made between causal explanations of consciousness and phenomenal consciousness is useful to distinguish consciousness of something from what we could call 'basic wakefulness'. But I will then go on to show how Madhyamaka philosophy undermines Chalmers' 'property dualism' by proving the ontological status of mind and matter to be equally one of insubstantiality. Dzogchen presents an ontology of immanence, that equates phenomenal consciousness with pre-personal non-local awareness. Given this view of basic wakefulness as immanent to epiphenomenal, subjective brain-consciousness, it follows that introspection is not seen as the duplication of a conscious content, and eliminates the need for an infinite regression of conscious observers. Temporalisation is nothing but alteration, there is no original static content to be preserved, but the basis for temporalisation is atemporal and immanent to time, according to the Dzogchen view. Studies of basic wakefulness in deep sleep provide speculative examples of this perspective by giving first person accounts of how atemporal consciousness precedes temporal subjectivity. **C24**

31 **How consciousness creates matter, relativity, quantum mechanics and self similarity: The oscillating universe of consciousness.** Robert E. Haraldsen <profero@online.no> (Profero-Hypertek, Eidsfoss, Norway)

This discussion is based on the assumption that consciousness is a dimensional field with the same relativistic dynamic characteristics as the electromagnetic field, e.g., specific frequencies, quantification, etc., relating to different processes of the mind. The idea adheres to the philosophical assumption that electromagnetic interaction is consciousness, or at least part of a broader consciousness field. Time is an illusion created by the processing and accumulation of perception onto reflections within the subjective mind, and is defined by the frequency of the interactions of thought process, where space is its reciprocal. This may seem self-referential as frequency, of course, is defined as events over time. However, the point is that time, as experienced, is totally "inside" -- it is subjective and different for each observer. Accordingly, "space" separated from "time" is a manifestation of structured consciousness, wherein experience exists as feedback of the mind projecting onto consciousness the illusion of separate entities. The closest one can come to true time is collective subjective time, and the universe is a collective subjective conscious entity of illusive space-time. At the deepest level consciousness is reverberation, fluctuations, analogous to matter-antimatter. Memories are contained within "materialized energy of consciousness" (as standing waves). This accumulation of energy-mass gives rise to its own experience of time-delay, following the time dilation principles of relativity. Past, present and future are merely constructions of mind and have nothing to do with any property of space-time 'itself' - as there is no such thing independently. Why we do not know about this relation to 'that which we have created' is because memory is continuously 'hidden' from awareness within the deepest levels of stored experience during evolution (and science is in a sense the methodology of rediscovery). Thus, consciousness is continuously changing and soon becomes unrecognizable as awareness shifts. If we should assume that the first awareness of existence was a step from nothing to something, it would be logically inconsistent, because however small the probability of existence may be, non-existence is indisputably zero, simply because it has no time. Our mind-body is so deeply integrated with and accustomed to the flow of 'collective creation' that we do not realize in what way we are so profoundly part of it. All minds overlap and are collectively and dynamically creating and building on the illusion of an infinite expanding universe growing out from a primordial infinitesimal point. These two illusion-extremes are vague and unexplained horizons. They should be regarded as directly connected analogically to the illusion of a sudden 'shifting of sides' on a Mobius strip (also analogous to a lens compressing an image through a focal point). The analogy is that dynamic relativistic effects of the collective consciousness invert space-time-sides "along the Mobius strip two-fold side". Consciousness, fundamentally being a relativistic oscillator, creates the illusive universe expanding or flowing continuously through singularities. Thus, the accelerating expansion is equivalent to a decelerating flow into a singularity and conversely. Moreover, at each oscillation of a dynamic part of consciousness, an experience is quantized into complex fractal patterns of collective material illusions. The Oscillating Universe of Consciousness - ERA http://www.scribd.com/doc/17000546/3-Relativistic-Flow-and-Aberration-illustrated-ERA **C39**

32 **Consciousness, enlightenment and existential evolution** Matthew Houdek <houdekm@my.uwstout.edu> (English and Philosophy Department, Syracuse, NY)

Pierre Teilhard de Chardin views consciousness as the third stage of the evolution of existence, following the emergence of the geosphere (inanimate matter) and the biosphere (biological life). He claimed that consciousness is an integral intrinsic element in the development of the universe leading eventually to what he referred to as the Omega Point: a maximum organized complexity (complexity combined with centricity), which he viewed as a Christogenesis, but for our purposes will be viewed outside of, or not exclusive to, Christianity or religion (it is this third stage that will be addressed). There are seemingly an endless number of theories and beliefs on the one-ness or inter-connectedness of consciousness, and for the mystics in particular, the one-ness of consciousness with absolute reality attained

through Enlightenment. When combined, the mystic view of one-ness and Enlightenment with (and adapted form of) Chardin's pro-scientific view of consciousness as the third stage in existential evolution suggests that Enlightenment, like consciousness itself, is inherent in reality (in humans, for example, according to John Searle, consciousness is a neurobiological phenomenon). William James and Richard Bucke would likely agree with this in their own theories about cosmic consciousness and Enlightenment, and through their analyses of others' religious or mystical experiences. For them, Enlightenment, a rare phenomenon in human history, is described as a distinct and higher form of consciousness, and thus elevated beyond how Searle and others view consciousness. This paper will build off James' and Bucke's thoughts on and descriptions of Enlightened or cosmic consciousness, off Searle's notion of human consciousness, and off mystic philosophy and will propose that (1) Searle's human (neurobiological) consciousness is a distinct and lesser, or rather limited, form of enlightened consciousness, that (2) enlightened consciousness is a distinct and lesser, or rather limited, form of existential consciousness (and that human Enlightenment is a tapping into this higher form), and that (3) the next stage in existential evolution could be an Enlightenment of this existential consciousness, thus not human-centric. In particular for this paper: if consciousness is inherent in reality, and if this consciousness becomes Enlightened (at the Omega Point), does the universe itself, in perfect form, enlightened, return to The Source just as the mystics have said humans that experience Enlightenment return to The Source (drawing on various Eastern traditions, Vedic, Taoist, Buddhist, of what The Source is)? If so, does this help explain recent theories (Penrose) of the universe as being a conformal cyclic cosmology, a succession of aeons sprung forth from a succession of nothing-nesses (which would be to imply that the Omega Point is, instead of a final stage of existential evolution, a re-setting of the existential evolutionary cycle, a return to a beginning, to pre-material reality)? Is human Enlightenment a microcosmic state of the universe in perfect (Enlightened) form? How exactly does Searle's notion of consciousness as a neurobiological phenomenon relate to enlightened consciousness? This paper will address all of these questions, among others, and offer a variety of potential answers. **P1**

33 **Self-realization through illuminated mind training - The workbook of "A Course in Miracles"** Clare Lamanna <clarelamanna@gmail.com> (A Course in Miracles, Reedsburg, WI)

The whole basis of every philosophical, scientific or religious endeavor is fundamentally an attempt to determine what we are, why we are here and what the purpose of life is. As a manifestation of consciousness, a human being is aware that he is aware, yet he is a questioner of what he is and believes he can provide the answer for himself predicated on his own cause and effect thought processes -- he believes reality is open to his own interpretation. If this were true, reality would be highly variable and completely unstable. By definition, reality must be unchangeable. Reasonably then, a human consciousness cannot be sure of anything while his uncertainty of self is the premise of his search. Self-realization through a mind training procedure such as the practice of the workbook of "A Course in Miracles" remedies the strange idea that it is possible to doubt yourself, and be unsure of what you really are. It does not aim at teaching the meaning of your Self, but it does aim at removing the obstacles to the awareness of Its Presence that is eternal joy, peace and love. Enlightenment, knowledge of self or self-certainty is merely a recognition, not a change at all and can only be arrived at through the transformation of the mind. One might well ask me, "How do you know that?" I know it through the illumination of my own consciousness. Who can deny the presence of what he beholds within himself? This presentation introduces the unworldly masterpiece that is "A Course in Miracles", a mind training that is leading to the very real physical, mental and emotional transformation of ourselves, and the recognition that each of us is a whole part of the eternally creating source of all reality. **P1**

34 **The Hard Problem of Existence** Kristjan Loorits <kristjan.loorits@helsinki.fi> (Helsinki, Finland)

One of the central issues in modern philosophy of mind is known as the hard problem of consciousness. The problem was introduced in the 1990s by David Chalmers, according to whom the existence of conscious experience cannot be explained in a traditional scientific framework because scientific explanations are limited to functional properties only. Chalmers argues that after explaining all the functional properties of conscious experience, we could still ask why these functions do not take place 'in the dark'; why is it that there is something it is like to be an organism that has cognitive functions? It seems that the hard problem of consciousness is actually a manifestation of a much more general problem, which could be called the hard problem of existence. I will attempt to show that the idea of the abstractness of physics introduced by Bertrand Russell allows us to treat all the objects of empirical sciences as abstract sets of functional properties, with no need to consider the existence of anything substantial that actually realizes these properties. Objects of physics can be thus interpreted as abstract sets of functional properties; actual substantial objects, on the other hand, should be interpreted as substantially realized sets of functional properties. Actual substantial objects are hence, in a strict sense, extraphysical, and their existence cannot be explained scientifically. The above-stated would also be true of conscious experience: even though the functional properties realized by conscious experience could be reduced by traditional scientific methods to more basic and fundamental functional properties, the actual existence of conscious experience, as a substantial entity, cannot be explained in a scientific framework. The above-described framework allows us to analyze the fundamental disagreement between proponents and opponents of physicalism with Wittgensteinian methods. It is possible that the concept of a substantially realized set of certain functional properties is linguistically indistinguishable from the corresponding concept that refers to a mere abstract set of functional properties. In light of the aforementioned vicious ambiguity, the progressive success of explaining conscious experience fully in terms of physics can be interpreted as a success of finding non-substantial interpretations to notions which are originally meant to refer to something substantial. Such success will not resolve the hard problem of consciousness or the hard problem of existence, but can hopefully, with the help of Wittgensteinian analysis, help us more clearly understand one central aspect of these hard problems. **P1**

35 **Consciousness: Expanding horizons** Marek Bronislaw Majorek , Roland Benedikter, European Foundation Professor of Sociology in Residence at the Center for Global and International Studies at the University of California <majorek@datacomm.ch> (School of Psychology, Centre for Research on Social Climate, Canterbury, United Kingdom)

During the preparatory stages towards the 'Decade of the Mind' project proposed to the U.S. government by leading universities and scholars (among them Roland Benedikter) for 2011-2020, the concept of 'consciousness research' as 'brain research' has been interdisciplinarily enlarged not least as a consequence of the flaws and limitations that characterized the 'Decade of the Brain' project designated by the then U.S. president George H. W. Bush for the period 1990-1999. Departing from the assumption that consciousness is a multilayered and complex phenomenon, not only neuronal, physical and medical, but also philosophical and religious experiences are now taken into consideration on a par with the former ones in order to make the first steps towards an inclusive and multidimensional image of the phenomenon of consciousness (cf. Roland Benedikter et al. 2009). During the 2009 'Towards a Science of Consciousness' conference in Hong Kong Marek Majorek presented arguments in support of the claim that no materialistic theory will ever be capable of the problem of the emergence of consciousness, for such theories are incapable of explaining the fact that essentially the same processes are observable in the brain when a person is conscious and when she is not conscious, e.g. is asleep and/or such theories seem to be incapable of explaining how meaningful, in particular conceptual, contents can arise from purely physical brain processes (cf. M.B. Majorek, in JCS, forthcoming). Such theories are further confronted with the need to explain a number of deeply puzzling empirical findings, like for example those of Nobel Laureate Roger Sperry who indicate that conscious intention comes before the activity of brain cells; of the Global Consciousness Project of Princeton University that showed that consciousness impacts matter to a similar extent as vice versa; or the findings of the fields of neuroplasticity and neurogenesis that are beginning to demonstrate that conscious intention can alter the brain structure (Perlas 2007). All these findings

seem to contradict the still largely prevailing mainstream assumption that the physical brain causes consciousness. We would like to outline an alternative interpretation of the role of the brain in the processes of consciousness, an interpretation which was put forward by Rudolf Steiner (1861-1925) nearly a hundred years ago, but has not received the attention it deserves. This interpretation sees the brain not as 'the producer' of consciousness, but rather as a 'mirror' for the reality existing outside of it. The resulting reality process is not a kind of 'thin, undifferentiated mist' produced merely by the brain, but rather, and in harmony with ageless spiritual traditions of mankind, a paradoxically structured subjective-objective process where the world cannot come into existence without the individual mind, and the mind cannot exist without the objective world. To conceive consciousness as a (synchronic and diachronic) 'spiraling process' between these two poles paves the way for experimenting integrative approaches that may be able to reconcile the still conflicting views of the 'two cultures', i.e. the natural sciences and the humanities. **C24**

36 **Panpsychism and the evolution of experience** Jaison Manjaly , <jmanjaly@iitgn.ac.in> (Cognitive Science, Indian Institute of Technology Gandhinagar, Ahmedabad, Gujarat India)

Panpsychism as proposed by Strawson (2006) assumes that micro-experience is a fundamental physical property which evolves into macro-experience through natural selection. Having explored 'what it is like for experience to evolve', this paper argues that the evolution of micro-experience is philosophically problematic. The paper also discusses how this problem could pose difficulties for the sustainability of panpsychism as a metaphysics of mind. **C37**

37 **Science, consciousness and the Russellian speculation** Tom McClelland <t.mcclelland@sussex.ac.uk> (Philosophy, University of Sussex, Lewes, Sussex United Kingdom)

This paper explores the relationship between science and consciousness, advocating a distinctive version of what Chalmers labels 'Type-F Monism'. Russell held that perception and measurement reveal only dispositions, allowing us to '...infer a great deal as to the structure of the physical world, but not as to its intrinsic character'. If structures require a non-structural foundation, a science-based ontology is logically committed to the existence of intrinsic properties, though their specific nature is beyond scientific investigation. Foster later dubbed these properties 'inscrutables'. The Russellian Speculation is that 'sensations' - what we'd call phenomenal properties - are one and the same as these inscrutables. What would this panpsychist position mean for science and consciousness? I argue it would invite a Good News/Bad News verdict. The good news is that inscrutables are in the charmed circle of properties countenanced by a science-based ontology, so consciousness would have a place within the scientific worldview. The bad news is that there could be no 'Science of Consciousness'. Scientific explanations, laws and theories can only describe the structural level of the world. We can improve on Russell by offering a position which is less pessimistic, and which avoids panpsychism. The apparent ontological gap between the physical and the phenomenal has two parts. First, the structural nature of the physical cannot accommodate the intrinsic qualities of consciousness. Second, the objectivity of the physical cannot accommodate the subjectivity of conscious awareness. The first gap is plausibly a symptom of our limited conception of the physical. The elusive inscrutables are physical properties that are intrinsic rather than structural. As such they could plausibly be responsible for the intrinsic qualities of experience. This suggestion, which draws on Stoljar's Ignorance Hypothesis, involves no panpsychist commitment to inscrutables being inherently experiential. The second gap is not undermined by the Russell strategy since inscrutables are not plausibly relevant to subjectivity. Consequently, a different strategy is needed to overcome the subjectivity problem. Self-Representational theories, such as Kriegel's, promise to account for subjectivity in objective terms. This Neo-Russellian mixed theory offers an appealing Good News/Fair News verdict for science. Firstly, it successfully accommodates consciousness within a science-based ontology. Secondly, though it prohibits a science of phenomenal qualities, it encourages the scientific investigation of the self-representational architecture of consciousness. **C10**

38 **Dual nature of consciousness** Igor Nevvazhay <igornevv@gmail.com> (Philosophy, Saratov State Law Academy, Saratov, Russian Federation)

I offer a concept of dual nature of consciousness which could give an opportunity to understand the Other. As it is known, the phenomenological theory of intentional consciousness has met with serious obstacles when Husserl tried to solve the problem of intersubjectivity. German philosopher B. Waldenfels developing the phenomenological theory of consciousness proposes that activity of consciousness is not reduced to only intentional acts, but its activity should be described also as responsive acts. The term "responsive" designates a situation when consciousness of the Other is present in my own consciousness by means of readiness to response inquiry of the Other. I ground the expanded treatment of concept of "responsiveness", which allows us to explain such enigmatic phenomena of human life as a dialogue with the Other, and deliberate deceit. Intentional consciousness and responsiveness are realized by means of two alternative fundamental actions. Intention creates a field of interpretations, that is, a set of meanings which are given to signs. These interpretations make the content of the constructed world. In this case consciousness works as a factory of reality. Another situation takes place, when we search for representation of already given content, trying to identify what is given to us. Here we deal with the act of "name". A proper name of some object is a way of its representation in consciousness. Existence of two types of conscious attitude to reality explains some optical illusions, and logical ones (lie, deception). Then I prove existence of two types of culture according to two mental activities. One of them I call a culture of rules, and the other one is a culture of expression. The culture of rules is determined by an attitude to a sign as something conditional concerning its referent. Here the consciousness exists as an intentional act which defines a meaning of a sign. This is a procedure of interpretation of a sign. A sign and its usage define its meaning, so the norm is "that exists what is right". Here the main cogitative opposition is "regular - irregular". It means real is that which is entered by means of rule. Thus, in this case consciousness works as a factory of reality. In the culture of expression the consciousness is directed at searching for the "right" expression of the already given content. Due to that the external reality becomes an event of our consciousness. Thus responsive acts create the type of culture in which the mental opposition is "right - wrong" which concerns estimation of a representation. Here there is the norm "that is right what exists". Analyzing human thought we have to recognize that different types of culture, or logic of thinking, are equal in rights. This point of view allows understanding legitimacy of claims of alternative ways of thinking in different spheres of human being. To illustrate that I am going to consider alternative approaches in mathematics: constructivism and intuitivism. **C10**

39 **On some theoretical problems with brain emulation** J.F. Nystrom <nystroj@ferris.edu> (Mathematics, Ferris State University, Big Rapids, Michigan)

If we presume an objective reality in which Mind and matter have a type of quantum mechanically imposed dualist nature, then there results some potential theoretical problems with the idea of Brain emulation. In the remainder of this abstract I discuss the specific type of dualism I advocate, and provide details on a theoretical problem that could cause, for example, Fred's Brain emulation (that Fred presumably built) to make the real Fred effectively (brain-)dead. According to modern physics the actions of a quantum vacuum are required in order for any process at all to exist in Universe. I have previously described a model for how the quantum vacuum actions should be separated into a non-spatio-temporal abode (which I call Negative Universe) and a reality flux mechanism (which involves all the antiparticles and virtual particles that are part of the quantum vacuum actions). A reality flux can thus mediate 'communication' between Negative Universe and physical Universe. This model of how the quantum vacuum provides a scaffolding for a Universe as computation has profound implications for how Mind interacts with physical Universe. Here, Mind would reside in Negative Universe, while matter and energy are things in physical Universe. This model is similar to both the Penrose-Hameroff model which uses a separate Platonic World (or intrinsic space-time geometry) to support Mind functioning, and to Jaegwon Kim's very Cartesian speculation that "the world is split in two with Minds on one side and stuff on

the other." To elucidate the issues associated with the possibility of Brain emulation, I now work from the presumption that each individual Mind does reside outside physical Universe (in Negative Universe) and maintains a 'connection' (if you will) with a Brain (in physical Universe) through actions of the reality flux. This dualist presumption raises serious consequences for those who would suppose to build brain emulations (by, for example, replicating the wiring and functioning of a human-like brain). To wit: If a Mind currently 'connected' to a Brain all of a sudden has two choices of what to 'connect' to in physical Universe; if it (i.e., the Mind) chooses to 'connect' to a brain emulation of Fred after Fred turns the brain emulation on, this Mind could then (possibly) cease to 'connect' with Fred's human brain, thus rendering Fred (brain-)dead; albeit with Fred's Mind "living on" by now being 'connected' to the brain emulation. There are other possible problems which presume first of all that Negative Universe is the repository for Minds currently not in use. Thus, the building of generic brain emulations could cause: (1) a potential depletion of Universe soul/Mind inventories, and (2) interruptions in the Hindu reincarnation process by capturing a Mind destined for elsewhere. Lastly, it is important to note that the builders would also in effect be mimicking a Gnostic Demiurge by entrapping a Mind in something of their own creation. **C18**

40 **From darkness to light: The way of Divine Reason** F. N. Vanessa "Jubi" O'Connor <jubilation@gmail.com> (Wisconsin Dells, WI)

The stated purpose of this conference is "to emphasize broad and rigorous approaches to all aspects of the study and understanding of conscious awareness." Given quite literally that the process of study and understanding can be accomplished only by means of conscious awareness, this undertaking places us in a conundrum of universal proportions, a conundrum upon which the entire human condition, the domain of ego consciousness is predicated. In other words, the underlying question driving your actions, "study" and understanding" is "What am I?" Yet you can know yourself only as you are, because that is all you can be sure of. Everything else is open to question. The concept of the self has always been the great preoccupation of the world. And everyone believes that he must find the answer to the riddle of himself. The attempt to find the answer has spawned all religions and given rise to conferences such as this one. Gnosis, the true goal of all religion can thus be seen as nothing more than the escape from concepts. You demonstrate an amazing capability of asking questions but not of perceiving meaningful answers, because these would involve knowledge and cannot be perceived. The mind is therefore confused, because only One-mindedness can be without confusion. As a mind that has become enlightened and knows its own wholeness, through the mind training procedure of Jesus Christ in A Course In Miracles, I can categorically submit that this knowledge can be gained only through a mind transformation process or enlightenment. There comes a time when images have all gone by, and you will see you do not know what you are. It is to this unsealed and open mind that truth returns, unhindered and unbound. Where concepts of the self have been laid aside is truth revealed exactly as it is. When every concept has been raised to doubt and question, and been recognized as made on no assumptions that would stand the light,then is the truth left free to enter in its sanctuary, clean and free of guilt. There is no statement that the world is more afraid to hear than this: I do not know the thing I am, and therefore do not know what I am doing, where I am, or how to look upon the world or on myself. Yet in this learning is enlightenment born. And What you are will tell you of Itself. - A Course In Miracles Today, we will let go all the trivial things that churn and bubble on the surface of your mind, and reach down and below them to the Kingdom of Heaven. There is a place in you where there is perfect peace. There is a place in you where nothing is impossible. There is a place in you where the strength, knowledge and love of God abide. **P1**

41 **Bohmian View of Consciousness and Reality** Paavo Pylkkanen <paavo.pylkkanen@his.se> (School of Humanities and Infor, University of Skovde and Helsinki, Skövde, Sweden)

Thomas Nagel has summarized the philosophical situation with the problem of consciousness as follows: "Neither dualism nor materialism seems likely to be true, but it is not clear what the alternatives are." One 20th century thinker who was trying to develop an alternative was the physicist-philosopher David Bohm (1917-1992). The starting point of Bohm's view was the realization that quantum theory and relativity require radical changes in our traditional notions of matter. Such changes then imply new possibilities for understanding the place of mind and consciousness in nature. Bohm showed already in 1952 that quantum theory can be understood by assuming that a new type of 'quantum potential energy' plays an organizing role at the quantum level. In later work with Basil Hiley in the 1980s he argued that this energy is best understood as a type of 'active information'. Information is something that is obviously related to mind and consciousness. By finding a role for information in the fundamental laws of physics Bohm opened up, at least in principle, a new possibility for understanding how 'minds' as informational, meaning-carrying processes - could possibly influence 'matter'. Another of Bohm's quantum-inspired concepts that seems useful in consciousness studies is 'implicate order'. Quantum phenomena such as discontinuity, wave-particle duality and non-locality suggest the need to give up the familiar Cartesian continuous 3D 'explicate order' as fundamental, and instead to assume that the fundamental order of the universe is the order that prevails in the movement of quantum fields, and that this order is 'implicate' in the sense that information about the whole universe is enfolded in each part of the movement. The familiar explicate order of things in 3D space then unfolds from this enfolded order. It seems that conscious experience has many features that might be better understood in terms of the implicate order, such as spatio-temporal structure, unity and dynamic flow. The Bohmian programme is ambitious and exotic, and also difficult to understand. It is thus perhaps not surprising that more sober consciousness researchers have by and large ignored the radical possibilities it opens up. In this talk I will briefly present the key ideas of the programme, bring out their advantages and problems, and make suggestions about how we might make progress along the road that it points to. The key problem in contemporary consciousness studies is how information becomes conscious. Can the Bohmian programme, with its new, scientifically grounded conceptual resources such as active information and implicate order, throw any new light upon this difficult problem? See also Pylkkanen, P. (2007) Mind, Matter and the Implicate Order. Heidelberg and New York: Springer Frontiers Collection. **PL6**

42 **Schopenhauer and the philosophy of mind** Peter Sjöstedt Hughes <peter@philosopher.eu> (Philosophy, College, London, United Kingdom)

Schopenhauer's philosophy presents a wealth of novel concepts that can be utilised within contemporary Philosophy of Mind, thereby clarifying the issues at stake. His version of Transcendental Idealism overcomes the problems of both Materialism and Dualism in a way akin to modern approaches such as 'Type-F Monism'. I propose to explain the relevant parts of Schopenhauer's neo-Kantian philosophy vis-a-vis consciousness, explaining its Kantian roots and its Nietzschean fruit. **C9**

43 **How consciousness forms the quantum hologram** Hasmukh Taylor <hasmukh_taylor@hotmail.com> (Consultancy, Pranava Yoga, Lake Mary, FL)

One of the most interesting philosophical projects in the study of consciousness is that of refining the notion of awareness so that it becomes a more perfect psychological correlate of consciousness. With the help of David J Chalmers's 'principle of structural coherence', a bridging principle will give a criterion for the presence of consciousness in a system, a criterion that applies at the physical level. Such a principle will act an epistemic lever leading from knowledge about physical processes to knowledge about experience. Dr. Hasmukh Taylor's insight presents a Quantum Holographic Model (The Living MATRIX) for integrating into the scientific framework phenomena of Consciousness (Atman) and Awareness (Brahman), which frequently have been considered beyond rigorous scientific description and has eluded all disciplines of science except a direct experience. This is true, not because of insufficient evidence for a particular phenomena's existence, but rather for lack of a theoretical construct and experience, which could fit within the prevailing paradigms of science. It is further postulated that from the point of view of evolution, quantum Awareness and nonlocal Consciousness are the basis from which self-organizing cosmological processes

have produced the common phenomenon of perception in living organisms with the help of the Quantum Awareness Holographic Model. It allows, for the first time, a possible approach for understanding the mysterious world of consciousness and awareness. Dr. Taylor will also be able to address and answer the following questions based on his personal yogic experience. Is consciousness an epiphenomenal happenstance of this particular universe? Or does the very concept of a universe depend upon its presence? Does consciousness merely perceive reality, or does reality depend upon it? Did consciousness simply emerge as an effect of evolution? Or was it, in some sense, always "out there" in the world? These questions and more, will be answered in this special occasion. Philosophical implications are also evident in Roger Penrose's evaluation of the difficulties of quantum mechanics. The principal conceptual difficulty is that reality existing in a unique and determined state always applies to the observer and the observer's instruments but only applies to other external objects after they have been observed. Thus, Schrodinger's Cat is both alive and dead at the same time, until the box is opened and the cat is observed. This was Schrodinger's own reductio ad absurdum of quantum mechanics, a feature not always noted in triumphalist treatments of the subject, since it raises the question who counts as an observer. A cat would seem to be a sophisticated enough being to count as an observer, or does it? And if it doesn't, why do we? And if a cat does, how about a mouse? A grasshopper? A bacterium? What is really the principle for making the distinction? It is clear that there isn't one (except just between "us" and "them"), and Penrose examines different possibilities, none of which seems entirely satisfactory. Dr. Hasmukh Taylor would be able to address these questions and answer them logically. **C23**

44 **New understanding of nature of human beings** Sandra Tereshko <sandratereshko@gmail.com> (European Humanities University, Minsk, Belarus, Minsk, Belarus)

This paper is intended to raise global awareness of the importance of new understanding of human beings' nature. Wrong understanding of what we are, leads to suppression of consciousness, and makes people ignorant of their ability to influence on their reality. That is why reconstruction of the assumptions of the world is so important. The creation of the science of consciousness should be put as a goal to achieve the primary purpose. Recent discoveries in quantum physics start pointing at a different way of thinking about the world. ''It suggests the world should be a highly interconnected organismic thing which extends through space and time. From this perspective, what I think and the way I behave has an impact not only on me, but on the rest of the world as well'' (Dean Radin). Discoveries in medicine show that we have an ability to change the way our brain processes information and the way our nervous system generates our emotions. The key aspect is that consciousness has an impact on the world (Fred Alan Wolf, Stuart Hameroff, William Tiller, Jeffrey Satinover, Candace Pert, Joseph Dispenza and others). At the level of our daily life it means that a new paradigm will give us a new vision of the essence of life, which will help to understand people's behavior, their feelings and circumstances, which we used to call accidentals. Moreover, we will most probably get very basic understanding of how we can develop our ability to affect the world. At the level of human society wrong perception of the meaning of ''being a human'' results in destruction of the system, humans are a part of. Global disasters, world wars and mass killings should serve as strong indicators that people get their nature wrong. However, is human consciousness potential limited in perceiving the world? For instance, can we understand the reason for existence of human beings or the reason for existence of the Universe? It is very probable that the human mind capacity is limited. This should mean that even if humans are given a direct answer to the question about the reason for existence, they will not be able to perceive the information. You might as well try to explain the method for accelerating nuclei in the synchrophasotron to children, but you cannot expect them to understand it. Obviously, there is not enough evidence to prove this point of view. Nevertheless, if I got this wrong, the human mind at the most advanced level of its development is able to create the Universe. An interdisciplinary approach to the study of conscious awareness, which has already led to the conclusion that our thoughts affect the world, should advance further research. Special consideration should be given to analysis of conditions and circumstances, which put into effect the process of transformation, to understand the way it could be developed. In such a development should be revealed the extent to which human mind can perceive the world. **P1**

45 **Australian indigenous people's dreaming consciousness** Kay Thomas , Kay L Thomas <kayt38@hotmail.com> (Boyne Valley, Queensland Australia)

The book Dark Sparklers, by Bill Yidumduma Harney and Jim Cairns, 2004, shows us the complexity of dreaming awareness of Indigenous Australians. Bill Yidumduma Harney is unique in that his father was a bushman and a famous author in Australia, Bill Harney, who lived amongst the Aboriginal people of the Wardaman tribe for many years and married into the tribe. Yidumduma was therefore able to correctly describe the cultural practices of his tribe to westerners and explain their spiritual and practical significance. Their spiritual world consists of over 150 different words and pictures metaphorical descriptions of the animals, birds, reptiles, trees, Lightning Children, and cultic items of the creation Story, that appear in intricate stone carvings of the sky at night. The difficulty we have in understanding this very different form of consciousness is that the anthropological reports we have of it are very much tainted by the belief that western thought is superior and that their spiritual and magical thinking, was inferior. In this paper I will try to explain the very different form of consciousness referred to as the dreaming that embodied practical and spiritual truths to guide people through a harsh environment and complex social relations. **C40**

46 **To be and not to be - Choice and semiosis as the basis of consciousness** Jussi Tuovinen <jussi.m.tuovinen@helsinki.fi> (Department of Philosophy, Hist, University of Helsinki, Helsinki, Finland)

Is there anything between deterministic causal processes and random stochastic processes? Yes, genuine choices between two or more alternatives, whether it is a question of deciding whether something is edible or not or deciding how to cope with the global financial crisis. Without a chance for choice there is no need for intelligence, memory, consciousness or any of those other quite useful tools evolution has offered us and other more or less intelligent animals. The reasons are obvious, but what enables that choice? The answer, I want to emphasize, is evaluation and estimation based on the interpretation of a certain thing or issue, thus a semiotic process by definition. Interpretation of anything links it with a meaning, value and motivation for action to its interpreter, whether it is something quite concrete and actual like to fight or run or something highly abstract and cultured like an expected etiquette on a six-course meal. By deconstructing semiosis and its semiotic processes to its basic elements it is also possible to see how these processes have evolved a step by step and hand in hand with cognitive evolution both enabling and necessitating the latter. Following and elaborating Terrence Deacon's model on semiotic sign formation from iconic to indexical and further to symbolic level I argue that this gradual development of semiotic skills is so closely connected to the development of cognition and intelligence that actually it is one and same process. Especially consciousness as a locus of choice and intentional agency is essentially based on this semiotic competence which gives it the choices to choose from. A proposed model of semiotic tetrahedron tries to conceptualize these processes and show how recurring layers of interpretation produce new meanings and knowledge and offer the link between the inner and outer worlds of each conscious mind. This heuristic model has two main aims. On one hand it represents the inner structure and dynamics of the sign formation process and on other hand it links the corresponding inner representations to their counterparts in non-semiotic space, i.e. 'out there'. Further research in neurology and other relevant fields of science will hopefully and quite likely offer more exact knowledge on the perennial mind/body-issue and connection of thoughts and their neurological correlates, but regardless of the exact actual neurological processes there has to be a link between cognitive signs and the meaningful objects of the world, and the claim of this paper is that it is essentially a semiotic one. **P1**

1.3 Materialism and dualism

47 **Research on mediumistic experiences and the mind-brain relationship**
Klaus Alberto , Alexander Moreira-Almeida MD, PhD <alex.ufjf@gmail.com> (Research Center In Spiritualit, Federal University of Juiz De Fora, Juiz De Fora, MG Brazil)

Mediumship, a spiritual experience widespread throughout human history, can be defined as an experience in which an individual (the medium) purports to be in communication with, or under the control of, the personality of a deceased person or other nonmaterial being. Research into this phenomenon was seminal to our understanding of the mind, particularly unconscious and dissociative mental activities. Since the XIX Century there is a substantial, but neglected tradition of scientific research about mediumship and its implications to the nature of mind. Applying contemporary research methods to mediumistic experiences may provide a badly needed broadening and diversification of the empirical base needed to advance our understanding of the mind-body problem. The best studies performed on this topic, the explanatory hypotheses raised, and their implications for the mind-brain problem will be discussed. **C8**

48 **Materialism's eternal return: Recurrent patterns of materialistic explanations of consciousness and other mental phenomena** Saulo Araujo <saulo.araujo@ufjf.edu.br> (Federal University of Juiz De Fora, Juiz De Fora, Minas Gerais Brazil)

Since the new developments of neurotechnologies for studying the brain functioning in the second half of twentieth century, a new wave of enthusiasm for materialistic explanations of consciousness and other mental phenomena has invaded philosophy and psychology departments worldwide. The culmination of all this was the so-called "Decade of the Brain" in the 1990s. However, a closer examination of the arguments presented by some of these new materialists reveals recurrent patterns of analogies and metaphors, besides an old rhetorical strategy of appealing to a distant future, in which all the problems will be solved. We intend to show that these new forms of materialism repeat discursive strategies of older versions of materialism, especially the French materialism of the 18th century and the German materialism of the 19th century. Finally, an interpretation for materialism's eternal return will be offered. **C25**

49 **Jackson's dual stipulation: The incoherence of the description of Mary** Noel Boyle <noel.boyle@belmont.edu> (Philosophy, Belmont University, Antioch, TN)

Conventional physicalist responses to the knowledge argument focus on what happens when Mary escapes her achromatic prison. Lewis argues that she gains a new ability; Loar argues that she gains new epistemic access to old facts; Horgan argues that she gains ontologically but not theoretically physical information; Dennett boldly suggests that she learns nothing at all. The problem I find with each of these responses is that Jackson's description of Mary as 'knowing all the physical facts in a black and white room' is taken to be coherent. Though Jackson's claim is merely stipulative and he can stipulate whatever he wants (it is, after all, his thought experiment), it too often goes unnoticed that Jackson makes a dual stipulation. Jackson stipulates that Mary's experiences are entirely achromatic. He also stipulates that she knows all the physical facts. By making this dual stipulation, Jackson asserts that the conjunction of the two stipulations describes a possible situation. That is, he implicitly asserts the modal claim: 'it is possible to know all the physical facts through purely achromatic means'. I reject this modal claim. Acknowledging that on some senses of 'all the physical facts' it is possible to know them all achromatically, I point out that the only sense of 'all the physical facts' that is relevant to the anti-physicalist conclusion of the argument is 'all the facts that can be countenanced by physicalist ontology'. Turning to Jackson's own work on the truth conditions for physicalism, I agree with Jackson that physicalism's claim to offer a complete account of the world is best captured in terms of the following supervenience thesis: 'any world which is a minimal physical duplicate of our world is a duplicate of our world simpliciter'. That is, physicalism is true if any complete and perfect

microphysical replica of this world is thereby automatically a replica of our world in every way (including a phenomenal replica). Returning to Mary, I grant the intuition that there are facts about our world which cannot be known by achromatic means. I point out that it is a further question whether such facts would also be true of a microphysical replica of our world. I claim that there are strong intuitions that such phenomenal facts are metaphysically necessitated by microphysical facts and are, therefore, also true in microphysical replica worlds and are, thus, are consistent with physicalist ontology. Finally, I argue that the burden of proof lies with those who would deny that qualitative facts can be countenanced by physicalist ontology. If, as I argue, physicalists are justified in holding that the phenomenal facts about our world are also true of microphysical duplicates of our world, then physicalists need not, and ought not, offer accounts of what happens to Mary upon her release. Instead, they simply bluntly deny that the thought experiment describes a coherent situation. They will have then shown, contrary to what Jackson's consistent claims, that physicalism and robust phenomenal realism are compatible. **C2**

50 **The origin of cognition** Christopher Holvenstot <cholvenstot@yahoo.com> (New York, NY)

"In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation. Light will be thrown on the origin of man and his history." (Charles Darwin, The Origin of Species, 1859). Our biological evolution from simpler organisms was accompanied by a cognitive evolution that has yet to be described and accounted for. The sciences have long avoided this obvious and necessary task because the substance and purposes of cognition are not empirically verifiable in the ordinary observable, measurable ways. The perspectival quality of being conscious does not show up under a microscope or in a brain scan. The lack of physical proof for the vibrancy and immediacy of consciousness indicates that we cannot employ the empirical logic of the causal-mechanical world-model in our explorations of conscious phenomena. In fact, limiting the explanation of conscious phenomena to empirical logic renders the subject incomprehensible. Fortunately, empiricism is not the only road to reason and clarity. Since sentience is always tied to biological entities it is appropriate to describe the origin of cognition by employing the associative, synergistic logic of interconnected living systems. Intended as the seed of a communal project, this paper explores the logic relevant to an origin of cognition narrative and explores the basic outline for such a narrative. **P1**

51 **Medical materialism, shamanic healing and the allopathic paradigm**
Shawn Tassone , Medical Materialis <ladeaobgyn@yahoo.com> (Tucson, AZ)

This experiential paper is a review of the initiatory rites and comparisons of training for indigenous shamans and Western medical students and residents in training. Experiential practices in nature were shown to increase a connection of the physician with their healing modality. Exploring shamanic ritual and practice also gave the students and residents an increased knowledge of healing and changed the paradigm to more integrative practices C8

1.4 Qualia

52 **Qualia as a biological form of energy** David Longinotti <longinotti@hotmail.com> (Columbia, MD)

Shroedinger characterizes living matter as unique in its ability to extract negative entropy (order) from its environment, thereby enabling it to avoid thermodynamic decay. I hypothesize that the production of qualia is another means by which some neurons maintain their biological integrity. When triggered, these specialized neurons convert the electro-chemical pulses into phenomenal energy, thereby avoiding the potentially damaging effects of the pulses. In arguing for this thesis, I assume that qualia are natural and that they can influence behavior. The main claims of the argument are as follows: - A quale is located in both time

and space. In asserting that qualia have no spatial properties, Descartes mistook an epistemological condition for an ontological property. That some phenomena (like low frequency sounds) might be perceived as unlocalized does not entail that they are non-spatial. - A phenomenal experience depends on a particular type of material. The locality principle of physics asserts that an event at a space-time location depends only on other events at that location. A functionalist account of qualia is inconsistent with locality because a functional, causal pattern is distributed over time and space. That leaves only material-type to determine a quale at a space-time point. - A quale is a form of energy. In brain stimulation research by Gallistel et al on rats pleasure centers, the motivation produced by the electrical stimulation is proportional to the energy in the electrical pulses, independent of their form. Per Kahneman, the motivation of a feeling is proportional to its intensity. Accordingly, the intensity of the pleasure is proportional to the energy in the stimulation. This is consistent with the conversion of the electrical stimulation into pleasurable qualia. - A quale originates in a living substance. If an action begins in a living substance and also begins in a feeling, then a feeling must originate in a living substance. An action begins in live matter because only such material has the self-maintaining character to be a 'goal-in-itself', something which is transcendentally necessary for an action. In rational creatures, an action begins in a feeling like thirst, rather than a reason, because a movement caused by a feeling is homeostatic (self-maintaining). Successful movement removes the motivating feeling and returns the organism to its prior state. - A quale is subjective because its energy is 'spent' within the living molecule that generates it. Otherwise, a quale would be detectable beyond the molecule. That qualia are a subjective form of energy is consistent with measurements of brain activity by Raichle that show an unaccountable loss of energy when only the currently accepted forms are measured. **C14**

1.5 Machine consciousness

53 **An outline project of homogenous non-computational cognitive system** Sergey Bulanov, Vitaly Dukhota <brainlogic.org@gmail.com> (Didcot, Oxfordshire United Kingdom)

An attempt was taken to create non-computational homogenous system capable of reasoning as a human being. The aim of the present project is to make a system capable of solving a wider range of problems from mathematics to engineering. The developed methodology successfully contributed to building an effective model of the system. This project has shown not only a number of technical problems (which are partially solved by the time) but also a number of philosophical ones. This paper shows an impact of philosophical problems upon technical solutions. **P1**

54 **Singularity, entrainment and consciousness enhancement** Paul Evans <p.l.evans@att.net> (The Sapphire Institute, Charleston, SC)

Over the last twenty years acceleration of technology has been the central feature in most discussions of human enhancement. The future development of technological entities with greater than human intelligence has been called a 'Singularity', where old models of reality must be discarded for new ones. Yet, beyond machine intelligence, other technical advancements are proceeding very naturally and in most cases are not even recognized by their developers for what they are. More specifically, as our ability to refine techniques of consciousness enhancement through brain entrainment progresses, we may achieve an amplification in human consciousness essential to human survival in the post-Singularity world. In fact, as the gap between computing and human cognition continues to shrink, the gap between machine and human consciousness could indeed widen by application and development of emerging entrainment technologies. Ultimately, routine adoption of entrainment technologies could lead to greater human/computer symbiosis combining and amplifying the machine intelligence of computers and the esthetic and emotional sensibility of humans. In this presentation entrainment technologies and the role of machines in altered states of consciousness are explored. The unfolding of machine consciousness, from 18th century automata to modern nanotechnology, is examined. Similarly, the evolution of entrainment technology (from the drum beating shamans and the photonic stimulation of Ptolemy--- to hundreds of consumer electronics entrainment products today) is discussed. Suggestions are made as to how various technologies might be more fully integrated into daily use in decision making, creativity, relaxation and enlightenment in the post-Singularity world. **C8**

1.6 Mental causation and the function of consciousness

55 **Is machine able to speak about consciousness? Rigorous approach to mind-body problem and strong AI** Victor Argonov <argonov@list.ru> (Pacific Oceanological Institute of the Russian Academy of Sciences, Vladivostok, Russian Federation)

In this talk we report the following novel results. (1) Rigorous approach to scientific verification of materialism is suggested. We argue that the analysis of the phenomenal judgment mechanisms is a scientific key to the "hard" problem. (2) Correct test for machine's consciousness is constructed. We argue that machine is conscious, if it is able to produce phenomenal judgments (PJs) on all problematic questions of consciousness without innate or external sources of philosophical knowledge. (3) Particular scheme of classical computer generating phenomenal judgments is proposed. It is able to generate judgments on a several topics only: self, binding, religion, materialism - dualism, but it is unable to generate judgments on qualia problem. Therefore, we make an assumption that this computer is actually unconscious, and all reported problems of consciousness should be called "easy" problems, not hard. "Phenomenal judgments and the verification of materialism". There are many "hard" problems, which seem to be unsolvable in a physicalist paradigm: problem of qualia, problem of self-identity, binding problem, etc. (Chalmers 1997). However, we are able to describe these problems (produce PJs). All PJs are the objective oscillations of matter. If a creature generates PJs, then its brain contains the information on problematic questions of consciousness. Where did this information come from? There are four possible mechanisms. Phenomenal judgment mechanism A. The information on problematic questions of consciousness is produced in the brain and describes some physiological phenomena. Phenomenal judgment mechanisms B-D. Brain gets the information on problematic questions of consciousness from (B) immaterial influence (interactionism only), (C) external material sources (discussions), or (D) innate knowledge. In our report, we provide the arguments that mechanism A is possible in materialism only. Otherwise (in dualism), brain contains the information, which can't be produced by physiological mechanisms. Therefore, it is possible to verify materialism (even in an eliminative form) in the study of PJ mechanisms. "Scientific test for machine consciousness". Let us imagine the self-learning artificial intelligence based on the deterministic (non-quantum) computer. Deterministic algorithm eliminates the possibility of PJ mechanism B. Let us guarantee that computer had no innate philosophical knowledge or philosophical discussions during the learning. Therefore, we eliminate PJ mechanisms C and D. If, under these conditions, machine generates PJs on all problematic questions on consciousness, then materialism is true and the computer is sentient (if sentience is not a senseless "folk" term). In a talk, we suggest a particular architecture of a classical computer that is able to produce justified PJs on several topics: self, binding, religion, metaphysics of materialism and dualism, but unable to generate PJs on qualia problem. We argue for the following interpretation: (1) this computer is unconscious, (2) several "hard" problems of consciousness (almost all problems excluding qualia) should be reclassified as "easy" problems. They simply describe the architecture of the neural network. However, qualia seem to be really problematic properties of consciousness. We suppose that they cannot exist in a classical (non-quantum) digital machine **C18**

56 **Generalization in human thinking** Anastasia Karpukhina <nastasyakarp@bk.ru> (General Psychology, Moscow State University, Faculty of Psychology, Akersberga, Sweden)

Conceptual structure of human thinking is one of the popular subjects of psychological research. Many authors mention that problems of the same complexity and logical structure

may be solved differently according to the personal meaning. This phenomenon has been described in the works of the O.K. Tikhomirov's psychological school as a structuring function of motives. This is now followed by a range of investigations dealing with the interrelationship between personal and cognitive, intellectual processes. It is experimentally proven that in some cases thinking peculiarities are conditioned by motivation, which may have different influence on thinking process. It is often stated that the conceptual formation of the mind exists at different levels, and this process features a changeable, dynamic character. Such an assumption is supported by the facts of ontogenetic development. Soviet psychologist LS Vygotsky pointed out that the conceptual structure of an adult mind retains its ability to change and contains formations, which can be attributed to different levels of generalization. He emphasizes the relationship between generalization and consciousness, generalization and level of awareness. Working with an adult with a fully formed mind the one can notice how different levels of generalization appear in the tasks which have important meaning to the test person and which are related to his motivational structure. Negative influence of the motivational structure on the process of thinking is called rational distortion (Arestova, 2005). It is a selective distortion of the thinking process, which manifests when the problem exposed to the subject targets the area of motivational conflict (Arestova, 2006). Such distortions are not random and linked to the trends in the resolution of motivational conflict which are relevant for a particular person. Such distortions are not random and allow to make suggestions about the particularities of thinking of a certain person. One of the examples of rational distortion is the change of generalization level in personally meaningful problems, which leads to the mistakes in the solution. To investigate this phenomenon we use a special set of techniques which has three parts. The first part allows to determine the highest level of conceptualization accessible for the person, to check ability of understanding logical connections, observing distinctions between different types of logical relations and also includes the IQ test. The second part reveals emotional traits and current state of the person, his meaningful themes and inner conflicts. It is used to study the motivational structure of the test person and to make prognosis in which problems from the third part the distortion will appear. The third part of the set contains the problems which allow to give solutions based on different levels of generalization. The problems from the third part are dealing with different fields of personal experience and they are designed to provoke emotional response. According to our hypothesis the change of generalization level occurs in the problems which are personally meaningful and provoke negative feelings. **C3**

57 **Non-local consciousness influence to physical sensors: Experimental data** Konstantin Korotkov <korotkov2000@gmail.com> (Computer Science, Saint Petersburg University ITMO, St Petersburg, Russian Federation)

The problem of Non-Local Consciousness Influence (NLCI) to the physical world has been widely discussed in popular and scientific literature. A lot of anecdotic cases have been reported, from which the most interesting were the cases of influence to electronic and computer systems. A number of experiments have been conducted in controlled experimental conditions. By the end of the XX century conceptual basis for NLCI was being created by the new scientific branch related to Quantum Entanglement, Quantum Teleportation and Non-Local Realism. Experimental investigation of NLCI effects was one of the topics of our research since mid 90th. Sensors of different design have been used, most of them based on transitional effects in gas-discharge plasma with several quasi-stable states. The latest version of the computerized device for detecting NLCI is based on commercially available Gas Discharge Camera (www.korotkov.org) and allows to follow time dynamics of several sensors in NLCI conditions. Readings are taken continuously by special software every 5 or 10 seconds in automatic mode. Neither sensor nor computer is moved or touched during measurements. Sensitivity of the device was tested by detecting the influence of total sun eclipse in Siberia in August 01, 2008 by several sensors in parallel and by many other geophysical measurements in different countries. Several experimental modalities have been developed: 1) Directed NLCI of a person; 2) Directed NLCI of a group of people; 3) Non-Directed NLCI of a group of people. In the first mode we experimented with several

people from Russia, Germany and USA involved in professional healing. After several trials with observing the real-time reactions of the instrument they tried to send NLCI from the distance. All the experiments were conducted in twin-blind regime recording signal for three hours, during which time healer, at the time of his choice, was trying to influence the sensor for 10 minutes. In some experiments a second similar sensor was used as a control. During 2003-2010 31 controlled studies have been conducted from Berlin, Tokyo and Moscow to Saint Petersburg. In 28 statistically significant results of NLCI were recorded Directed NLCI of a group of experienced meditators was tested during several workshops in Europe and USA. People were asked to meditate and send their positive emotions to the sensor being positioned in the same room, recording time dynamics of a signal for at least an hour before and after the test. In all cases statistically significant changes of signal were recorded. Group NLCI was organized by Internet by Lynne McTaggart. People were able to see the photo of the experimental setup and start their meditation at the agreed time. The difference between 10 min signal sequences before, during meditation time and after was statistically significant in several experiments of this type. Korotkov K, et.al. New Approach for Remote Detection of Human Emotions. Subtle Energies & Energy Medicine 19,3, 1- 15, 2009. Korotkov K., et.al. Healing Experiments Assessed with Electrophotonic Camera. Subtle Energies & Energy Medicine 20,3,1- 15, 2010. **C29**

58 **The utility of perceptual consciousness on higher-order theory** George Seli <gseli@gc.cuny.edu> (Long Island City, NY)

Higher-order theories of consciousness posit that a mental state is conscious in virtue of being represented by another mental state, which is therefore a higher-order representation (HOR). Whether HORs are construed as thoughts or experiences, higher-order theorists have generally contested whether such metarepresentations have any significant cognitive function. Focusing on perceptual consciousness, I argue that HORs do not facilitate perceptual processing itself. Being about a mental state, a HOR does not serve to gather information about the environment. Being extrinsic to its target state, neither can it alter the causal powers of the perception it represents. Nor is it plausible that a HOR is required to further cognitive access to first-order perceptual content. What HORs do enable, I argue, is reasoning about one's current perceptual state. I show how this account of the function of state consciousness, which I call IMT (Inferential Metacognition Theory), explains the correlation between conscious perception and cognitive access to first-order perceptual content. The latter allows planning one's reaction to external objects, and information about one's perceptual state can be relevant to that planning. I conclude by sketching how IMT can explain the utility of consciousness in deliberation and problem-solving. **C1**

1.7 The 'hard problem' and the explanatory gap

59 **Operations in the first person perspective** Wolfgang Baer <baer@nps.edu> (Information Sciences, Naval Postgraduate School, Monterey CA, Monterey, CA)

The development of thought by William James, Whitehead, Atmanspacher, and Hofstader has suggested that the "Hard Problem" of consciousness and its "Explanatory Gap" can be bridged by postulating the existence of a physical processing loop that transforms mind into body and back again. In the March-April 2010 Journal of Consciousness Studies, I suggested that a physical loop could contain a primitive consciousness if the process is a closed cycle in time. If we are such a loop then there is no separate "we" outside to see ourselves as an external object. One can never experience the true cause of ones sensations unless one conceives of an operation that transcends the physical self. Though transcendental and religious traditions claim to provide a mechanism of transcendence through meditation or prayer, the scientific approach seeks to achieve understanding while remaining firmly anchored within ones every day first person experience. This presentation examines our ability to understand consciousness when limiting operations to those that can be performed in the first person perspective. Though the conscious cycle cannot be observed objectively,

a model of it can. Such a model of the consciousness process can be built by transforming a description of sensations into a model of the cause of those sensations and back again. Consciousness is incorporated in the activity thus described. The description of sensations is easily mapped into ones first person experience and hence its meaning is clear. However, the symbols in the model of the cause - by which is meant the reality one believes in- cannot be mapped into direct experience and remains beyond our ability to grasp objectively. If these symbols, used to build reality models, cannot be translated into sensory meaning, their significance must be sought in their function. All symbols no matter how small are incorporated into some physical form. As objects, they effect and interact with other physical objects directly. As symbols, they interact with other physical objects indirectly through a cognitive reader. Since there is no separate "we", i.e. reader, outside the cognitive loop the symbols of reality in a model of a cognitive cycle act directly as physical objects. The cognitive loop model represents a process that translates a symbol in one node into an object in its opposite node. The object in such a cycle is commonly referred to as a memory and the model of such a cycle is an externalization of the thinking process containing conscious awareness. This presentation will clearly show that if we carefully examine operations in the first person perspective a physical process, which translates sensory experience into a physical memory structure that has no meaning beyond its use to re-generate the sensory experience again, is the physical container of conscious awareness. **C39**

60 **Conscious perception, reality and the nature of space: Indirect realism and the relation between phenomenal space, neurophysiological space and physical reality** Thomas Droulez <tdroulez@hotmail.com> (Philosophy, University of Strasbourg, Bischheim, France)

This presentation will be a philosophical and scientific defense of indirect realism, defined as the thesis that our conscious perception is the result of an active mechanism of transformation (and not a passive mechanism of transmission of supposedly undistorted, unedited signals) that does not provide us with a straightforward access to what is in the world or in our body, but that actually recreates an adaptive internal presentation of external reality. By focusing on our conscious experience of space relying on exteroceptive phenomenal presentations of the visual field and on interoceptive phenomenal presentations of the somesthetic-kinesthetic body image, it will be shown that compelling empirical and experimental evidence reveals that our fields of perception are complete spatial reconstructions, under the form of a constantly adjusted multimodal phenomenal space, of what our context-sensitive cerebral perceptual mechanism deems to be most probably out there (in the body or the environment) at a given moment. This will eventually lead us to tackle a serious but often neglected binding problem, which does not concern intermodal sensory unification (the classical binding problem), but rather the topological non-congruence between vectorial coding of signals in cortical maps and their decoded topographical presentation in our fields of perception (the most striking example being that of the huge discrepancy between, on the one side, the non-pictorial patterns that are observable in our visual cortex, and, on the other, the colorful and structured images as they appear in our visual field). This problem has long been neglected because of an enduring confusion, originating in direct realism, between stimulus field, neurophysiological field and sensation field. Once that confusion is dissipated, it becomes possible to elaborate an original naturalistic explanation that goes beyond the classical and rigidified categories of Cartesian dualism and mind-brain Identity Theory, and that is freed from their shared impoverished representation of space. Indeed, by relying on and developing the models elaborated for example by John Smythies (in neuropsychology) or Bernard Carr (in cosmology and physics), a new scientific understanding of the nature of space (its physical structure, but also its topology and dimensionality) can at last make sense of the presence of our conscious phenomenal spaces in physical reality, by integrating them as genuine sui generis spatial extensions in a higher-dimensional domain of a global physical manifold. Even if that leaves David Chalmers' famous hard problem unsolved (why are there phenomenal impressions at all, instead of a whole zombie universe?), that approach makes it nonetheless feasible to at least build a spatial model of the relation between the

brain and the sense data, without having to reject the latter as illusions belonging to an outdated folk psychology (as in behaviorism or materialistic eliminativism), to reduce them to neuronal activities by neglecting or covering up the psychophysical gap in conscious perception (as in the so-called mind-brain Identity Theory), or to shroud them in mystery by conceiving them as attributes of some non-spatial substance that would yet unintelligibly interact with physical space (as in the Cartesian version of mind-brain dualism). **C39**

61 **Epistemic pessimism and the mind-body problem** Ståle Gundersen <stale.gundersen@uis.no> (University of Stavanger, Stavanger, Norway)

Conscious mental states are states that feel a special way, or in Thomas Nagel's words, 'It is something it is like to have them'. A solution to the mind-body problem is supposed to bridge the gap between physical and conscious states, that is, to explain how physical states generate conscious states. Three possible views seem to exist concerning theories about the mind-body problem: 1) one of the existing theories is the true (or approximately true) solution to the problem, 2) none of the existing theories are close to the truth, but it is not impossible to find the solution in the future, and 3) the mind-body problem cannot be solved, even in principle. The third view is called 'epistemic pessimism'. Arguments for epistemic pessimism very often focus on human's limited knowledge of physical reality. There is a trend in philosophy starting with Kant and Schopenhauer, and culminating with Russell, claiming that our ignorance of physical reality is chronic because of the very nature of scientific inquiry. This 'epistemic pessimism' or 'ignorance view' entails that one cannot know what physical entities such as fields, electrons and elementary particles are in themselves (their intrinsic nature) because one can only describe their dispositions and how they are related to each other. However, we know how some physical systems are in themselves, because when a person has a conscious experience, he/she is directly aware of an aspect of his/her own brain, as it is in itself; because for conscious states, there is no distinction between appearance and reality. Conscious states are supervenient on the epistemically unknown intrinsic natures of the physical entities that constitute brain activity. A link exists between the mind-body problem and the problem of other minds because if the former is solvable, then the problem of other minds is also solvable. However, the problem of other minds is unsolvable because theories about consciousness are not testable; therefore, one cannot decide which organisms and physical systems are conscious. It is then possible to ask why these theories are not testable, and the answer to this question supports epistemic pessimism. Analogous results to epistemic pessimistic are revealed in the more established sciences, for instance, Heisenberg's uncertainty principle and the unsolvability of the halting problem (proved by Alan Turing). **C2**

62 **What can a brain really do? Mind-body question is either undecidable or materialism is false. Solving the problem of consciousness by transforming the hard problems to easy ones** Jan Pilotti <dr.pilotti@telia.com> (Child & Adolescent Psychiatry, Child and Adolescent Psychiatry, Orebro, Sweden, Örebro, Sweden)

The mind-body problem seems not to be empirically answerable because the empirical content of existing mind-body "theories" is inadequate, as no "theory" seemingly can predict which experiences are possible and which are not. Non-materialistic views on the mind-body-problem cannot be falsified by empirical data and are therefore unscientific in Popper's view, and are therefore beliefs. But the materialistic views are equally bad in this respect, as there seems not to exist any empirical phenomenon that can be observed, in this life before death, which must be accepted as a falsification of the materialistic view. My first conclusion is that the mind-body problem is undecidable within existing science. We have therefore to choose on other grounds. Sometimes it is proposed that we should according to the principle of Occams razor choose materialism, which is thought to be simpler. But materialism has not explained consciousness, e.g. qualia, and more importantly; on what grounds are we to chose simplicity instead of meaning? But there might still exist a more empirical approach, which can falsify materialism and therefore decide the question. We can look at the very structure of experience at its basis, namely the number of dimensions that we can

experience. In our world we can experience three independent space directions: length, breadth and height and our physical space and all its material objects are three-dimensional. I think this is as self-evident as anything can be and is also the basis of classical physics. As a thought-experiment we can try to experience a world as a linelander (who can move just back and forth) and as a flatlander (who can move back and forth, and right and left) compared with us who can move back and forth, right and left, up and down. Also I think we could easily discriminate between these three different worlds. Even if the materialistic belief is that the brain can produce all possible experiences how this can be done is not shown. A more limited and probably simpler problem should be to show if and how a three dimensional brain could produce experiences of more than three dimensions. This problem can be approached in three ways, which together could give a reasonable answer: 1.To construct a theory which shows how a three dimensional structure can produce something with four independent directions of movement. Or by analysis of possible alleged materialistic theories for consciousness show that the project is impossible on logical and mathematical grounds. 2. To construct non-materialistic theories which do explain how we can experience more than three dimensions. 3. To show that there exists experience that includes more than three dimensions. The extension of special theory of relativity to six dimensions, three space and three time dimensions, where conscious experiences are identified not with processes in the brain but with processes in the six-dimensional spacetime solves the problem of qualia and transforms the hard problems to easy problems in a six dimensional physical spacetime structure and thus solves the problem of consciousness. **C25**

63 **Can physicalism explain consciousness?** Carissa Veliz <carissaveliz@usal.es> (Philosophy, University of Salamanca, Salamanca, Spain)

In this paper I will question physicalism's explanatory power in trying to account for consciousness. I will then suggest that a theoretical framework whose fundamental terms are not exclusively physical is more likely to help us overcome the explanatory gap. Physicalism's first difficulty is known as 'Hempel's dilemma', which points out that we have no means of substantially defining what is physical. If we define it according to present-day physics, it will probably be wrong in the future, since today's physics is, at the very least, incomplete. On the other hand, we can't define it in terms of a complete theory of physics because we have no idea what that would look like. This option would leave us with too broad an idea of the physical: anything could be physical. This would make physicalism unfalsifiable and thus, unscientific (Popper). If physicalists choose to be loyal to naturalism and wait for what physics has to say at the end of the day, then that amounts to withdrawing from the mind-body problem debate (Montero). Anyone who wishes to defend a standpoint must make up their mind as to how to give physicalism some content. In order to do this, some restrictions must be established as to what the physical can be. After examining possible restrictions that would give content to physicalist theories, I will suggest that in any plausible case, physicalism makes the mind-body problem insoluble. Whatever may be said of the physical must be objective. So if we wanted to include mental phenomena in physics, we would have to study them as objective entities, even though they seem to be a first-personal kind of phenomena. An objective stance will by definition abandon the subjective point of view (Nagel). Albeit this problem, to deny, ignore or shun from science what we experience just because we still can't study or explain it satisfactorily would be a cognitive dishonesty. Science, because of its empirical nature, should not limit a priori its scope, and if it discovers some new territory that doesn't fit in its map, it must change its map and not the territory (Quine and van Fraassen). In this case, the changes that should take place might involve not only expanding the scientific ontology, but modifying the scientific method as well (Montero). If our standard way of making science fails to explain mental phenomena, which we know exist from first-person experience, maybe we should change our very way of making science. Meditation, phenomenology, and other first-personal approaches to the study of consciousness might play an important role in helping us build theories in which experience is acknowledged as an intrinsic part of reality. Tibetan yogis, for example, report insights which are particularly relevant to these issues. Theories where the fundamental constituents of reality are neither

mental nor physical but something neutral that makes both possible can be the point of departure towards building the necessary theoretical framework we are missing to be able to approach the gap between the subjective and objective. **C25**

1.8 Higher-order thought

64 **The Cemi Field Theory: Gestalt Information and the Meaning of Meaning** Johnjoe McFadden <j.mcfadden@surrey.ac.uk> (Faculty of Heath and Medical S, University of Surrey, Guildford, Surrey United Kingdom)

In earlier papers I described the conscious electromagnetic information (cemi) field theory, which claimed that the substrate of consciousness is the brain's electromagnetic (em) field. I here further explore this theory by examining the properties and dynamics of the information underlying meaning in consciousness. I argue that meaning suffers from a binding problem, analogous to the binding problem described for visual perception, and describe how the gestalt (holistic) properties of meaning give rise to this binding problem. To clarify the role of information in conscious meaning, I differentiate between extrinsic information that is symbolic and arbitrary, and intrinsic information, which preserves structural aspects of the represented object. I contrast the requirement for a decoding process to extract meaning from extrinsic information, whereas meaning is intrinsic to the structure of the substrate encoding intrinsic information and does not require decoding. I thereby argue that to avoid the necessity of a decoding homunculus, conscious meaning must be encoded intrinsically in the brain. Moreover, I identify gestalt information as field-encoded intrinsic information and argue that the binding problem of meaning can only be solved by grounding meaning in gestalt information. I examine possible substrates for gestalt information in the brain, but conclude that the only plausible substrate is the cemi field. **PL1**

65 **Potentialities and the Indeterminacy of Nonhuman Animal Minds** Alexis Mourenza <amourenz@ucsc.edu> (Philosophy, University of California Santa Cruz, Santa Cruz, CA)

Potentialities can only be identified when the appropriate conditions that elicit them have been provided, when they are expressed in functioning form. That is, potentials cannot be observed, only expressions of those potentials can. Refocusing attention on the potentialities rather than the competencies of nonhuman animal minds changes the debate, and the implications for responsibility in scientific practice. Recognizing the plasticity of minds and role of interactions between experimenter and subject in the emergence of complex cognition raises problems for assumptions about the necessity of ecological validity in ABC research as well as for claims of the uniqueness of human cognition by calling into question not only the status but also the content of such claims of 'human uniqueness.' By examining the process by which an experimental program seeks to demonstrate the possession or absence of a given cognitive capacity by an animal subject I will seek to show that cognitive competencies demonstrated are the product of the interaction of the organism?s physiological potentials with the training and testing procedures they undergo in the lab. Experimental work coming out of the pinniped lab at the Long Marine Laboratory at the University of California, Santa Cruz offers an informing example of indeterminacy in nonhuman animal cognition. The sea lion subject Rio is the first nonhuman animal to demonstrate the formation of equivalence relations between perceptually disparate stimuli. In other words, she understands some basic rules of deductive logic. The UCSC researchers attribute her success to the nature of the training and testing procedure they utilized, which provided Rio with experience with a sufficient number of exemplars to grasp the interrelated concepts of reflexivity, symmetry, and transitivity. After being taught that a number of samples and comparisons are interchangeable, Rio rapidly learned to respond to novel equivalence relations the first time she encountered them. The particular sequence of tests conducted were designed to maximize Rio's correct performance on test trials by ensuring that she had demonstrated all of the prerequisites for a given test before that test was given. This provides a concrete case in which even the experimenters themselves acknowledge that they are not investigating an

observer-independent object but phenomena that come into being only within the interaction of researcher and experimental subject. The interface of the experimental procedure and the subject's mind provides the evidence of her formation of equivalence relations and is exactly where (in time and space) that the object (phenomena) itself emerges. I advocate a shift of focus from the sole emphasis on epistemological uncertainties (questions of species-typical traits and our failure to elicit them in a laboratory setting) of nonhuman animal cognition to include an exploration of the ontological indeterminacy (potentialities and plasticity) of what their minds can do and the joint role played by both the human experimenters and the animal subjects in the experimental processes of demonstrating complex cognition in nonhuman animals. **C27**

1.9 Epistemology and philosophy of science

66 **Temporal Waves and Thought Waves** Johann Ge Moll <johanngmoll@gmail.com> (Department of Psychiatry, Hospi, Medical Academy Sofia, Sofia, Bulgaria)

Temporal waves are only pulsation that travel very quickly between World Energy and World Information , and they only connect Energy Waves with Informational Waves. Through Temporal waves to each point (instant) of World Energy corresponds biective point (instant) of World Information. This define Time as only a measure of Traveling between Energy and Information (between Energy waves and Informational waves.) As Space is only a measure of Distance between Energy and Information. The gaps in modern physics is that " No one can calculate the amount of Dark energy, and nobody knows what is its nature. Yet, we know: The substance of dark energy is force of World Asymmetric Non-self-identical Antigravity Impulse. The nature of this Asymmetric Impulse (Impetus) is World Fugue of Primordial Time - Time that not yet transformed through into geometric dimensions , (Only small part of Primordial Time, which is confined into geometric dimensions is allowed manifested as Energy, while the rest , the biggest part of Time remains unrecognized ,undetectable and invisible , and upon that non-confined into geometry World river of Time floats the energetic -geometric ball (sphere) of the Universe. (But if the Time is not seen that no meant that Time is undetectable : Because : What is sensory organs that catch-perceive Time? - This organ is not eye (vision) but ear (hearing) - since if Space is seen , the Time is heard. If Space is perceived by visual logic then Time is perceived by audio logics (oto logic). That's why the visual Space is intellectual , (as Visual logic is intellectual logics,) while hearing Time and Heard Time is emotional ,voluntary and fantasizing logics) and the being of Time is emotional, fortuity, chance-full, fantasizing and voluntary As nature of Time is similar to nature of Music, and nature of Music is identical to nature of Psyche - then Music, Psyche and Time are woven by the same tissue - then source of Psyche and source of Time coincide. No one knows where Dark energy came from? - Yet, we know: It came from our Subjectivity, it came from our Consciousness - as the substance of our consciousness is namely that Dark Energy, since the emptiness of Dark Energy and the Emptiness of Consciousness is the same. As the authentic description of Consciousness is description of mini-Black Hole. The reason d'etre to identified Dark Energy and Consciousness is that both poses a nature of non-self-identical Infinite negativity - as ever negating itself negation and ever different from itself difference , from which constant self-difference emerges every newness, novelty, unpredictability and unforseen event in the world. No one knows what is that power (force) that expands the Universe with the growing velocity ? **C40**

67 **Epistemological reasoning and structural solutions for defining the human psyche** William Hohenberger <wrh@defnet.com> (Natural Philosophy Alliance, Fort Myers, FL)

Human beings exhibit many common and similar behavioral traits; and therefore, the foundation for our collective human behavior, from which those individual behavioral traits arise, must be organized and structured. Accordingly, the words that both define and describe those individual behavioral traits within our collective behavioral foundation must also be organized and structured. This proposed "Organized Word Structure" (OWS) for our human language directly overlays the human brain, and explains the various mechanisms and processes that function within the human brain. Moreover, it delineates human nature and includes absolute definitions for good and evil. The OWS can also be directly correlated on a one-to-one basis with the "I Ching" - an ancient Chinese Oracle (2000 to 5000 years old) of the motivating forces (Yin & Yang) within human nature, with the "Kabala" - the classical study (1000 to 2000 years old) of the meanings of the Hebrew alphabet and Hebrew text, and with "Luescher's Color Test" - a correlation between human perceived colors and the human psyche. The I Ching, the Kabala, and Luescher's Color Test each independently and together collectively validate the OWS. A very brief and also very typical example is: OWS (12-Experiences), I Ching (03-At the Beginning) and Luescher's Color Test (36-Sensual Gratification), which reads like a sentence in a book - "Experiences Begin with Sensual Gratification." The various processes used in developing the OWS and used in integrating the OWS with the other disciplines referenced above, are structural in form, are exact in procedure and cannot be deviated in anyway. However, it is recognized that some of the words chosen within the OWS may be improved, as the remainder of the OWS is finished, which because of the depth and the breadth of the theory, will require many years of additional work. **P1**

68 **Some implications of the everyday out-of-body experience** Dwight Holbrook <hdwight10021@yahoo.com> (School of English, Adam Mickiewicz University, Poznan, Poland)

The everyday out-of-body experience is a form of knowing, one that has literal elasticity in that it transgresses the spectator-to-knowledge paradigm. Elasticity knowing extends outward from the body as far as our perceptual field extends. This notion draws on Seemann's distinction between the bounds of the conceptual self and that of the subject of perceptual experience. It borrows as well from infant-caregiver studies and insights from Hobson, Velmans, Gallagher, and others. Our underlying premise: What we know is not just what we think and what our brain does. What we know is that part of us outside our body and brain. This knowing arises out of the here-and-now we have direct acquaintance with, shared and synchronized with that of others. The paper then moves to a consideration of four implicative questions. First, as to the collision between the evidence of what first-person encounters show and what third-person research, based on various cognitive theories, usually disregards or denies: which "person" do we take seriously? Does our shared experiencing of here and now -- our sentience of here and now -- necessarily qualify and preconditionally limit what neuroscientists, with their sentience presupposed, have to say about brain activity's causes of sentience? Second, how is science to understand the immateriality of this everyday out-of-body experience? A critic of Velmans' perceptual projection theory writes: "Should we take projection seriously and interpret Velmans as saying that the brain is in fact projecting 'stuff' onto the things themselves? This would amount to a world that contains the individual things themselves and further is smeared all over by projected phenomenal experiences belonging to all kinds of different creatures like for example Homo sapiens." To which one can answer: Do we predefine the empirical universe as having nothing in it but "stuff"? Is "immaterial" taboo? Third, where does out-of-body take us in terms of the face-to-face in various contexts: therapy encounters, the Christian gospels, healing as external experience/knowing? Fourth, what are the implications of this exteriority of our here-and-now on sequential time paradigms? On cosmological riddles like before the Big Bang? Does the Zen "being time" offer science a way to de-serialize time? Conclusion: a look at the difference between information and experience. **P1**

69 **Science's future role in resolving the mysteries of consciousness** William H Kautz <williamkautz@seznam.cz> (Former Director, Center for Applied Intuition, Postupice, Czech Republic, Czech Republic)

Science is modern man's established means for systematically growing new knowledge and is the recognized arbiter of its validity. Indeed, this is its principal role in the world. Those of us in the consciousness community have been tacitly assuming that science will be our preferred means for exploring, understanding and explaining consciousness.

But is the institution and methodology of science really up to this task? If not, could it be somehow enriched or extended to embrace consciousness studies? Is it even enrichable or extendable? We may have to toss it out and devise a new means. These questions are not of merely academic curiosity but are fundamental to the future of our field. We need to answer them before expending further effort, perhaps fruitlessly, on using the wrong tool, for this diversion could delay progress and even block the findings we are seeking. In this paper I offer five reasons, both fundamental and practical, why modern science, so powerful over the last few centuries, is no longer a sufficient means for understanding such a highly subjective domain as consciousness. I then identify which parts of science may be retained, which must be discarded and which might be changed or extended to enable consciousness studies. The possibilities for this extension are examined, mainly through "other ways of knowing" besides the strict scientific one for generating new knowledge and verifying it. I propose a novel, feasible and proven alternative means based on the direct perception of new information - the human faculty commonly called intuition - which functions in the human mind apart from reasoning, sensual perception, memory and materialistic stances such as reductionism and causality. Recommendations are then offered for particular actions we may profitably take, both individually and as a professional body, in order to grow a new body of useful experience, understanding and consensual knowledge about the nature and workings of human consciousness. These actions will rely increasingly upon a formalized intuitive approach, along with best of present-day science. **C35**

70 **Towards a better understanding of 'consciousness': An analytical approach to the most prominent positions within the philosophy of mind** Richard Koenig , Alexander Mirnig, Alexander.mirnig@sbg.ac.at <richard.koenig@stud.sbg.ac.at> (Neurodynamics and -Signaling, Neurodynamics and -Signaling, Salzburg, Austria)

The description of the phenomenality behind the states of "what-it's like-ness" (consciousness) builds on a rich, historical, and rather complex landscape of conceptual approaches within the modern Philosophy of Mind. A clear delineation between its various ontological positions can therefore be expected to be helpful in identifying any possibly privileged positions on one hand and help to avoid redundant argumentation on the other. In the present essay we apply a strict formal method to (re-)analyze and categorize the ontological background in the study of consciousness utilizing previous approaches put forward by Searle and Chalmers. The variety of positions is abundant (eliminativism, analytic functionalism, interactionism, epiphenomenalism etc.) and new research results are gained every day, which renders a clear overview over all the positions regarding consciousness a rather difficult task to accomplish at times. But of course such a categorization is nonetheless also very important. Therefore we opt for, instead of a purely historical categorization, a more systematic one: We begin by determining the number of possible basic positions from an ontological and an epistemological standpoint and then arrange them in an axiomatic framework. In particular, we focus on the question of compatibility and formal structure of the various philosophical positions in question which further allows us to critically discuss their positional assignment, coherence, and interpretation. We also demonstrate how a rigorous treatment of logical connections in the categorization of positional argumentation can shed new light on some central aspects in empirical approaches in consciousness studies, including concepts such as psychogenic causality and the question of neuro-physical correlations. **C32**

71 **Consciousness and mind-brain interaction** José Roberto Martinez , John Rogers Searle, Sigmund Freud, Bento Prado Junior, Merleau-Ponty. <dr.jrmartinez@gmail.com> (Medicine, Federal University of Grande Dourados, Marília, São Paulo, Brazil)

According to the American philosopher of mind John Rogers Searle (1932 -) the intelligent mind can be likened to a biological machine that processes information that is meaningful, something that artificial machines are not capable of. The biologist and naturalist paradigm that guides the Searle's vision of philosophy of mind can be conceived as a kind of methodological pluralism in science which wants to reinsert the notion of subject without falling into the Cartesian dualism or the substantial spiritualism. Searle defends an unreductionist ontological monism, founded in neurobiology and neuroscience, which aims to resolve the antinomies of objectivism versus subjectivism, conscious versus unconscious, selfhood / objectivity, etc. The Searle's unconscious is neurophysiologic and differs from the Freudian unconscious in that it attributes that Searle define the Unconscious were actually acts of conscience or provisions for the emergence of conscious states. Searle is against the physicalism of Daniel Dennett as being an epistemological fallacy that would reduce the phenomenon to a kind of "being-object" (objectivism) or "being-thing". He proposes the irreducibility of the syntax and semantics. He takes the point of view of causal power of brain in the production of consciousness as a phenomenon consisting of "subjective states of Sensitivity (sentience) or science (awareness) that begin when a person wakes up in the morning, after a dreamless sleep, and extend throughout the day until she goes to sleep at night from a coma, dies or otherwise becomes, say, 'unconscious'. There are significant differences between the views of John Searle (1932 -) and Sigmund Freud (1856-1939) about the concepts of consciousness and unconsciousness. The problem of the conscious and unconscious mind-brain's relationship depends on a theory that can illuminate heuristically and fruitfully the researches and that can reduce the distance between the philosophy of neuroscience and others proposed theories in philosophy of mind. So, we can perhaps move to a stage of theoretical and terminological disputes that can leave us to a real scientific and real progress. Unfortunately the schools of scientific thought are still opposing assumptions and the prejudices with the new proposals are still large. Searle proposes, therefore, a biologist and naturalist perspective reminds us that a pluralist form of emergentism, contrary to the objectivist verificationism of Dennett, and distinguishes the epistemic dimension of the ontological dimension. In the ontological perspective or subjective first-person being is perceived as being (esse est percipi from Berkeley) or, in the Sartre's sense of consciousness, the being is "being for itself." The survey plan of Searle's interesting in that naturalizes the mind based on the biology, but it can stop the development of the progress of the researches, including the important contributions of psychoanalysis, phenomenology of structural and other scientific fields such as anthropology, sociology, etc. The complexity of the structure of the brain and its function can't confirm the possibility that the mind can be primarily more complex than the brain itself, from a standpoint of the both ontogenetic and phylogenetic view. **P1**

72 **The Meta-structure of knowledge: Object, meaning, reference and the explanatory gap** José M. Matías <jmmatias@uvigo.es> (Statistics, Universidad De Vigo, Vigo, Pontevedra, Spain)

Confronted with the conflict between identity and change, the history of thought has always adopted a position that, a priori, favours identity. Change, at best, has been relegated to a secondary role, perhaps due to the fact that, since the beginnings of philosophy, humans have struggled to construct a vision of the world in which they would fit as individuals and which would resolve the problems arising from their individuality. Even after many centuries of thought, however, there is still no widely accepted, clear and concise answer for this conflict between identity and change. As a fundamental question, the importance of this conflict is enormous. Indeed, it could be said that the most relevant problems of philosophy today arise from the dissension between identity and change. The few attempts that have been made to postulate the primary role of change amount to nothing more than isolated, incomplete or contradictory reflections that often lead to nihilism or spiritualism and, in the opinion of many, to epistemologically void positions. This kind of reflection has, however, galvanized thinking, by calling into question traditionally sacrosanct terrain and pointing to the importance of a detailed analysis of the structures and mechanisms of human thinking. This work reviews the structure of knowledge in the context of change viewed as a primary aspect of the world. The review contributes a novel and clarifying perspective on many important problems of philosophy, while avoiding the typical vain attempt at dissolution. The review concludes that, given that we are part of it, we cannot understand the essence of the world; nonetheless, it does contribute what we would expect of a useful theory: it explains both how knowledge emerged and developed to its present configuration and how its

intrinsically contradictory structure today raises several philosophical problems formulated by knowledge itself. Some of these problems concern change and identity; time, object, concept, meaning and reference; consciousness and the explanatory gap; the subject as observer; and self-referential paradoxes. A crucial point in the analysis is to clarify the concept of object and its relationship to both time and change, and also its relationship to concept, meaning and reference. Under this perspective, fundamental problems of philosophy are unravelled, thus facilitating their comprehension and revealing their common origins. **C2**

73 **Towards a better understanding of 'consciousness': An analytical approach to the most prominent positions within the philosophy of mind** Alexander Georg Mirnig , Richard Koenig <alexander.mirnig@sbg.ac.at> (Philosophy, University of Salzburg, Salzburg, Austria)

The description of the phenomenality behind the states of "what-it's like-ness" (consciousness) builds on a rich, historical, and rather complex landscape of conceptual approaches within the modern Philosophy of Mind. A clear delineation between its various ontological positions can therefore be expected to be helpful in identifying any possibly privileged positions on one hand and help to avoid redundant argumentation on the other. In the present essay we apply a strict formal method to (re-)analyze and categorize the ontological background in the study of consciousness utilizing previous approaches put forward by Searle and Chalmers. The variety of positions is abundant (eliminativism, analytic functionalism, interactionism, epiphenomenalism etc.) and new research results are gained every day, which renders a clear overview over all the positions regarding consciousness a rather difficult task to accomplish at times. But of course such a categorization is nonetheless also very important. Therefore we opt for, instead of a purely historical categorization, a more systematic one: We begin by determining the number of possible basic positions from an ontological and an epistemological standpoint and then arrange them in an axiomatic framework. In particular, we focus on the question of compatibility and formal structure of the various philosophical positions in question which further allows us to critically discuss their positional assignment, coherence, and interpretation. We also demonstrate how a rigorous treatment of logical connections in the categorization of positional argumentation can shed new light on some central aspects in empirical approaches in consciousness studies, including concepts such as psychogenic causality and the question of neuro-physical correlations. **C37**

74 **On the nature of scientific mind** Donald Poochigian <donald.poochigian@und.edu> (Philosophy and Religion, University of North Dakota, Grand Forks, North Dakota)

Rather than beginning with the scientific nature of consciousness, beginning with the conscious nature of science is wiser. Science presupposes a certain state of consciousness for its purpose of discovering truth and falsity. Encompassed are appearance, reality, and self, together, constituting intentionality, imposing self by relating primitive experiences. Analysis is an evaluation by autonomous self of intentional construction to determine what part of construction corresponds to reality. Constituent of the same experience, mind and body are hypothetical abstract rules postulating an existent from which experience and behavior necessarily follow. Their properties (effects), being the same, they are mutually irreducible because they are different indivisible entities following from such rules. As simple primitives, neither can compose the other. Mind and body are knowable only when ascribed, then. Assignment of either, however, presumes a metaphysical mind functioning autonomously, a self-determining entity. An autonomous sequence is initiated by a metaphysical self immediately succeeded by a reason as a teleological awareness, when subsequent members of the sequence conform to this teleological awareness. In hypothesis, science is autonomous. A metaphysical self is a precondition of science, science not occurring without it. Assuming no autonomy, all is necessary, a determined sequence of events in time and space. As so, science is irrational, without purpose or meaning. In misguided defense of science, twentieth century analytic philosophers designate metaphysical entities 'nonsense.' They argue mind is incomprehensible nonsense because unobservable. Overlooked is this argument's applicability to matter, which constitutes a Lockean substratum. An unobservable entity manifested

in experience, matter's existence is either needless complication, or incomprehensible nonsense. Truth and falsity presuppose appearance and reality. Discarding this distinction, nothing is true or false, it simply is. Only by introducing appearance and reality are truth and falsity introduced, and this requires distinguishing between mind and body. Mind is the realm of appearance, and body of reality. Truth and falsity is correspondence and difference of appearance and reality. Concerned with correspondence between appearance and reality, science is possible only in a world of matter and mind, truth and falsity occurring only in such a world. Regard for a science of consciousness occurs because the causal interaction problem appears to bring into doubt the rationalist ideal of a coherent scientific universe. Such fear is justified, not because of the causal interaction problem, but because science presupposes consciousness, putting consciousness beyond science's reach. This scientific limit is overlooked because the subject matter of science is confused with science itself. Sought is a material world ironically making science impossible. Its success is often science's defense, but scientific mind is limited, science not applying to most of life. Basic to science is the conscious state of appearance and reality, which is only one of many conscious states. Because hypothesizing and evaluating are acts of autonomy, science requires an autonomous self. Matter being necessarily determined, an autonomous self must be immaterial or metaphysical. Science studying the determined material, it is unable to explain the nature of mind required by itself. Thus, a science of consciousness is impossible. **C35**

75 **Knowledge: Scientific analysis using set theory** Sandeep Sharma <sandeep_scientist@yahoo.co.in> (Knapur, Uttar Pradesh, India)

Epistemology or theory of knowledge is the branch of philosophy concerned with the nature and scope (limitations) of knowledge. Much of the debate in this field has focused on analyzing the nature of knowledge and how it relates to connected notions such as Truth. Academic disciplines vary widely in their implicit epistemologies. This paper is written in a scientific style to explain the following features of typically philosophical epistemology:- 1) Definition of Knowledge 2) Significance of Knowledge 3) Methods of Transference of Knowledge - Analysis using Set Theory. 4) Characteristics of Knowledge 5) Wisdom and Knowledge. However the material presented in this paper is applicable to all forms of Epistemology. **P1**

76 **The problem of content and self-knowledge of one's mental states** Krzysztof Swiatek <swiatekk@macewan.ca> (Edmonton, Alberta, Canada)

Since the 1980s the problem of content has dominated the discussion of the concept of mental states in the philosophy of psychology The two opposite positions tout narrow--individualistic (conforming to Stich's principle of psychological autonomy) and solipsistic (conforming to Putnams' principle of methodological solipsism) and wide (anti-individualistic and non-solipsist) concepts as most promising for the purposes of psychology as an empirical science and a tool for the explanation of behavior In this paper I defend the view that narrow content is, in general, better suited for the explanatory tasks of psychology. However I also try to prove that the explanatory adequacy of individualism has an unexpected downside; namely, it threatens the agent's knowledge of the contents of his own mental states. Paradoxically, a similar objection has been raised by Putnam and others against the wide content. (Putnam 1975; Fodor 1980; Searle 1983; Woodfield 1982; Cf. Davidson 1986) I shall attend at some length to this argument, and particularly to Davidson's critique of it, for its strong bearing on the subject-matter of my project. When properly reinterpreted, Davidson's argument attempts to prove that wide content is cognitively externalist in that the agent is not aware of the true contents of his beliefs. In my paper I argue that in spite of the wrong reasons Davidson gives, he is right in attributing cognitive externalism to Putnam and the concept of wide content. He does not note, however, that a similar conclusion holds of both kinds of narrow content. Actually, I show that solipsistic content is similarly externalist in a strong, metaphysically necessary form of cognitive externalism. Such a conclusion is a consequence of the analysis of Davidson's argument presented by Boghossian in his 1989 article "Content and Self-Knowledge", a consequence implied by Boghossian's argument

but not recognized by him. In contrast to the narrow content of methodological solipsism, individualist content will prove cognitively externalist in a weak, metaphysically contingent sense. This kind of externalism implies that the explanatory contents are not fully known by the agent and likely will never become so. **C2**

77 **What is most metaphysically basic in science; laws, sealing wax, cabbages, structures or things?** Laura Weed <weedl@strose.edu> (Philosophy, The College of St. Rose, Albany, NY)

A discussion of the metaphysics of science, and especially of physics, has made a comeback in recent years from the state of exile into which early analytical philosophers, such as A.J. Ayer and Moritz Schlick had sentenced it. Philosophers such as Nick Huggett, James Ladyman and Don Ross, Bas Van Fraassen, and Tim Maudlin have begun to make forays into proposing a theoretical metaphysics for quantum mechanics, following similar work by physicists and scientists, such as Henry Stapp, Sunny Auyang, Giuseppe Vitiello, Walter J. Freeman and Karl Pribram. In this essay I will first, give an evaluative overview of the recent philosophical overtures toward a metaphysics for quantum mechanics. In each of the philosophers highlighted I will point out some of the advantages of the approaches that are being explored, while pointing out some areas in which I believe the approach could be improved. Second,I will point out some of the issues raised in the work of the scientists working in this area that present problems for the philosophers that I've discussed, and make some suggestions about what might be needed to resolve these problems. Third, I will propose my own analysis of a metaphysics for contemporary science, that I believe will better reflect the emerging metaphysics of science. **P1**

1.10 Personal identity and the self

78 **Language, time, and subjectivity: lessons learned from rhetorical analysis of religious experiences** Sharon Avital <avitalsharon@mail.utexas.edu> (Communication, Interdisciplinary Center, Hertzelia, Rishon Lezion, Israel)

This paper deals with the complex relations between consciousness and language. More specifically, this presentation explores the relations between linguistic structures, the ways in which these structures construct different perceptions of time, subjectivity and ultimately - different experiences of transformations. This paper is based on my dissertation in which I looked at the relations between experience and expression at the context of three religions and their respective languages - Judaism (Hebrew), Christianity (mostly Greek and Latin), and Zen (Japanese). In my research I rhetorically analyzed testimonies of radical subjective transformation (i.e., awakenings) in the context of the above religious and their hermeneutic traditions. This study shows that even an experience of awakening which is considered subjective and is often described as 'ineffable' is in fact rhetorically constructed. In spite of some important similarities, significant differences were found between awakening experiences of members of the different religious traditions. In-depth analysis revealed the ways in which particular idioms and topoi construct different religious experiences providing further proof to the flexibility of consciousness and the importance of language in shaping even 'personal' experiences such as awakening. Another important and relevant finding concerned time. In his book The View from Within, Varela names temporality as the most important and under studied element in the study of consciousness. Interestingly, this study of religious experience and expression revealed temporality to be of central importance indeed. The analysis showcases the self as inter-subjective and as co-arising in the shared movement between silence and speech. It further shows that any discussion of language must always assume embodiment and a particular temporality. In other words, perceptions of time and language keep shaping one another and ultimately construct different experiences of self. It was found that Christianity understands the self as an independent being that is subject to time but always aspires to realize its true form by going beyond time. In Judaism, the self and the community are interrelated: time is understood as cyclical and is defined by

the qualitative content of events which reverberate across time. The linear understanding of time in Christianity was related to the use of the solar calendar and the understanding of language as mimetic and as moving away from origins. Likewise, the self is experienced as an object which moves along a linear time. Transformation is accordingly experienced as a dramatic event (rather than a process) which divides life into 'before' and 'after.' Buddhism emphasizes the ways in which the construction of time and the construction of self are interdependent. Memory of past events and projection into the future create the illusory sense of continuity in time which reifies into the sense-of-self. The objectification of time is also the objectification of self which is experienced as autonomous and timeless while it is also trapped in time and subject to it. Zen uses particular rhetoric to deconstruct the duality of time and infinity and construct instead an experience of satori in which the self is experienced as in constant flux and as empty of objective existence. **C11**

79 **Three conceptions of the self for applied purposes** Tatiana Bachkirova <tbachkirova@brookes.ac.uk> (Business School, Oxford Brookes University, Oxford, Oxon, United Kingdom)

Issues of the nature of self and agency are important not only for theoretical understanding. They make a significant difference to the way we construct practical approaches in the applied fields such as counselling, psychotherapy, coaching and developmental psychology. As neither science nor philosophy can yet be certain about the nature of the self I will describe an attempt to identify a model of the self that at least does not contradict the current findings of science and some plausible theories in philosophy and at the same time is reasonably clear for practical purposes. The model is meant to clarify a typical confusion between two main perspectives on the self: phenomenological and metaphysical. The literature for practitioners is full of examples in which the authors describing components of the self from the first person perspective such as a sense, awareness or experience without a blink proceed to name them as capabilities and cognitive processes implying a third person perspective. I will demonstrate that many practical approaches to facilitating changes in the individual are affected by this confusion. Instead I will be suggesting that there could be three legitimate notions of self, each representing an explicit standpoint. From the pure phenomenological perspective the most basic notion of self is our first-person pre-linguistic sense of being separate from the environment and active in it, just because of simply being a living organism. It could be called a centre of awareness. Then from the metaphysical perspective it could argued that there is a neurological network that could be called an executive centre or ego, responsible for the coherent behaviour and normal functioning of the individual in the world. This network is modular, with each module or mini-self responsible for a function/action of the individual in the world. This centre responds to the needs of the organism mainly unconsciously but the individual may become conscious when the usual functioning is delayed because of the ambiguity, complexity of a task or with a provision of greater leisure. Finally the self can also be seen as a narrative construction which is a product of human nature designed to explain the view of the self that we consciously and linguistically conceive. This should be consistent with the phenomenology of our experience, but should also make sense from the metaphysical perspective. Self-models or various stories of 'me' are created because of our ability to use language. They may correspond to actual mini-selves or perhaps - not at all. A combination or potential synthesis of these self-models can be called a centre of identity. By separating these notions of self for practical purposes we can propose three corresponding mechanisms of counselling/coaching that aim to facilitate certain changes in the person. These mechanisms involve improving the quality of perception, working with the unconscious, automatic and emotional properties of the whole organism and working with the multiplicity of various self-stories. **P1**

80 **Panpsychism reloaded: The concept of the self** Alexander J. Buck , Ludwig J. Jaskolla <mail@alex-buck.de> (Metaphysics, München, Germany)

In our talk at the TSC 2010 on panexperiential holism and the combination problem, we argued that defending panexperiential holism softens the combination problem drastically.

Later that year, Philipp Goff and Sam Coleman (independently) put forth the thesis that even for atomistic panpsychists the combination problem might be less severe than originally assumed. Nevertheless, there are pressing problems to answer for panexperiential holists as well as Goff/Coleman panpsychists: At the heart of many of these problems lies the question which concept of the self is entailed by the approaches mentioned above. One classic argument tells us that panpsychistic ontologies are only compatible with unintuitive and therefore self defeating notions of the self. With this talk, we want to resume the discussion from the Toward a Science of Consciousness (TSC 2010) and tie up some loose ends concerning panpsychism and the concept of the self. (0.) We will start off our discussion by giving some introductory remarks on the essential characteristics of both pan-experiential holism and Goff/Coleman panpsychism. (1.) In the first systematic section of our talk, we are going to present to formal arguments showing that (1.1) panexperiential holism as well as (1.2) Goff/Coleman panpsychism need to be revisionary (in Strawsonian sense) about the concept of the self and that these revisions are incompatible with many classical approaches to the self. For example, we will show that most prominently this revised concept of the self is incompatible with Richard Swinburne's account of a simple criterion for personal identity (cf. Swinburne's Gifford Lectures 1982- 84). (2.) The second section will have a twofold structure: (2.1) Firstly, we are going to show that both concepts of panpsychism are compatible with Derek Parfit's revised concept of the self (cf. Derekt Parfit 1984). Parfit argued that what matters is not strict identity over time, but mental continuity and causal connectedness. (2.2) Despite this structural compatibility, Pafit's own claims are entirely anti-realistic: we will defend the thesis that an ontological interpretation of Parfit's original claims can be given by employing "the theory of abstraction" (Bob Hale and Crispin Wright 2001). This allows for an ontological grounding of Parfit's relation R within the framework of the natural world. (3.) At the end of the day in the final section of our talk, this ontological interpretation will allow us to show that most of our basic notions about selves can be upheld within both kinds panpsychism. We will argue for this assertion by showing exemplarily that human persons can be understood as being moral subjects within the theoretical framework sketched above. If our claims are true, then one of the most pressing problems for panexperiential holism as well as Goff/Coleman panpsychism can be circumvented completely - rendering the whole endeavor of panpsychistic ontologies more plausible. **C37**

81 **'I' as a truth maintenance system: Consciousness integrates information in order to arrange coherent structures** Ida Hallgren Carlson <idahallgren@hotmail.com> (Psychology, University of Gothenburg, Gothenburg, Sweden)

The 'I' is here suggested to be a system of coherent information available for the conscious subject at any given time. The function of consciousness is to integrate information within this system. Memories seem to be stored as if directed by a Truth Maintenance System which means that coherence will be restored within a given system. Adding facts to a knowledge base in an artificial system is easy as compared to adding information that is in conflict with existing parts of the knowledge base. Rearranging information when faced by conflicting information is more difficult. Such rearrangements are harder to allow for in artificial systems and are generally avoided by conscious systems. Perceptions and facts that are easily incorporated with previously gathered information will be added to the information base that is the 'I'. Incongruent facts or perceptions are preferably avoided as in accordance with the theory of cognitive dissonance. Attentional mechanisms tend to block out information that does not fit the picture and are closely related to what in clinical psychology is referred to as defence mechanisms, they help maintaining the stability of the information system of the 'I'. Viewing the 'I' as a coherent information system will explain why different experiences that are not so easily incorporated into the same information system instead will be divided between different systems with internal coherence. To divide information between different systems with internal coherence is then a normal cognitive process, but in extreme cases the systems would be fully separated, as in cases of Dissociative Identity Disorder. Here the conscious subject is unable to get access to two different knowledge bases simultaneously. The conceptual self is made up of different I-structures where the most predominant one is in line with what we refer to as the 'I' in everyday language. In psychotherapy different parts of the conceptual self, that is, different 'I' structures with internal coherence, will be activated simultaneously and hence integrated through the integrative mechanisms of conscious processing. **P1**

82 **Are schizophrenic experiences exceptions to the Shoemaker's principle of immunity to error through misidentification?** Yao Wen Hsieh , Allen Y. Houng <zechsxie@gmail.com> (Institute of Philosophy of Mind and Cognition, National Yang Ming University, Taipei City, Taiwan)

The Shoemaker's principle of "the immunity to error through misidentification relative to the first-person pronouns" (IEM) has been one of the most important ideas to understand self consciousness for more than four decades. Shoemaker suggests that when a speaker uses the first-person pronoun ("I") to refer to herself, she cannot make a mistake about the person to whom she is referring. However, some puzzling pathological cases such as schizophrenic thought insertion (Feinberg, 1978 & Frith, 1992) are proposed to be the counterexamples to the IEM principle. In those cases, a patient does not claim that she is the owner of a thought which she is in fact thinking, that is to say, she misidentifies the source of her thought and seemly to violate the IEM principle. I will argue that, if we take the model of two-level self and make a distinction between core self and autobiographic self (Damasio, 1999), the misidentification could only happen in the aspect of autobiographic self. The autobiographic self is weaved by the left hemisphere, the "interpreter", of the brain, according to limited information and thus is fallible in its nature. On the other hand, there is a more basic aspect of self called the core self. The core self is the foundation of the narrating ability of the autobiographic self and thus itself is not narrated by the autobiographic self. Therefore, in the case of thought insertion, the core self is not misidentified and the IEM principle is not actually challenged. If we hold the theory of two-level self, any similar error of assigning a certain thought or experience to a subject is not sufficient to object the IEM principle. By defending the IEM principle from the attack of the possible misidentification, the two-level theory has more explanatory power than the one-level theory on the problem of self-consciousness. **C26**

83 **Is personal identity the wrong question to ask?** Ling-Fang Kuo , Allen Y. Houng <sierra214135@gmail.com> (Dept. of Life Sciences, National Yang-Ming University, Taipei, Taiwan)

Personal identity is an important issue in philosophy. Why the problem is hard to be solved is due to the confusing way of asking the question. In this presentation, I will point out that the question of personal identity is the wrong question to ask, and provide a better framework from recent research on multi-level theory of self to solve the confusion. The question of personal identity is to ask what makes a person the same person. Philosophers more or less propose these three approaches to the question: The Psychological Approach, The Somatic Approach and Anticriterialism. However, they didn't realize that when answering the question - "What makes a person the same person?" - the question has several distinct aspects. This overlook makes personal identity a very hard question, because a single theory can never satisfy all the criteria in different aspects. In my presentation, I will raise four aspects in personal identity, synchronic/diachronic, first person/third person, here and now/social historical, individuation/identity. And show that lots of debates in personal identity are deal with different aspects. It is why the debate in personal identity can't reach a consensus, because they are talking about different questions. I think the better way to discuss the problem of personal identity is that of using the multi-level theory of self as the framework. In the end, I will talk about several kinds of multi-level theory of self, for example Galen Strawson's self theory and psychologist Antonio Damasio's self theory -- and will show how the multi-level theory of self can provide a better framework which includes four aspects of personal identity for discussion. **C26**

84 **The effects of attentional load on self-consciousness** Ted Lougheed , Brook, Andrew <tloughe2@connect.carleton.ca> (Cognitive Science, Carleton University, Ottawa, Ontario Canada)

There is disagreement among philosophers on whether or not an entity can be conscious of anything without being self-conscious. Some philosophers claim that phenomenal consciousness in general implies consciousness of self (e.g., Rosenthal, 2005; Kriegel, 2005). We argue, contrariwise, that consciousness is possible without explicitly representing oneself as the subject of experience. We hypothesize that self-consciousness requires attentional resources, so when attention is directed away from self-related thoughts, one can be conscious without being self-conscious. Drawing from research on inattentional blindness and episodic memory, we have devised an experiment to test this hypothesis in mentally-healthy adults. Current research (Conway, 2005; Gardiner, 2001; Tulving, 2002) suggests that episodic memories are encoded specifically as experienced by self, so we reason that the encoding of episodic memory requires self-consciousness at the time of encoding. Under conditions of inattentional blindness with respect to self, we expect that the ability to encode episodic memories will be greatly reduced, if not entirely absent. To test our hypothesis, we will manipulate the presentation of self-related images during an attentionally-demanding backwards-counting task. In the test group, we periodically interrupt the counting task with novel images; in the control group, we use images of the participant collected at the beginning of the session. We will also test participants on a version of the introspective Remember/Know test pioneered by Tulving (1985), comparing participants' responses with data from the earlier task. We present a detailed overview of our experimental design and discuss our preliminary results. **C28**

85 **The feeling of personal identity in the locked-in syndrome is deeply rooted in the body representation** Marie-Christine Nizzi <marie.nizzi@free.fr> (IHPST, Paris, France, Metropolitan)

Philosophers tend to define personal identity from a third person perspective as the logical property of any person remaining herself during a certain time. Because the body is always changing, personal identity would be granted by an immaterial and everlasting entity like the Cartesian soul. We suggest redefining personal identity as a first-person significant investment of the experienced body. Locked-In Syndrome (LIS) patients suffer a full body paralysis without cognitive impairment. In this survey, we investigate the importance of body representation and experienced meaning in life in the feeling of identity, as evaluated in a fist person perspective by 44 chronic LIS patients then in a third person perspective by 20 healthy controls matched in gender and age. Fifteen questions using Likert scale were presented in 3 domains (A: global evaluation of identity, B: body representation, C: experienced meaning in life). We observed significant correlations for patients between A and B as between A and C and significant differences between patients' and controls' scores in parts B and C. Results suggest that the feeling of personal identity relies on body representation as a significant and dynamic psychological investment from the subject that needs to be investigated in a first-person perspective. **C26**

86 **Does proprioception constitute self?** Hao Pang, Allen Y. Houng <howpan@gmail.com> (Taipei, Taiwan)

Proprioception is the unconscious perception of movement and spatial orientation arising from stimuli within the body itself. The information they provide is solely about the body, as opposed to information about the relation between the body and the environment. According to some philosophers, forming a point of view needs the participation of proprioception. Yet the case of "The Disembodied Lady" seems to provide a counterexample. The case was about a lady who had lost somatic proprioception and used vision in every situation where she used proprioception before. Even though she lost her sense of proprioception, she still has a self and can experience the world with a point of view through other preceptors. If proprioception is necessary for a "point of view", then "The Disembodied Lady" would not have a point of view. But "The Disembodied Lady" has a point of view. Therefore, proprioception is not necessary for point of view. In this paper, I will argue that the case does not count as a counterexample. In my argument, there are two types of proprioception: type one, a subjective aspect and type two, a qualitative aspect. These two types of proprioception are double dissociated. The subjective aspect is necessary for constructing a point of view, but the qualitative aspect is not. Therefore, not all proprioception is necessary for point of view. Only type one proprioception, which "The Disembodied Lady" still remains, is necessary for constitute self- a point of view. In conclusion, I argue proprioception as the subjective aspect is an constitutive component for self. **C34**

87 **Emergent consciousness from self-organized dimensions of meaning through intercoordination of perspectives** Julia Shaw <julie.shaw@esc.edu> (Human Development Center For D, State University of New York - Empire State College, Troy, New York)

This research demonstrates the emergence of consciousness in adolescents and adults by the creation of complex constructions of meaning using single abstract perspectives as building blocks into four dimensions of meaning: Narrative, Ranking, Partition, and Visual gestalt. Nearly all participants age ten through 86, when given instructions to 'make a personally meaningful arrangement' of ten cards, each of which had a self-selected perspective, arranged a meta-level 'dimension' of those ten perspectives into: 1) a Narrative; 2) a Ranking; 3) a Partition; 4) a Visual Gestalt, or an intercoordination of these meta-level gestalts. Participants, particularly with age ($p = .01$) used these four meta-level arrangements as dimensions. In personal meaning, narratives organize perspectives temporally, whereas rankings, partitions and visual images organize perspectives spatially. Personal differences lead to variations in patterns of perspective (translations) where time and space can translate one to another. Developmental maturity leads to increased complexity in patterns (transformations) where individual perspectives simultaneously situate within patterns of multiple dimensions, creating unique complexes of perspective. The results of this study visually show how dimensions of operational time and space for personal meaning emerge into a more consciously organized self from fluid and formerly unrelated perspectives within a less-organized self. This is a process for emergence of a well-formed identity. Awareness of this process of perspective-alignment into meta-level dimensional gestalts can assist in self-reflection; in awareness of systematic variations in dimensional meaning in others; and in the creation of more grounded and more flexible constructions of meaning. **C22**

88 **The other in me: Interpersonal multisensory stimulation changes the representation of one's identity** Manos Tsakiris , Stephanie Grehl; Ana Tajadura-Jiminez <manos.tsakiris@rhul.ac.uk> (Psychology, Royal Holloway University of London, Egham, Surrey United Kingdom)

Mirror self-recognition is a key feature of self-awareness. Do we recognize ourselves in the mirror because we remember how we look or because the available multisensory stimuli (e.g. felt touch and vision of touch) suggest that the mirror reflection is me? Participants saw an unfamiliar face being touched synchronously or asynchronously with their own face, as if they were looking in the mirror. Following synchronous, but not asynchronous, stimulation, and when asked to judge the identity of morphed pictures of the two faces, participants assimilated features of the other's face in the mental representation of their own face. Importantly, the participants' autonomic system responded to a threatening object approaching the other's face, as one would anticipate a person to respond to her own face being threatened. Shared multisensory experiences between self and other can change representations of one's identity and the perceived similarity of others relative to one's self. **C26**

1.11 Free will and agency

89 **Free Will: A question of personality and self-involvement? Hints from interindividual differences in the lateralized readiness potential** Eva-Maria Leicht , Markus Quirin, Julius Kuhl, Ulla Martens, Thomas Gruber <eleicht@uos.de> (Cognitive Science, Individual, University of Osanbrück, Osnabrück, NIEDERSACHSEN Germany)

This EEG study investigates manipulated self-involvement and interindividual differences occurring in a self-evaluation task. We modified the Libet (1982) paradigm to examine the degree to which high-level, self-referential decision processes may affect the LRP and the subjective moment of decision: Fifteen participants were asked to decide by key press whether attributes presented in the centre of a clock describe themselves or not. Afterwards, they had to report the position of the rotating clock hand. Data from previous studies could be replicated. In addition, we found substantial moderating effects of personal relevance of the decisions and personality differences. The findings are discussed with respect to an integrative model of physical determinism and the psychological impression of freedom and self-determination (Kuhl, 2008). **C3**

90 **Decisions, Decisions** Andrew Westcombe <awestcombe@gmail.com> (Blaxland, NSW Australia)

In 1983 Benjamin Libet observed the most extraordinary phenomenon amongst his test subjects. Once the subjects entered his laboratory and were wired up to an EEG, the subjects' wrists started randomly flexing, much to everyone's surprise. Libet deduced that this strange behaviour came about because human choices and actions are not consciously initiated. Instead, these things are initiated unconsciously, as evidenced by the famous half-second "readiness potential". No, wait ... that's not quite right. Benjamin Libet observed a half-second readiness potential prior to the conscious awareness of the "random" wrist flexions that his subjects had agreed to perform during the experiment. The subjects consciously agreed beforehand to perform these behaviours, so no-one was surprised to witness these flexions. Since these random flexions were plainly the result of a prior conscious choice, Libet's claim that human decisions and actions are not consciously initiated is not substantiated. The flaw in Libet's analysis, I contend, is to conflate two types of decisions. One type of decision relates to specific choices or actions - the other is somewhat less specific. This paper offers a fresh analysis of Libet's work on the Readiness Potential, and explores the implications of this analysis upon the scientific and philosophical study of consciousness. **C3**

1.12 Intentionality and representation

91 **A critique of pure representation** Sean Allen-Hermanson <hermanso@fiu.edu> (Miami Beach, FL)

I reply to Bourget's (Nous, 2010, 44:1) claim that all possible conscious states are underived if intentional. This is a crucial component of what he calls the originality thesis, and, ultimately, his view that consciousness is "PURE" representation. An underived state is one of which it is not the case that it must be realized at least in part by intentional states distinct from itself. Bourget gives both intuitive and empirical arguments for this claim. The intuitive argument fails because it trades on an ambiguity in the phrase "split second." If the duration of an experience fell below a certain temporal threshold, it would cease to be an experience. However, it is arguable that at least some of the briefest experiences above that threshold cannot exist in isolation from other intentional states. Either way, his claim that all experiences can, in principle, be isolated from all other intentional states does not go through. A second objection raises another dilemma: either Bourget's imagined subject, who only exists for a split second, is otherwise physically normal, or, not. If she is, then she cannot have an experience of whiteness isolated from all other experience, since she will also be experiencing a background of bodily sensations, possibly including a sense of her balance, hunger,

thirst, pressure, and the articulation of her limbs. On the other hand, to imagine subtracting all possible background intentional states is just to subtract the subject as well. His empirical argument attempts to use the modularity of perception to buttress the claim that an experience could occur in isolation, and so be underived. However, this is a non-sequitor, because the evidence is better interpreted as supporting the view that intentional states can be subtracted, but not isolated, and so are derived. An analogy helps explain. A quarter can be subtracted from an economy, but a quarter cannot exist in isolation (a round piece of metal can be isolated, of course, but a quarter derives its economic value from its role in an economy). In short, just because a functional state can be subtracted from the modular system of which it is a part, doesn't imply that it can exist, qua functional state, in isolation from that system. Bourget begs the question in favor of the originality thesis by assuming otherwise. Finally, despite my criticisms of Bourget's arguments, I conclude by suggesting that the philosophical implications are dire if consciousness is not the same as underived intentionality. **C1**

92 **Performing towards sense: The perception-language loop** Sergio Basbaum <sergiobasbaum@pucsp.br> (Computation, Pontificia Universidade Católica De São Paulo (PUC-SP), São Paulo, São Paulo Brazil)

The present work derives from our recent post-doctoral research on philosophy and cognition (2009), and examines the possibility of a non-informational description of the individual-environment dynamic cognitive coupling, taking as its main focus the relations among perception and language. Without using the concept of information, it is possible to provide a rich account of the cognitive alchemy by which the body transforms the perceived world in a spoken world, and the perception-language loop thus derived. We believe the conclusions open research directions that constitute a meaningful contribution to cognitive modeling, and especially to the quest for semantics in language, grounded in a dynamic view of individual's life as performing towards sense. Merleau-Ponty's writings on the 1940's and contemporary accounts inspired by the French Phenomenologist's works on perception (such as Alva Noe's) draw a dynamic picture of perception as an embodied, intentional, non-objective and ever uncompleted process of "enacting" a "world" in which to perform one's life -- a "stage" also influenced by cultural patterns. We need a well resolved, meaningful circumstance, a provisory world that makes sense, so that one can perform one's life in it. May this dynamic picture be compelling, then language can be understood as a whole-body task (coordinating brain, nervous system, head, ears, chest, muscles, breath, etc), a body gesture which gives to this transitory and immediate perceived world an elusive permanence: language completes and "consecrates" the work of perception, thus allowing a sharing of one's "sky being made on the flight" and the intersubjective seaming of collective "reality", impacting itself on perceptual patterns. The perception-language loop emerges as a power of one's whole individual presence, allowing performing a meaningful world. To argue for this, we rely in an interdisciplinary matrix guided mainly by the Phenomenology efforts of Maurice Merleau-Ponty, enriched by several contemporary readings which support embodiment and situatedness, such as the Neurophenomenological works of Varela and Thompson, the anthropology of Classen and Howes, Horst Ruthroff's semiotics and some insights of interdisciplinary media-theorist Marshall McLuhan. **C17**

93 **Do higher-level properties influence the phenomenal character of visual experiences?** Mette Kristine Hansen <mette.hansen@fof.uib.no> (Philosophy, University of Bergen, Bergen, Hordaland Norway)

Most philosophers agree that the phenomenal character of perceptual experience involves the representation of lower-level properties such as colors, spatial properties and temporal properties. However, the view that the phenomenal character of visual experience also involves higher-level properties such as natural kind properties and artificial kind properties is more controversial. In his article "Perceptual experience and the Reach of Phenomenal Content" Tim Bayne presents some contrast arguments that favor the higher-level view. In my view, the most convincing of these arguments appeal to the phenomenon of pure associa-

tive agnosia, an impairment in perception that is not due to elementary sensory malfunctions (Bayne 2009). In this paper I argue that, contrary to what Bayne seems to think, a lower-level theorist can deal with contrast argument such as the argument from associative agnosia. **C1**

94 **Language, Consciousness and performative action** James Moir <j.moir@abertay.ac.uk> (Social & Health Sciences, University of Abertay Dundee, Dundee, Angus United Kingdom)

This paper considers recent debates in the study of language use about the status of speech acts versus performative actions. At first glance the two may appear to be one and the same but I shall argue that this is far from the case. Although Austin's 'speech-acts' appears to be associated with Wittgenstein's concept of 'language-games', there has been an over-extension of this into considering discourse as the subject of performative actions through various 'devices' and 'formulations' and 'displays'. The focus of performativity leads us down the path of considering persons as agents who are engaged in the conscious mastery of language use as if it were comprised of elements that are in need of selection and control. In this view then, the primacy of the agency of the language user is asserted over that of the speech act, or to paraphrase Austin, the things we do with words. It is the language user or hearer who is therefore deemed to be conscious of what it is that they are saying or hearing as something that is designed as such. This is assumed to involve aspects of rhetoric or discursive psychology that speakers and hearers are attuned to in the course of interaction. The search for units of linguistic performance has led us towards a kind of particle physics within the study of the social use of language. Various elements have been identified and are presented as discrete units of use or analysis. Whilst such a focus is at times interesting, it leads us to consider language use as something that is related to agency in terms of conscious selection and construction. The problem is then posed in terms of language use as something that is related to the performance of action by an agent who has learned how to master 'it'. This has the effect of transferring the study of syntax further up the discursive chain in terms of the mastery and use of particular linguistic devices within the order of interaction. This codification of the properties of language use therefore retains a focus on performative action rather than an engagement with the acts themselves. The argument advanced in this paper is that for the most part, interlocutors are not conscious of such linguistic features. Taking speech acts as the focus leads us to consider as primary the acts themselves. From this perspective it is not the agency of the language user in terms of performative action that is primary, but rather participation in linguistically-constituted practices in terms of doing such things as asking, complaining, excusing etc. In other words, it is not a case of the conscious mastery of devices, formulations, and displays that evident but rather the unconscious use of language as part of practices themselves that are treated as primary. Learning to engage in speech acts is not the same as learning to use language as separable from the things that are done with words. C17

95 **Synaesthesia and the Structural Approach to Perceptual Content** Michael Sollberger <msollberger@datacomm.ch> (Department of Philosophy, University of Lausanne, Lausanne, VD Switzerland)

The goal of this paper is to promote and defend a new structural version of the Representative Theory of Perception within the philosophy of mind and perception that is backed up by empirical as well as conceptual arguments. To this end, I first discuss the structural account of representation and apply it to perception and perceptual consciousness. One upshot of this discussion will be that perceptual experiences possess both representational and purely sensational properties. Then, I concentrate on empirical cases of synaesthesia and argue that synaesthetic experiences are well-suited for advocating a structural approach to the perceptual mind. The general picture that emerges in this paper prompts a new perspective on perceptual consciousness that is structural through and through. **C4**

1.3 Miscellaneous

96 **Action and perception in pain experience** Alice Kyburg <kyburg@uwosh.edu> (Philosophy, University of Wisconsin - Oshkosh, Oshkosh, WI)

If pain, understood as a quality or type of experience, is the representation of tissue damage, as Tye and other representationalists about pain hold, then in what does this representation consist? Using 'active vision' from computer science and the neurosciences as a model for perception and taking pain to be a kind of perception, I develop the thesis that the phenomenal content of pain experience is a representation of tissue damage that is at least partly the result of sensory/motor pairings competing for representational resources within the context of prioritized actions and goals. The result is an active representationalist account of pain that incorporates many of the premises motivating Klein's imperative theory of pain. Various kinds of pain are considered in evaluating this account, including difficult cases such as phantom limb pain, chronic pain, and pain that seems to become less bothersome when subjects focus their attention on consuming activities. **C33**

2. Neuroscience

2.1 Neural correlates of consciousness (general)

97 **Cardiac neurons firing precedes cortical neurons firing by variable time equivalent to RP or Libet`s Latency Period in goal directed behavior or action in conscious state** Amna Alfaki <amna1952@hotmail.com> (Pediatrics, Omdurman Islamic University, Kharoutm-Omuduman, Sudan)

The signals, and the neuronal mechanisms underlying the behavior, actions and action-directed goals in man and animals during conscious state are not fully understood, and the neuro-dynamic mechanisms and the source of these neuronal signals are not authenticated. Temporal judgment alone can neither account for neural signaling necessary for emergence of conscious act nor can explain the readiness potential RP (the accepted neural correlate time needed for the neurons to fire) that precede the onset of action or the latency time of 0.5 ms that precede the conscious act found by Libet. Neuronal feedback mechanisms between the heart and the brain seem feasible and logical suggestions to be considered, so clearly I would suggest that the onset of a conscious directed goal, conscious action, freewill, and intention, the neural signals and mechanisms that control them may depend upon the interaction between two sources: 1) Brain 2) Heart. The - temporal - cardiac (neural system) interaction has been well established in the heart-brain interaction studies by many workers who found that the work of the heart precedes that of the brain in EEG findings in conscious stimulation, which may explain and account for RP time and the 0.5 ms latency period of Libet`s important findings. According to my hypothesis (Alfaki,2009)and views the temporal neurons in the somato-sensory cortex will respond to conscious stimulation only after receiving neuronal signals from the cardiac neurons in the neural plexus of the heart, after variable millisecond equivalent (RP) or Libet's latency period prior to temporal neuronal fringing in response to conscious act. This time is the time needed by cardiac neurons to process and signal information to the brain through feedback mechanism and heart-brain interaction. **C13**

98 **Backward Time Referral in the Amygdala of Primates** Sara Gonzalez Andino , Rolando Grave De Peralta, Katalin M. Gothard <sara.gonzalezandino@hcuge.ch> (Department of Clinical Neurosc, University of Geneva and Geneva University Hospital, Geneva, Switzerland)

The existence of 'unconscious' neuronal processes that precede and potentially cause volitional acts is crucial to the concept of temporal backreferral. The existence of such signals is also postulated by the much less controversial ideomotor principle (IMP)4,5 which

emphasizes the importance of anticipating (implicitly or explicitly) the sensory consequences of our actions and the actions of others. Supporters of this principle consider anticipatory signals as essential to cope with the information bottleneck in living systems overwhelmed by a non-stopping flow of incoming sensory information and a pressure to prepare a response before events actually occur. In this talk, we will provide evidence for the existence of cells within the amygdala of primates that are compatible with temporal backreferral and which support the IMP. During a fixation-saccade task we observed that the amygdala of primates contains goal-related and general-purpose (omnipause) fixation neurons. Goal-related neurons start firing at the onset of task related saccades and continue firing until fixation is broken. For these cells, neuronal activity was a predictor of correct performance on the fixation task. Significant differences in firing were observed between trials where the gaze was held on the fixation spot for the required 100ms and error trials where the fixation was never initiated or interrupted before 100 ms. For most of these cells, differences between correct and error trials start long before (~160-100 ms) fixation onset, i.e., close to the timing of the visual response. Interestingly, the activity of these cells can be neither explained as a pure visual response nor as a motor (saccade) preparation. Their response appears compatible with a top-down modulating signal conveying information about the potential consequences of oculo-motor actions. **PL2**

99 **Quantum effects, brain functioning, consciousness, and meditation practice** Frederick Travis <ftravis@mum.edu> (Center for Brain, Consciousnes, Maharishi University of Management, Fairfield, IA)

Quantum effects have been identified at many levels of brain functioning: quantum entanglement of DNA base-pairs (3.4 x 10-10 meters), quantum superimposition of tubulin proteins in microtubules (2.4 x 10-8 meters), and in the synapse (2.0 x 10-8 meters), including quantum probability amplitudes along presynaptic vesicle grids, and quantum diffusion effects of calcium ions in pre-synaptic membranes. It has been suggested that quantum effects at the microscopic level could support quantum tunneling in gap junctions in macroscopic brain structures, especially the 'dynamic core' - the reticular activating system and thalamocortical circuitry (10-1 meters). While quantum brain effects are apparently random, they may provide necessary activation to maintain classical brain states' persistent re-entrant thalamocortical circuits associated with subjective experience. The brain is molded by sensory experiences - temporally and spatially consistent stimuli - that move through sensory circuits and organize sensory cortical cytoarchitecture. The process has been described in Edelman's Neural Darwinism model as developmental selection - changes in synaptic connections and myelination of axons, and experiential selection - strengthening used-connections, and pruning less-used connections. This process creates re-entrant circuits that, according to Edelman, create continuity of experience by combining past experiences with current experiences. Re-entrant circuits permit sensory processing in neural circuits to remain 'online' - more than 100 msec - for sufficient duration to support conscious experience. Reverberations in thalamocortical circuits are associated with conscious experience. But why are we consciously aware of stimuli? We suggest that conscious awareness or qualia depends upon re-entrant circuits. The 'qualia' re-entrant circuits would involve thalamic matrix nuclei, intralaminar and medial dorsal nuclei recursively interacting with cortical association areas, especially the medial prefrontal cortex. While reentrant circuits with thalamic core nuclei (specific nuclei) hold content online; reentrant circuits with thalamic matrix nuclei (nonspecific nuclei) may, in a parallel way, hold 'wakefulness' online leading to subjective experience or qualia. The integrative functioning of these two parallel re-entrant circuits could underlie daily experience. Meditation practices explore these two parallel re-entrant circuits. Meditations have been divided into three categories: Focused attention, Open-monitoring, and Automatic self-transcending. Meditations in the focused attention category (i.e. Loving Kindness and Compassion) appear to explore the object of experience; those in the Open-monitoring category (i.e. Zazen and Vipassana) appear to explore subject/object relations. Those in the Automatic self-transcending category appear to explore the subject alone - the experience of pure self-awareness or pure wakefulness. Pure self-awareness is described by the "absence of time, space, and body sense." This description suggests that it may be the experience of the quantum field posited to drive classical brain states. With regular meditation practice, pure self-awareness is experienced as an uninvolved backdrop to relative experience. This may be the experience of the 'quantum brain' along with 'classical brain states.' In the ancient Vedic tradition, this state is the first, stabilized state of enlightenment called Cosmic Consciousness or Turiya-teet Chetana. This talk will discuss mental causation and meditation experiences in light of this integrative model of quantum and classical brain states, and of the coherent interaction of objective and subjective re-entrant thalamocortical circuits. **C5**

100 **Neuroscience of Transcendent Experiences** Mario Beauregard <mario.beauregard@umontreal.ca> (Psychology and Radiology; Neur, Université De Montréal, Montreal, Quebec Canada)

In my presentation, I will review data suggesting a role for the temporal lobe in transcendent experiences (TEs). The possibility of experimentally inducing such experiences by stimulating the temporal lobe with weak electromagnetic currents will be considered. I will also examine the results of neuroimaging studies of TEs conducted to date, and discuss these results with respect to the mind-brain problem. **PL7**

101 **Time Effects in Human Cortical Neuronal Firings** Moran Cerf <moran@klab.caltech.edu> (Computation and Neural Systems, New York University, Caltech, UCLA Dept. of Neurosurgery, Los Angeles, CA)

One key attribute of our brain is its ability to predict and simulate the future based on information from the present and the past.Humans are able to predict outcomes that were not experienced and make decisions based purely on imagining them and their prospects. Observing the process of raising thoughts into our mind and making free choices based on these can be ultimately best seen by directly recording the activity of single neurons in the brains of humans, in real time - as they ruminate over the world and make these choices. In a sequence of studies recently conducted using single-neuron recordings in the brains of humans undergoing brain surgery we were able to visualize the process by which subjects alleviate thoughts and predictions in their own mind and used real-time decoders to alter the environment accordingly, causing a change in the neuronal interpretation of the environment inside the patient's brain. In this new work, which I will address in my talk, we directly tackled subjects perception of time and choice in their own brain by altering the outcomes of their actions simultaneously with their conscious awareness of those. We looked at the change in pathways and characteristic in the patients brain as they learn to control the dynamics of their own neurons and the change in the neuronal correlates of consciousness' activity as the neurons are being interpreted in real-time. **PL8**

102 **On the complexity of consciousness: An fMRI study of the intersection between auditory conscious perception, working memory content, and task difficulty** Johan Eriksson <johan.eriksson@physiol.umu.se> (Umeå Center for Functional Brain Imaging (UFBI), Umeå, Sweden)

Neuroimaging research has demonstrated consistent involvement of higher-order (frontal and parietal) cortical regions in conscious perception, though the nature of this involvement is debated. It has been suggested to reflect attentional processes required to elevate a mental state from unconscious to conscious. An alternative view is that it reflects integrative processes related to changing the content of working memory. Here we use fMRI and a tone detection task designed to dissociate stimulus parameters from conscious perception, in combination with a 2 x 2 factorial design manipulating task difficulty (i.e., attentional requirements) and target complexity (i.e., integrative requirements) in relation to auditory conscious perception. The results show that frontal regions are mainly affected by task difficulty, in line with the proposal that frontal cortex works as a cognitive 'engine' that help drive mental states from unconscious to conscious status. Activity in parietal regions increased with increasing target complexity, suggesting that the parietal cortex works as an

information integration point. However, parietal cortex activity was largely non-significant when perceiving simple tones, supporting the view that involvement of higher-order cortical regions may not be a necessary requirement for consciously perceiving simple and easily identifiable stimuli. **C12**

103 **Operational architectonics of consciousness: EEG study in patients with severely injured brain** Andrew Fingelkurts , Andrew A. Fingelkurts 1,*; Alexander A. Fingelkurts 1; Carlos F.H. Neves 1; Sergio Bagnato 2,3; Cristina Boccagni 2,3; Giuseppe Galardi 2,3 <andrew.fingelkurts@bm-science.com> (BM-Science - Brain & Mind Technologies Research Centre, Espoo, Finland)

Even though no one yet has provided complete explanation as to how the subjective experience (phenomenality) could arise from the actions of the brain, the Operational Architectonics (OA) of brain-mind functioning offers some plausible theoretical framework [1,2]. The OA theory has following tenets: brain generates a highly structured and dynamic extracellular electric field in spatial and temporal domains and over a range of frequencies. This field exists within brain internal physical space-time (IPST) and is best captured by the electroencephalogram (EEG) measurement. Detailed analysis of the complex structure of hierarchical architecture of EEG reveals the particular operational space-time (OST) which literally resides within the IPST and is isomorphic to the phenomenal space-time (PST) and, as it has been proposed, may serve as a potential neurophysiological constituent of the mind phenomenal architecture [3]. The OA theory predicts that EEG OA would be quantitatively related to the degree of expression of consciousness, as for example in non- or minimally communicative patients with severe brain injuries. If OA is the direct neural correlate of awareness, it has to reflect the phenomenological difference in the integrity of mental states between patients with disorders of consciousness and healthy subjects. In order to address this question EEG OA analysis was conducted in vegetative (VS) and minimally conscious (MCS) patients to study the OA as a function of consciousness expression. We demonstrated that the size and duration of local EEG fields were smallest in VS patients, intermediate in MCS patients and highest in healthy fully conscious subjects. At the same time, these fields were quite stable in healthy subjects, less stable in MCS patients and very unstable in VS patients. The number and strength of coupling of local EEG fields (supposed to be responsible for the integrated subjective experiences) were highest in healthy subjects, intermediate in MCS patients and smallest or even absent in VS patients. The observed alterations similarly occurred across EEG alpha as well as beta1 and beta2 frequency oscillations (but not in the delta and theta bands). Taken together these findings suggest that the EEG operational architectonics indeed mediates the degree of consciousness expression. Since local EEG fields reflect the operations executed by local transient neuronal assemblies, it is suggested that consciousness is an emergent phenomenon of coherent dynamic binding of operations performed by multiple, relatively large and stable, but transient neuronal assemblies organized within a hierarchical brain architecture (for a detailed review and discussion see Ref. 3). In this sense, the partially preserved EEG OA in VS may indicate a minimal level of operational organization that is already insufficient (in contrast to MCS) to support representational content integrated within the first-person perspective. **C12**

104 **Reporting conscious states: A neuro-phenomenological analysis** David Gamez <david@davidgamez.eu> (Department of Computing, Imperial College London, London, England United Kingdom)

The first step in the development of a scientific theory of consciousness is the identification of correlations between measurements of the physical brain and reports about conscious states. Measurement of the physical world is reasonably straightforward, with a variety of scanning technologies being available to measure the state of the physical brain - for example, fMRI, EEG or electrodes. An issue that has been much less examined is how reports about conscious states can be understood without introducing a causal dependency between consciousness and the physical world, which is typically thought to be causally closed. The first part of this talk will provide some context for this problem by outlining how a science

of consciousness can be grounded in correlations between measurements of the physical world and reports describing conscious states. Next, the talk will examine epiphenomenalism, which is often thought to be an effective way of combining the unique characteristics of conscious states with the causal closure of the physical world. However, the fatal problem with epiphenomenalism is that it cannot explain how conscious states can be spoken about. If epiphenomenalism is true, there is no causal link between the phenomenal and physical world, and no way in which the words coming out of my physical mouth are *about* my conscious states. Since dualism and physicalism are also highly problematic, some other way needs to be developed that can combine the causal closure of the physical world with our ability to make reports about conscious states. One potential solution to this problem is that the physical sounds describing our conscious states could be completely caused by preceding states of the physical world *and* completely caused by conscious states - in other words the preceding physical and phenomenal states causally *over-determine* the sounds reporting the conscious states. Whilst the notion of causal over-determination is problematic, its difficulties can be mitigated by comparing it with causation between different levels of description of a physical system. A different solution would be to use a correlations-based approach to explain our ability to report conscious states. One of the axiomatic assumptions of consciousness research could be the existence of correlations between consciousness and reports about consciousness. This assumption would avoid causal over-determination, but it would have to be a founding assumption of a science of consciousness since it could not be proved empirically. One potential problem with this approach is that it would have to be able to handle false reports about conscious states. **C17**

105 **The Inner World as Simulated Interaction with the Environment** Germund Hesslow <germund.hesslow@med.lu.se> (Depart. of Experimental Medici, Lund University, Lund, Sweden)

The lecture will outline a physiologically based account of one aspect of consciousness, the appearance of an ‘inner world’. It is proposed that the inner world arises from simulated interaction with the environment. Three assumptions underlie this ‘simulation’ theory. Firstly, we can simulate behavior or actions in the sense that we can activate motor structures, as during a normal overt action, but suppress its execution. Secondly, we can simulate perception by internal activation of sensory cortex in a way that resembles its normal activation during perception of external stimuli. The third assumption (‘anticipation’) is that both overt and simulated actions can elicit perceptual simulation of their most probable consequences. This theory explains why we appear to have an inner reality and it provides a simple account of the nature of mental objects. A large body of evidence, mainly from neuroimaging studies, that supports these assumptions, is reviewed briefly. The theory is ontologically parsimonious and does not rely on standard cognitivist constructs such as internal models or representations. It is argued that the simulation approach can explain the relations between motor, sensory and cognitive functions and the appearance of an inner world. It also unifies and explains important features of a wide variety of cognitive phenomena such as memory, goals and cognitive maps. Novel findings from recent developments in memory research on the similarity of imaging and memory and on the role of both prefrontal cortex and sensory cortex in declarative memory and working memory are predicted by the theory and provide striking support for it. **PL12**

106 **Default to nonduality** Zoran Josipovic <zj232@nyu.edu> (Psychology/Center for Neursci, New York University, New York, NY)

The two large globally distributed networks in the brain, the task-positive extrinsic and the task-negative intrinsic or default network, have been focus of much research recently. A somewhat simplified view about the nature of their relationship has emerged, one that sees them as being fundamentally antagonistic. This talk will attempt to introduce a more nuanced understanding of their functioning. I will show the results of our study on the ‘influence of nondual awareness on the anti-correlated networks in the brain’, and discuss them in light of different views about nonduality. Nondual awareness presents a unique opportu-

nity to study the functioning of the intrinsic/extrinsic networks in the brain, as it cognizes everything without dividing the field of experience into internal vs. external, into a rigidified self vs. other. **C5**

107 **What makes blue blue?** Bruce Katz <katz@cbis.ece.drexel.edu> (Drexel University, Philadelphia, PA)

Research into the Neural Correlate of Consciousness (NCC) has understandably concentrated on distinguishing between states and processes that result in consciousness from those that do not. The seemingly more difficult problem of attaching an NCC to a particular quale has been largely overshadowed by this effort. However, the latter may be in some cases more approachable because it introduces additional constraints over and above that contained in the former. In particular, we may distinguish between two such constraints of successive strength: 1) The difference or supervenience constraint (weak): Let Q1 and Q2 be different qualitative experiences, corresponding respectively to NCC1 and NCC2. Then NCC1 should be different then NCC2. 2) The similarity constraint (strong): Let Q1, Q2, and Q3 correspond respectively to NCC1, NCC2, and NCC3, with Q1 perceptually more similar to Q2 than Q1 to Q3. Then, by some suitable measure NCC1 should be closer to NCC2 than to NCC3. This methodology is applied to color consciousness. It is first argued that an activation (or firing rate) representation meets neither 1) nor 2). The reason for this is simple: although we as external observers may view activation patterns (for example, those encoding red, green, blue) in an ordered fashion, nature has no way of ordering these when they are considered in isolation. For example, a firing pattern in the retina or LGN of full red, half green, and no blue is indistinguishable from half red, no green, and full blue. Some means of 'vectorizing' this unordered representation must be present to have any chance of meeting the above constraints. It is next argued that the set of transformations that successively carry RGB to opponent, then to hue-saturation-lightness space, and then further to categorical processing can form the basis for this process. In particular, two sets of transformations are introduced over a network plus firing rates (corresponding to a given input). In the first, an artificial lesioning methodology is shown to produce an approximate causal flow for such a combination. The second related methodology looks at information flow in the network under the given set of transformations. In both cases, that is in the resulting causal network, and the resulting informational network, constraint 1) is easily met. Constraint 2) is more difficult, and highly dependent upon both the type of network and stage of color processing. However, the general result applying to both types of networks is as follows: the more processing layers, and thus greater network complexity, the greater the correlation between differences in perceptual space and differences in network space. In summary, what makes blue blue, according to this account, are the set of casual and informational relations implicit in the transformation from retinal registration to final categorization. Red will undergo a different set of transformations, because the opponent lightness for this is different than blue (blue is darker), and likewise for other hues and colors. The talk will conclude with suggestions regarding the possibility of generalization of this methodology to other aspects of vision. **C38**

108 **Consciousness and mesoscopic brain dynamics** Hans Liljenstrom <hans.liljenstrom@et.slu.se> (Agora for Biosystems, Sigtuna, Sweden)

One of the greatest challenges with regard to our understanding of how neural systems and processes relate to consciousness, concerns the interaction between different temporal and spatial scales. Even though we have a fairly good understanding of how action potentials can be generated by ion currents, and some general ideas on how action potentials may be related to cortical neurodynamics, we still have little knowledge about any information transfer between the different levels. Supposedly, interactions between different scales in the nervous system are both bottom-up and top-down, with no clear causal priority for either direction. Instead, such inter-scale interactions may be crucial for the brain-mind relation, where different neural states are interactively related to different mental states. Transitions between different states could be triggered either by microscopic processes (e.g. through the

level of spontaneous neuronal activity) or by macroscopic processes (e.g. by various neuromodulators and hormones). At all these levels, processes may be characterised by regular, as well as irregular behaviour. The regular behaviour may be expressed as synchronous firing or oscillations at various frequencies, whereas the irregular behaviour could be stochastic noise or deterministic chaos, or a mixture thereof. In any case, such irregular behaviour is truly unpredictable, which may have bearing on the creative and intentional activity at a higher level of the organism. While believing consciousness is non-computable in nature, we use computational models to explore various relations between different spatial and temporal scales of the nervous system, with a focus on the mesoscopic neurodynamics of cortical networks. In particular, we study relationships between ion channel kinetics, action potentials and mesoscopic brain dynamics, which all could be involved in various cognitive (and conscious) activities. With examples from perception and associative memory in vision and olfaction, we illustrate possible links between structure, dynamics and function in the brain. Specifically, we demonstrate how gamma and theta rhythm oscillations, in the presence of noise and chaos, can play a role for the efficiency of neural systems. Our simulations also demonstrate that the blocking of specific ion channels, as a possible effect of some anaesthetics, can change the global activity from high frequency (awake) states to low frequency (anaesthetized) states, as recorded with EEG. More generally, we show that the network dynamics can be shifted into, or out of, different dynamic (oscillatory) states, either by altering ion channel densities, or by altering network connectivity. Finally, I will speculate on how consciousness, with its dual aspects of attention and intention, may relate to the neurodynamics of cortical structures, and how it could evolve with increasing complexity. I will briefly discuss the role of fluctuations for the classical mind-brain problem, and will argue for an interactionistic solution to this problem. I will also briefly touch upon some philosophical consequences of this view, arguing for a strictly indeterministic worldview, and for a shift in the discussion towards an interaction between computational and non-computational processes. **C5**

109 **In principle impossibility of the thoughts' reading experiment** Michael Lipkind <michael@lipkind.info> (and the International Institut, Kimron Veterinary Instit / Intl. Instit. of Biophysics, Beit Dagan, Israel)

Evidence that all the conscious manifestations - from pain feeling to the deepest thoughts' meanders or ecstatic revelation - have the respective neural correlates, gives theoretical ground to claim that "if enough neurons in a human brain could be recorded simultaneously, such recordings could well be able to reveal human thoughts" (Tsien, 2007). Such a statement, however, harbors some logical inconsistencies. The thoughts' recordings may be considered either as the thoughts' consummate imitation, or as the thoughts, themselves, i.e. the thoughts' materialistic transfiguration as their real essence. However, the paradox is that one cannot "read" thoughts' recordings "directly", i.e. to "think immediately" what is recorded. Then, the thought reading process must include decoding of the recordings displayed via digital glossary (letters, tokens, marks, curves, symbols, numerical combinations, schemes, etc.). Consequently, one possible way of "reading" those thoughts' recordings would result in verbal description of the thoughts' essence, i.e. the thoughts' reading is a result of a posteriori mental analysis of the thoughts' recordings. An alternative way of the thoughts' reading is based on the idea of identification of the thoughts' recordings with the initial thoughts. Then, any potential answer displays dialectical paradox: if the recordings of a thought are identical to the thought itself, then any mastery of such "recorded" thought (its "reading") must occur within the brain of a person "reading" the thought's recordings by the "ordinary" organs of perception. But reading the recordings' protocols by eyes will not induce in the reader's head the recorded initial thought of an experimental subject. Then, an extreme way to reveal the thoughts via their physical recordings' is to arrange in the reader's brain "implantation" of an identical system "working" in a "reverse" manner. Such a direct ("from-brain-to-brain") transfer means that the physical-chemical correlates of the experimental subject's current thoughts are to be transferred via physical device into "analogical" neurons of the reader's brain, thus inducing the initial thoughts. The hope is that such a "mirror"

experimental system would provide direct "reading" of the potential thoughts' recordings and, thus, "revealing" the experimental subject's thoughts by their immediate "thinking". However, such thoughts' "transfer" from an experimental subject to a reader is doubtful. It is not ensured that the brain's recordings of one's thoughts transferred by the physical devise to another person's brain equipped with identical recording system "working" in the opposite direction would induce the initial thoughts. It is reasonable to expect that there is a kind of asymmetry (reminding the asymmetric direction of time) between the process of the physical recordings of the initial thoughts and the induction by those physical recordings of the identical thoughts in the reader's brain. Besides, since the thoughts' recording and the thoughts' reading systems should be identical, the thoughts originated in both the brains may well be passing from each other simultaneously causing the thoughts' interference, that demonstrating the absurdity of the whole consideration. Thus, the final verdict is that the thoughts' reading experiment is in principle impossible. **P2**

110 **Local Neuronal Ignitions and the Emergence of Perceptual Awareness** Rafael Malach <rafi.malach@gmail.com> (Meurobiology, Weizmann Institute of Science, Rehovot, Israel)

A fundamental question in the search for the neuronal signatures of perceptual awareness concerns the spread of cortical activity associated with a conscious percept. A particularly informative method towards this goal is intra-cranial recordings in patients. These recordings are obtained in the course of a diagnostic procedure aimed at neurosurgical treatment of epilepsy. The recordings provide field potential signals (ECOG) from multiple localized (3mm) electrode sites at msec resolution. By accumulating data across a number of patients, a large cortical coverage can be achieved. Here we report on such a large scale study conducted in collaboration with Dr. L. Fisch from our group and Prof. I. Fried from the UCLA and Tel Aviv Medical Center involving >400 electrode sites from 11 patients. The patients participated in different visual recognition and memory tasks. Our results show that a typical visual recognition trial modulated the activity (measured as any significant change in power spectra) in the vast (>80%) majority of electrodes. Given that a number of electrodes failed to record due to improper placement, this number is an under-estimate and raises the intriguing possibility that the entire cerebral cortex is engaged during a sensory-motor task. These results are thus compatible with massively global models of cortical processing during a reportable percept. On the other hand, our results show that at perceptual threshold the emergence of a visible target was specifically associated with intense and persistent 'ignition-like' increases in gamma (40-80 Hz frequency band) power. When limiting the signal analysis only to such 'ignition' phenomena, our results reveal that these were quite rare and localized in a small minority of 'hot-spot' regions. Hotspots located in the visual cortex were consistently activated whenever patients perceived the target and were invariant to the task (memory vs. recognition) or means of report (Button press vs. verbal report). In contrast, frontal electrodes were highly task specific, failing to 'ignite' during specific tasks and means of report even though the patients clearly perceived the targets during such tasks. Our results thus support a model in which perceptual awareness is associated with localized 'ignitions' of intense gamma power. However, these ignitions are embedded in wide spread, weakly modulated patterns of activity likely encompassing the entire cortical mantle. These weak patterns may subserves subliminal effects endowing the ignition events with contextual or attentional frameworks. Supported by, ISF Bikura and Mark Scher Research Grants to R.M. **PL5**

111 **Endogenous Electric Fields Guide Cortical Network Activity** David McCormick , Flavio Frohlich <david.mccormick@yale.edu> (Neurobiology, Yale University School of Medicine, New Haven, CT)

Local field potentials and the underlying endogenous electric fields (EFs) are traditionally considered to be epiphenomena of structured neuronal network activity. Recently, however, externally applied EFs have been shown to modulate pharmacologically evoked network activity in rodent hippocampus. In contrast, very little is known about the role of endogenous EFs during physiological activity states in neocortex. Here we used the neocortical slow oscillation in vitro as a model system to show that weak sinusoidal and naturalistic EFs enhance and entrain physiological neocortical network activity with an amplitude threshold within the range of in vivo endogenous field strengths. Modulation of network activity by real-time feedback of an activity-dependent EF provided direct evidence for a feedback loop between neuronal activity and endogenous EF. This remarkable susceptibility of active networks to EFs that only cause small changes in membrane potential in individual neurons strongly support an active role of endogenous electric fields in guiding neocortical network activity. **PL1**

112 **Sense-trapped mind can cause various mind-related diseases, while sense-released mind charged with infinite consciousness can cure all ailments of body and mind** Shyamala Mruthinti <shyamala.mruthinti@va.gov and smruthinti@mail.mcg.edu> (Psychiatry, Veterans Medical Administration and Medical Colleg, Augusta, GA)

Consciousness was a taboo concept in U.S until 1950s which was secluded as non-scientific subject limited to philosophy and religion. It gained its acceptance and entrance into scientific research by none other than our Nobel Laureates: 1.Sir John Eccles in 1963 (who discovered that neuro-transmission is electrical and not chemical) and 2. Dr. Francis Crick (whose work on DNA along with Watson won them Nobel-Prize). However, consciousness was very deeply studied subject by nature scientists named as Vedic Rishis from 5-7,000 years ago. Crick says: a person's mental activities are entirely due to the behavior of nerve cells, glial cells, and the atoms, ions, and molecules that make them up and influence them. We have shown that certain neurons expressing alpha7 nicotinic receptors (crucial for memory) are lost in Alzheimer's brain due to abnormal beta amyloid aggregates. We can also demonstrate similar loss of target neurons (alpha7) in petri-dishes which are treated with beta amyloid; yet where is the mind in these in-vitro cell cultured neurons? Mind is not an organ nor is limited to the brain, but mind uses neurons for its function. Mind is made of thoughts and thoughts arise from vacuum which can be vibrant enough in depressive and angry mind, to cause neuronal disruption similar to wind blowing through room on stormy night via open window. With number of drugs pumped into niche market, increasing number of psychiatric doctors and hospitals, patient number is also rising; which explains that the disease of the mind has to be dealt by altering the state of mind more than giving drugs. Similar to our immune system which renders protection to our body from foreign invaders, unseen subtle, yet powerful-Web of Cosmic-Energy spinning wheels known as Kundalini-Chakras during TM, also dissipates positive energy gliding in an upward direction from base of spine; to rectify and correct blood-cells and neuronal-circuits to enable proper function of mind. Vedic Rishis (> 5000 years ago), have learned the art of freeing the mind from clutches of five senses through Yoga and Transcendental Meditation (TM). In TM, the mind is turned inward, the body is stilled and senses are controlled, and breathing is slow and steady, when the mind slowly emerges out of body consciousness to merge itself with Infinite Consciousness; similar to river flowing into an ocean to become one with an ocean. In such deep meditative state, the mind begins to see, experience, hear and understand the subtle Cosmic-vibrations. TM, corrects genes, proteins and protects neuronal-circuits. We are not this mortal body and our true existence resides in Immortal-Self, which is Omnipresent, Omniscient and Omnipotent. Knowing, understanding and Being one with Inner-Self (Aham-Brahma-Asmi or Thou Art That), human mind establishes itself in supreme consciousness to remain steadfast, unperturbed and indifferent to all adverse life-events, just like an ocean which is not affected by rising waves on the surface. A person who has thus established his/her mind in Infinite consciousness, remains free of disease of mind and body. **C24**

113 **Neuronal Avalanches, Coherence Potentials, and Cooperativity: Dynamical Aspects that Define Mammalian Cortex** Dietmar Plenz <plenzd@mail.nih.gov> (Section on Critical Brain Dyna, National Institute of Mental Health, Bethesda, MD)

The mammalian brain has evolved to allow for adaptive interactions with the environment to promote survival of the species. Recent progress in my lab has identified three principles

that characterize the mammalian neocortex at the network level: balance, computation, and cooperativity. These principles emerge as three precisely identifiable dynamical aspects of brain activity. At criticality, the myriads of interactions between nerve cells are exquisitely balanced leading to a scale-invariant organization of neuronal avalanches that optimizes numerous aspects of information transfer. At this critical point, coherence potentials emerge that represent perfect coupling of neuronal groups across multiple cortical sites. Coherence potentials form in analogy to action potentials at the single neuron level, suggestive of computational building blocks at the network level. The organization of coherence potentials translates into weighted, directed networks built on the principle of cooperativity. These small-world networks share unique features with gene networks and human social and communication networks. All three dynamical aspects are found in the ongoing activity of normal neocortex whether recorded in the dish or in awake monkeys suggesting they constitute a robust framework of mammalian brain function. **PL5**

114 **Brain electric field and consciousness level** Jordan Pop-Jordanov , Nada Pop-Jordanova <jpj@manu.edu.mk> (Macedonian Academy of Sciences and Arts, Skopje, Macedonia, Former Yugoslav Rep)

The correlation between brain electric field frequency bands and consciousness level is empirically well established and clinically widely used. However, the complete theoretical explanation of the neurophysical mechanism underlying this correlation is still missing. Here, after reviewing some present classical and quantum approaches, a transition probability concept of consciousness level is presented, based on the interaction of brain electric field with coupled quantum dipoles [1, 2]. The resulting analytical expression for the collective transition probability corresponds to the empirically proven sigmoid curve. The obtained general formula, derived by normalizing the transition probability spectrum, can serve as quantitative measure of general operation of consciousness, providing information on its frequency dependent level. In addition, compliances of the proposed approach with the Ockham's principle of simplicity, the Penrose's passive consciousness, the Chalmers' background state of consciousness and the McFadden's seven consciousness clues, are considered. Finally, some clinical applications are described. [1] Pop-Jordanov J, Pop-Jordanova N. Neurophysical substrates of arousal and attention. Cognitive Processing 2009; 10(Suppl. 1): S71-S79. [2] Pop-Jordanov J, Pop-Jordanova N. Quantum transition probabilities and the level of consciousness. Journal of Psychophysiology 2010; 24(2): 136-140. **C1**

115 **Feeling through the field: How understanding acts of perception may help constrain the properties of the conscious field** Ashley Willis <ashley.willis@arup.com.au> (n/a (Structural engineer with Arup), Melbourne, Victoria Australia)

I have direct experiential knowledge of how two perceptual mechanisms actually work, both of which are forms of audition to which science is blind. The first mechanism syncopates vibrations reverberating within the eyeball with auditory perception of external acoustic rhythms. The second entails how 'entities' of an unexplained nature move over the cortex and interact so as to once again exactly syncopate with the audition of external music. In both cases, the generation of multiple waves/entities, allow elaborate rhythms to be predictively replicated - (a use for N300). Both these perception mechanisms feel as though they are 'felt through a field', in that the vibration waves and entities are felt to move through something so that their positions are continuously known, and their waveform interactions can be felt. This is interesting for many reasons: it gives the eye's dual function; it puts acts of perception on the periphery of the CNS; it gives multiple mechanisms of audition which presumably can be cross-correlated. Both are left-side conscious only, with the actions on the right side 'unfelt' and presumed through the interactive behaviour. Both come from direct experience during an unadulterated state of mind (which disappointingly, has long-past). Both were experienced on multiple occasions, with increasing complexity in that only beats could were syncopated with in the first, which then advanced to extremely complicated rhythms. Both have intrinsic learning capability. The second can count. The first gives a functional paradigm for the blood vessels invivo the aqueous humour which after

growing the lens in foetal development, medical science has no explanation why they continue to exist (as they help shield 80% of photons that enter the eye from ever reaching the rod/cone neurons) and so it is interesting to give them an evolutionary function. The second is more interesting still, as it leads one to imagine that the generation and movements of the 'entities' shadow synchronous synaptic firing & give global brain dynamics context. Both mechanisms replicate & syncopate internal function with external reality, and hence fulfill the requirements of 'awareness'. The second probably goes further, as it gives consciousness a way of feeling itself, and may require fundamental physical theory to be re-imagined in order to be understood. (Determining what the 'entities' are and measuring their 'dance' is my No.1 goal). **C22**

116 **Increased Alpha (8-12 Hz) activity during slow-wave sleep as a marker for the transition from implicit knowledge to explicit insight** Juliana Yordanova , Vasil Kolev; Ullrich Wagner; Jan Born; Rolf Verleger <jyord@bio.bas.bg> (Institute of Neurobiology, Bulgarian Academy of Sciences, Sofia, Bulgaria)

The Number Reduction Task (NRT) allows studying the transition from implicit knowledge of hidden task regularities to explicit insight into these regularities. In order to identify sleep-associated neurophysiological indicators of this restructuring of knowledge representations, we measured frequency-specific power of EEG while participants slept during the night between two sessions of the NRT. Alpha (8-12 Hz) EEG power during slow-wave sleep (SWS) emerged as a specific marker of the transformation of pre-sleep implicit knowledge to post-sleep explicit knowledge. Beta power during SWS was increased whenever explicit knowledge was attained after sleep, irrespective of pre-sleep knowledge. No such EEG predictors of insight were found during S2 and REM sleep. These results support the view that it is neuronal memory reprocessing during sleep, in particular during SWS, that lays the foundations for restructuring those task-related representations in the brain that are necessary for promoting the gain of explicit knowledge. **C5**

2.2 Vision

117 **EEG correlates of stable and unstable mental object representations** Jürgen Kornmeier , (2) Katja Krueger; Michael Bach (2); Sven Heinrich (2) (1) Institute for Frontier Areas of Psychology and Mental Health, Freiburg, Germany (2) University Eye-Clinic, Freiburg, Germany <kornmeier@igpp.de> (Institute for Frontier Areas of Psychology and Mental Health, Freiburg, Germany)

Normally, we perceive the world as visually stable. However, a stable conscious percept has to be constructed out of limited and ambiguous information. In the case of ambiguous figures, our perceptual system creates only temporarily stable percepts that suddenly switch to alternative interpretations. We investigated whether and how the ERP ('event related potential') to ambiguous figures, evoking such instable percepts, differ from ERPs to unambiguous figure variants, evoking stable percepts. Results: (1) Tiny figural changes, rendering an ambiguous figure unambiguous, cause a sizable positivity at about 400 ms after stimulus onset ("P400"). (2) This P400 was found for two different categories of ambiguous figures (Necker cube and Old/Young woman). (3) This strong ERP difference occurred only with attended stimuli. Our results suggest the existence of an unconscious neural instance that evaluates the reliability of the perceptual outcome, given limited and ambiguous visual input. The result of this evaluation may be reflected by the amplitude of the P400. **C11**

118 **Dreams, visions and mystical revelations: The mechanics of imagination** Mary Lee-Woolf , Callum Macrae, Outsider T V <marylw@btinternet.com> (Outsider TV, London, England United Kingdom)

This 3 part documentary series will explore the astonishing landscape of hallucinations and visions of some extraordinary minds. It will examine the world of things that other people can't see, and then try to understand why they see them. Using a dramatic state of

the art CGI universe of the mind, created specially for the series, we will explore this final frontier in a bid to map the mechanics of imagination Working closely with leading scientists and drawing on remarkable advances in neuro-imaging technology we will examine a whole range of visual illusions, perceptions and experiences by travelling inside the brains that experience and create them: Experiences which range from the visions of people with Charles Bonnet Syndrome where the brain tries to create sense of damaged information from the eyes through autism, prosopagnosia, LSD hallucinations, dyslexia and a whole range of conditions where it is the brain itself which has unusual, damaged or altered wiring. Finally we look for God and find him holed up in the frontal cortex. We try to understand the mechanics of religious experience and imagery. This will, we hope, be a contentious and controversial series, visually stunning and occasionally disturbing - but it will also with the help and guidance of our highly respected scientific advisors, be a programme whose science is of the highest standard. **C23**

119 **Emotional body and its manifestations** Peeyush Verma <pverma@nitttrbpl.ac.in> (Department of Electronic Media, National Institute of Technical Teachers' Training & Research, Bhopal, Madhya Pradesh India)

Emotional body or the causal body or the Buddhi-Manas (key to theosophy; p 121) is key to decide the quality of one's life. It manifests in physical form but is not as visible as the physical body. It requires subtle inputs, it performs processes as per the quality of inputs and then it provides the outputs which ultimately are reflected as different actions/events/emotions and ultimately reflected in the quality of life. The reception of inputs by the emotional body depends upon the status, strength and worth or the potential of the emotional body. Higher the strength and potential of the emotional body, higher will be the reception of inputs and better will be the processes and the output and ultimately the quality of life. The strength and potential of emotional body is indicated in many ways such as capacity to make decisions, take risks, take responsibility, be affirmative, be passionate about life and living, have emotions of love, empathy and benevolence and so many other indicators. Thorough research in this area will pave a new way of looking at life, its quality and living passionately. **P2**

2.3 Other sensory modalities

120 **Neuroscientific and quantum physical approach to advanced Buddhist mindfulness meditation: Perceptual learning, neuroplasticity, complexity, texture, fractals, and synesthesia. A model in-progress** William Bushell , Ganden Thurman <wbushell@mit.edu, wcbphd@att.net, wbushell@tibethouse.org> (Anthropology, Massachusetts Institute of Technology/Tibet House US, Cambridge, MA)

In many Buddhist meditative traditions, it is asserted that continued engagement in mindfulness practice can eventually lead to enhanced perception of both "inner" (ie, the workings of consciousness) and "outer" (ie, the nature of the "external world") phenomena. This enhanced perception may (putatively) be characterized by increased complexity and clarity of detail, and is claimed to include, among other things, direct perception of a previously invisible particulate spatiotemporal nature of apparently "solid" phenomena. The same traditions also claim that advanced meditatively-developed perception is of a synesthetic nature. In terms of particulate nature, it is known that, with appropriate comportment as well as practice, human sensory-perceptual systems are capable of "remarkable performance" (Bushell, Annals of the New York Academy of Sciences, 2009;1172:348): the detection of light at its quantum mechanical limits, on the level of very few and perhaps individual photons; the (visual) detection of many features of the environment on a scale of a fraction of the diameter of a photoreceptor cell (<15 seconds of arc or several millionths of a meter, known as hyperacuity); auditory detection may possibly be influenced by displacements to inner ear organs on an atomic scale. From a neuroscience/biophysics perspective it may be possible to treat accounts of advanced direct perception into this alleged particulate nature of phenomena as a form of "problem" in texture perception, in which practice-induced perceptual learning can lead to incremental neuroplastic changes subserving increased complexity, magnitude,

and detail of perception (ie, texture "density," "numerosity"). The pioneering neuroscientist/biophysicist AW Snyder (eg, Journal of Integrative Neuroscience 2003 Dec;2(2):149-58) has shown that global and immediate changes in brain function induced through a particular form of transcranial magnetic stimulation may also lead in such a direction for visual perception (which he identifies as "savant-like"). New cutting-edge studies in neuroscience have revealed that neuroplasticity-mediated changes in perceptual learning may have critical cross-modal properties with respect to visual and auditory sensory-perceptual modalities, among others. Recent breakthroughs in, for example, sound analysis, have uncovered algorithms that "may transform sound into visual representations with far more accuracy than anything currently available, and that may use the same type of method as the human brain" (MO Magnasco, website, The Rockefeller University). Such state-of-the-art research may have important implications for the general neuroscientific/biophysical study of human processing of visual, auditory, and somatosensory textures, as well as for the phenomenon of synesthesia, and in some Buddhist meditative texts the "particulate" nature of phenomena (English translation from Sanskrit: "seeds") is specifically and explicitly characterized as synesthetic. Along with hyperacuity and synesthesia, the phenomenon of fractals also appears to provide explanatory power to this model of advanced meditative perception. This presentation provides an overview of the new model as well as the possible implications for Hameroff's and Chopra's question, "Is consciousness connected to the fine structure of the universe?"(Conference website, and Washington Post, 3/27/10). **VSynth**

121 **How we come to experience that we own our body: The cognitive neuroscience of body self-perception** H. Henrik Ehrsson <henrik.ehrsson@ki.se> (Department of Neuroscience, Karolinska Institutet, Stockholm, Sweden)

How do we come to experience that we own our body? In this talk I will describe how cognitive neuroscientists have recently begun to address this fundamental question. I will present experiments that suggest that multisensory mechanisms are crucial for how we come to experience a sense of ownership of our own our body. The hypothesis is that parts of the body are distinguished from the external world by the patterns they produce of correlated information from different sensory modalities (vision, touch and muscle sense). These correlations are hypothesized to be detected by neuronal populations that integrate multisensory information from the space near the body. We have recently used a combination of functional magnetic resonance imaging and human behavioral experiments to test these predictions. To change the feeling of body ownership, perceptual illusions were used where healthy individuals experienced that a rubber hand was their own, that a mannequin was their body, that they are outside their physical body and inside the body of other individual, or that they are a Barbie-doll. Our behavioral results demonstrate that ownership of limbs and entire bodies depend on the temporal and spatial congruency of visual, tactile and proprioceptive signals in body-centered reference frames, and that the visual information from first person perspective plays a crucial role. Our imaging data show that neuronal populations in the premotor and intraparietal cortex are active when humans sense they own limbs, which supports the hypothesis that the integration of multisensory information in body-centered coordinates is crucial for ownership. These results are of fundamental importance because they identify the brain mechanisms that produce the feeling of ownership of one's entire body. The perception of one's own body as an object that is distinct from the external world creates a foundation upon which higher cognitive self-related processes rely. Thus the multisensory mechanisms of body self-perception described in this talk could influence a wide range of higher cognitive processes that involve making a distinction between self and non-self, for example, self-reflective and self-referential information processing or self-referential thoughts related to past and future events. **PL12**

122 **The Illusion of sensory consciousness** Richard Mazer <rmazer1@myfairpoint.net> (Londonderry, VT)

Suppose a room containing only a bell and an observer. The bell is struck: what happens to the room and the observer during the next fraction of a second? Not what seems to

happen - we are all aware of that - but what actually happens, described in the established language of the appropriate physics and biology. And what conclusions can we draw from this understanding which can then serve as the modus operandi for all sensory perceptions of consciousness? Just as waves of vibrating air are introduced into the neural processing of the brain by mechanical transduction, so certain airborne molecules are processed by chemical transduction to be perceived as odor, and a limited spectrum of the electro-magnetic field is transformed by both electro-magnetic and chemical transduction to be experienced as coherent appearance. Now we can acknowledge an objective World devoid of the qualities of sound, odor, and vision to which we are accustomed, one that is transformed by our capabilities for transduction specific to the particular character of the existent environmental state, providing portals through which these states may be fundamentally altered and then introduced as electric signals into the neural activities of the brain. Conclusion: the whole of our sensory experience consists of these illusions of consciousness occurring in the otherwise dark and silent World in which we evolved and now inhabit. **P2 A**

123 **Do I need a body to know who I am? Perceptual and neural correlates of body ownership** Valeria Petkova , Giovanni Gentile, Mehrnoush Khoshnevis, Henrik Ehrsson <valeria.petkova@ki.se> (Neuroscience, Karolinska Institute, Stockholm, Sweden)

The question of how we perceive our body as part of ourselves is fundamental since it addresses a basic aspect of self-consciousness. Clinical cases of patients with specific disturbances of the integrity of their bodily self perception have given us some valuable insights into the brain mechanisms underlying the sense of body ownership. However, to address this question more precisely we need an experimental model which would enable us to tackle all its aspects in controlled experimental environment. The studies I will present describe a novel experimental set-up which allows healthy participants to experience a new body as being their own and helps us determine the perceptual and neuronal mechanisms giving rise to the sense of bodily self. I will report the results of a series of behavioral and neuroimaging (fMRI) studies which outline the putative mechanisms of the bodily self-awareness. Illusory body swapping could provide a valuable tool for research on self-identity which is a fundamental aspect of human self consciousness. This experimental set-up provides a unique possibility to address within the experimental science the old philosophical question about the relation between the body and the mind. **C28**

2.4 Motor control

2.5 Memory and learning

124 **Gated Learning: Much ado about background information** Giorgio Ascoli , Matteo Mainetti <ascoli@gmu.edu> (George Mason University, Fairfax, VA)

Experiencing certain events triggers the acquisition of new conscious memories, i.e. the ability to instantiate previously unconceivable mental states. Although necessary, however, actual experience is not sufficient for memory formation. Learning is also gated by the knowledge of appropriate background information to make sense of the experienced occurrence. For example, to learn how to text on a new cell phone, one needs to read the manual and to know already what texting and cell phones are. At the neurobiological level, there is strong evidence that formation of new synapses underlies long-term memory storage. This form of structural plasticity requires that the axon of the (candidate) pre-synaptic neuron be physically proximal to the dendrite of the post-synaptic neuron. We propose that such 'axo-dendritic overlap' (ADO) constitutes the neural correlate of background information-gated (BIG) learning. The key spatial constraint is based on a simple neuroanatomical observation: an axon must pass close to the dendrites that are adjacent to the neurons it contacts. The topographic organization of the mammalian cortex ensures that nearby neurons encode related information. Using neural network models, we formulate this notion quantitatively, demonstrating by construction that ADO is indeed a suitable mechanism for BIG learning.

We report results from two sets of simulations. In the first, associations are learned based on a compilation of noun and adjective co-occurrence in Wikipedia. The second example is based on an online computer science thesaurus, whereas two terms are directionally linked if one is used to define the other. In both cases, the acquisition of background information progressively leads to the emergence of an idiosyncratic 'expertise' that enables further ADO-mediated learning of some (related), but not all (unrelated) new knowledge. Our analysis also reveals the independent existence of two forms of background information: one that is intrinsic in the observable reality, and the other that depends on the history of what is in fact observed by an individual subject. We are currently extending this framework to represent mental states as distributed neuronal assemblies as opposed to individual nodes. **C27**

2.6 Blindsight

125 **"The Amyloid Trap" - Hypothesis of Alzheimer's disease** Rudolph E. Tanzi <tanzi@helix.mgh.harvard.edu> (Director, Genetics and Aging R, Harvard University Joseph P. and Rose F. Kennedy Professor of Neurology, Boston, MA)

Alzheimer's disease (AD) is the most common form of dementia affecting the elderly and is characterized by global cognitive decline in learning, memory, reasoning and judgment. AD is strongly influenced by genetics with four established AD genes, APP, PSEN1, PSEN2, and APOE, which account for roughly 50% of the inheritance of AD. We have carried out genome-wide association studies to identify the remaining AD genes based on screening of thousands of families in which clustering of AD is observed. In these studies (Alzheimer's Genome Project), we (and others) have identified over 100 novel AD gene candidates. These genes are involved in a large variety of functions ranging from synapse function, the innate immune system, and cell division. The most common feature of the AD genes identified to date is that they regulate the accumulation of a neurotoxic substance in the brain called beta-amyloid. Beta-amyloid is an abnormal buildup of a peptide called 'Abeta', which is derived from the amyloid precursor protein encoded by the Alzheimer's gene, APP. While Abeta plays a normal role in the brain, in excess it is believed to drive AD pathogenesis. Abeta accumulates in the brain as amyloid plaques and oligomers ranging from dimers to 12-mers. The Abeta oligomers accumulate in synapses and impair neurotransmission. A novel hypothesis coined the 'amyloid trap hypothesis' will be presented. Briefly, this hypothesis contends that excessive Abeta sequesters zinc and copper, which in turn, drives Abeta aggregation into oligomers and plaque. As beta-amyloid accumulates in the synapse, zinc is depleted owing to sequestration by beta-amyloid. In an extension of this hypothesis, sequestration of zinc would lead to microtubule destabilization and cognitive decline based on the Hameroff-Penrose hypothesis of microtubule-encoded memory. Moreover, as microtubules are disrupted, the microtubule-associated protein tau is liberated and aggregates into neurofibrillary tangles leading to neurodegeneration. Finally, data will also be presented on our AD drug, PBT2, a zinc ionophore that competes zinc away from beta-amyloid deposits, making the metal bio-available to synapses and neurons, This serves to ameliorate both AD pathology and improves cognitive based on studies of AD mouse models and human clinical trials. **PL10**

2.7 Neuropsychology and neuropathology

126 **The superhuman mind: From synesthesia to savant syndrome** Berit Brogaard <brogaardb@gmail.com> (Philosophy, University of Missouri, St. Louis, MO)

Savant syndrome is a condition in which a person has a talent that is so developed that he can perform what may seem like impossible mathematical, linguistic or artistic tasks. Blind Tom, a blind autistic slave in Georgia in the nineteenth century, was an amazing pianist and performer. Stephen Wiltshire drew an extremely accurate sketch of a four square mile section of London, including twelve major landmarks and two hundred other buildings after a twelve minute helicopter ride through the area. For any date you pick, the "human computers" Kay and Fro can report what they had for dinner, what they did on that day,

what weekday it was, what their favorite TV-host wore on that day, and so on. Oliver Sack's autistic twins John and Michael computed prime numbers with more than 6 digits. The real rain man Kim Peeks was a living encyclopedia. There is currently no widely accepted explanation of the superhuman abilities of savants. What we do know is that most of them are synesthetes or autists and have left-brain injuries and particularly well-developed right-brain areas. Neurobiologist Stanislas Dehaene has proposed that savant synesthetes don't really differ that much from the rest of us. He claims that what distinguishes a mathematical genius from a normal person is an obsession with numbers and lots and lots of training. I provide empirical evidence against this hypothesis and offer a new theory of how savant synesthetes manage to complete ostensibly impossible tasks. **C4**

127 **Neural correlates of massage therapy in healthy adults: Role of the default mode network** Shawn Hayley , Sliz, D.; Smith, A. Northoff, G. <shayley@ccs.carleton.ca> (Psychology, Carleton University, Ottawa, Ontario Canada)

A greater number of individuals are seeking complementary and alternative forms of treatment, either as an adjunct to conventional medicine or to simply serve as a tool of relaxation. Massage therapy is one of many available treatments which has seen a surge in recent years. Its beneficial effects on psychological and physiological measures have been well documented (e.g. reductions in anxiety and depressive moods, enhanced immunity, improved circulation and flexibility). However, the neural mechanisms by which this therapy seems to bring about mental relaxation remains unresolved. The current study sought to investigate the immediate effects of a Swedish massage in healthy adults using functional magnetic resonance imaging. It was of particular interest to see how the massage treatment would modulate conscious resting state activity. Much attention has been given to the default mode network, a set of brain regions showing greater activity when not engaged in specific cognitive functions. These regions (i.e. insula, posterior and anterior cingulate, inferior parietal and medial prefrontal cortices) have been postulated to be involved in the neural correlates of consciousness, specifically in arousal and awareness. We posit that massage would modulate these same regions given the benefits and pleasant affective properties of touch. Healthy participants were randomly assigned to a Swedish massage or resting control condition. Each person was naive to the condition they were placed in prior to the imaging. The right plantar surface of the foot was massaged for a period of 8.5 minutes while each participant performed a Go/ No Go cognitive association task in the functional magnetic resonance imaging (fMRI) scanner. There were a total of eight resting blocks between each block of the cognitive association task. In order to gain insight into the brain's resting state with the massage treatment, only the resting blocks were analyzed using statistical parametric software (SPM8). Our study has shown that a Swedish massage therapy treatment activates specific regions implicated within the default mode network, notably the posterior and anterior cingulate cortices. These regions have been speculated to play a role in the neural correlates of consciousness and to be characterized by a higher level of reflective self-awareness. Given the cortical input from the spinothalamic pathway nuclei, these brain regions (and their reciprocal connections with the insula and primary somatosensory cortex) likely mediate the human touch component of the Swedish massage therapy condition, as well as its soothing and relaxing manipulation of muscle tissue which might lead to an enhanced level of positive emotional awareness and conscious experience. This work might also have implications for mood and anxiety disorders. **C5**

2.8 Anesthesia

128 **Surges of Electroencephalogram Activity at the Time of Death: A Case Series** Lakhmir S. Chawla <lchawla@mfa.gwu.edu> (George Washington University Medical Center, Washington, DC)

Level of consciousness at the end of life in critically ill patients is poorly characterized. We report a case series of seven patients who were neurologically intact before the decision to withdraw care due to extensive systemic critical illness. As part of our end-of-life care protocol, bispectral index (BIS) monitor (Aspect Medical Systems, Newton, MA) or SEDLine (Hospira, Lake Forest, IL) monitoring devices are placed on each patient to ensure adequate comfort. Both monitoring systems use an integer-based system (BIS or PSI, respectively) to reflect the level of consciousness=effect of anesthesia. In each case, loss of blood pressure, as monitored by indwelling arterial line, was followed by a decline in BIS=PSI activity followed by a transient spike in BIS=PSI activity that approached levels normally associated with consciousness. This spike in electroencephalogram (EEG) activity had short duration and the activity then declined to a level of activity associated with burst suppression. In one case of a patient who had a SEDLine device, we were able to capture and analyze the raw EEG signal, and confirm that the EEG waveform was not artifact, and in fact a high frequency waveform was present during the spike activity. We speculate that this level of BIS=SEDLine activity is related to the cellular loss of membrane polarization due to hypoxemia. We further speculate that since this increase in electrical activity occurred when there was no discernable blood pressure, patients who suffer 'near death' experiences may be recalling the aggregate memory of the synaptic activity associated with this terminal but potentially reversible hypoxemia. **PL14**

129 **Volatile anesthetic interactions with tubulin and coherent energy transfer** Travis Craddock , Douglas Friesen; Jack A. Tuszynski <travisc@ualberta.ca> (Physics, University of Alberta, Sherwood Park, Alberta Canada)

The cytoskeleton is essential to cell morphology, cargo trafficking, and cell division. The complex structure of the neuronal cytoskeleton has been implicated to play a role in memory, and a startling number of neurodevelopmental, neurological, and neuropsychiatric disorders show a dysregulation in its function. However, the role of the cytoskeleton in general anesthesia, and its link to consciousness, remain questionable. Using computational modeling and simulation we examine the interaction of volatile anesthetics with cytoskeletal microtubules as well as the plausibility of coherent energy transfer between chromophoric amino acids in microtubules via dipole excitations coupled to the environment. Results for putative binding sites of anesthetics to microtubules, with the relation to overall cytoskeleton function, are presented, providing insight on the role of the cytoskeleton in anesthetic action and consciousness. In addition, we present the spatial structure and a model Hamiltonian containing localized site energies and couplings between aromatic amino acids. Energy transfer is discussed in terms of the quantum walk formalism and energy transfer efficiency. Plausibility arguments are presented for the conditions favoring a quantum mechanism of electronic signal propagation along a microtubule and its role in consciousness. C20

130 **Molecular and Neuronal Mechanisms of General Anesthesia** Nicholas Franks <n.franks@imperial.ac.uk> (Biophysics, Imperial College, London, United Kingdom)

Because the potencies of most anesthetics can be accurately predicted by lipid partitioning (the Meyer-Overton correlation), they have long been considered to be archetypal 'non-specific' drugs. However, this view has now changed radically and it is recognized that even the simplest anesthetics (including the inert gas xenon) can be surprisingly selective in their actions and exert their effects by binding directly to protein targets. Identifying which protein targets are pharmacologically relevant, and which are not, has been a major challenge, yet great progress has been made in recent years. In this talk I will present the evidence which identifies ion channels as the critical targets in the central nervous system and show that for some commonly used agents, the relevant targets can be unambiguously identified. At the molecular level, I will discuss how anesthetics, which mostly bind with low affinities, may act by changing the distribution of kinetic states, while causing minimal perturbations in the channel structure. The identification of the important anesthetic targets has facilitated investigations into the possible connections between general anesthesia and natural sleep. It has long been suspected that the neuronal pathways that are involved in NREM sleep may also be relevant to the induction and maintenance of general anesthesia. Only recently, however, has evidence showing a causal link been provided. I will describe experiments that show

how certain key nuclei in the brain, which are involved in the regulation of sleep, may also be involved in the actions of general anesthetics and present new data which shows that connectivity between the cortex and lower brain centers is disrupted at the point of anesthetic-induced loss of consciousness. **PL13**

131 **Meyer-Overton Meets Quantum Physics: Consciousness, Memory and Anesthetic Binding in Tubulin Hydrophobic Channels** Stuart Hameroff <hameroff@u.arizona.edu> (Anesthesiology, Psych, CCS, Center for Consciousness Studies, University of Arizona, Tucson, AZ), Travis Craddock, Dept. of Physics, University of Alberta, Edmonton, AB, Canada; Jack Tuszynski, Division of Experimental Oncology, Cross Cancer Institute, Edmonton AB Canada

Introduction Anesthetic gases selectively erase conscious awareness and memory, sparing non-conscious brain activities. At the turn of the 20th century, Meyer and Overton found anesthetic potency correlates with solubility/binding in a non-polar, hydrophobic environment, subsequently shown to be hydrophobic pockets within proteins (Franks and Lieb, 1984), including 70 receptors, ion channels and tubulin in cytoskeletal microtubules (Eckenhoff et al, 2002). Anesthetic gases bind in hydrophobic regions by quantum London forces, electron cloud dipole couplings with non-polar amino acid residues, e.g. phenylalanine and tryptophan. Theories suggest anesthetic quantum actions in protein hydrophobic regions (Hameroff, 2006), and quantum computations in microtubules supporting consciousness (Hameroff and Penrose, 1996). Evidence for functional quantum effects in warm biology include ion channels and microtubules (e.g. megahertz coherence, lossless conductance through helical lattice pathways, Bandyopadhyay, 2011). Quantum processes in microtubule hydrophobic regions are potential sites for consciousness and anesthetic action. Methods We used molecular modeling of tubulin to identify tryptophan, phenylalanine and anesthetic binding sites, and calculated anesthetic-tubulin binding energies and affinities. Results Within tubulin, 8 tryptophans and 32 phenylalanines cluster and align (< 2 nanometer separation) along tubulin-tubulin helical pathways. Predictive anesthetic binding energies are between -2.54 and -3.12 kcal/mol, corresponding to dissociation constants (binding affinity) between 6 and 16 millimolar. Anesthetics bind at 5 putative sites, e.g. within 6 angstroms (0.6 nanometer) of an aligned tryptophan with a binding energy of -2.74 kcal/mol (11.7 millimolar). Discussion Anesthetic-tubulin binding is 10 to 100 times weaker than anesthetic binding to other neuronal proteins, e.g. GABAa receptors. However there are 100 times more tubulins than GABAa receptors per neuron. Intra-tubulin hydrophobic channels match microtubule lattice helical pathways, and may account for lossless conductance (Bandyopadhyay, 2011) and topological quantum computing implicated in consciousness and memory (Hameroff et al, 2002; 2010). Microtubule hydrophobic channels (possibly quantum entangled with GABAa receptors and other neuronal proteins) are viable candidates for consciousness, memory and anesthetic action. References Bandyopadhyay A (2011) TSC abstracts www.consciousness.arizona.edu; Eckenhoff et al (2002) J Pharm Exp Ther 300:172-9; Franks and Lieb (1984) Nature 310:599-610; Hameroff S, Penrose R (1996) J Consciousness Studies 3(1)36-53; Hameroff et al (2002) Biosystems 64:149-162; Hameroff S (2006) Anesthesiology 105:400-412; Hameroff et al (2010) J Integrative Neuroscience 9(3)253-267 **PL13**

132 **Anesthetics and Gamma Synchrony** Anthony Hudetz <ahudetz@mcw.edu> (Department of Anesthesiology, Medical College of Wisconsin, Milwaukee, WI)

Kulli and Koch in 1991 asked the provocative question “Does anesthesia cause loss of consciousness?” and proposed that 40Hz neuronal oscillations may hold an answer. Since then, the role of 40Hz gamma oscillations as a neural correlate of consciousness, and their absence as a correlate of unconsciousness, has been debated. Roy John et al found in 176 anesthetized patients that frontal-occipital gamma coherence was the sole reliable correlate of the loss and return of consciousness (LOC and ROC). However, change in gamma coherence was biphasic; elevated at LOC and decreased during surgical anesthesia. A difficulty is that clinical protocols do not allow prolonged recordings of EEG at multiple depths of anesthesia near LOC. In animal experiments, where such recordings are possible, we found

that 40Hz gamma power was not reduced by general anesthesia, at least with inhalational anesthetics. Anterior-posterior gamma coherence was decreased, but this change correlated best with sedation, not with LOC. Only fentanyl, an opioid that hardly removes consciousness, reduced gamma power. Stimulus-related 40Hz gamma synchrony was observed in both awake and anesthetized conditions suggesting that 40Hz gamma oscillations were necessary but insufficient for consciousness. Recently, we found that high-frequency gamma power at 70-140Hz was attenuated by isoflurane anesthesia in a concentration-dependent manner. The covariation of the high-frequency gamma powers among distant brain regions was also decreased. High-frequency gamma covariation may depend on fast cortical or thalamic neuronal gap junctional communication and may be a marker of consciousness. To resolve the gamma controversy, one has to advance beyond the routine analyses of classical gamma power and coherence, and examine the neuronal information encoded in gamma activity. The Information Integration Theory of Consciousness of Tononi suggests that a breakdown of information capacity or long-range functional integration may account for LOC in anesthesia. Earlier evidence from our laboratory suggested that fronto-parieto-occipital information transfer at 40-50Hz EEG gamma frequencies was reduced at LOC in anesthetized animals. Information transfer was calculated from sensory stimulus-evoked gamma oscillations that were preserved at short latency but attenuated at long latency, while the reactivity of the neurons was preserved or enhanced. The long-latency response has been thought to support cortical information integration. Anesthesia also diminished the repertoire of independent states of cortical hemispheres as indexed by their EEG cross-entropy. Since gamma synchrony originates in the dendritic fields, a more accurate account should focus on information integration in local field potentials (LFP). 64-channel simultaneous LFP recordings in rat visual cortex indicate that a sudden increase in local information capacity occurs upon regaining consciousness from anesthesia. This is consistent with earlier suggestions that the state transitions at LOC or ROC are abrupt. We postulate that neural information is encoded in the dynamic patterns of local gamma LFP, which is then disseminated in form of global synchrony. The number and lifetime of transient deviations of local gamma LFPs from the population average are measures of this information capacity and suggested as a putative neural correlate of the state of consciousness. **PL13**

2.9 Cellular and sub-neural processes

133 **Microtubules in yet another role? Transient cytoskeletal electrical currents and change in conscious experience** James Beran <jimberan@earthlink.net> (Richmond, VA)

While widely accepted roles of microtubules (MTs) include intracellular transport and generation of cell morphologies, other roles have been proposed for MTs and other cytoskeletal components: Hameroff and Penrose, for example, proposed that quantum computations in MTs in neurons give rise to consciousness; further, electrical properties of MTs and other cytoskeletal components suggest that cytoskeletal information processing occurs in neurons. [1] In contrast, most electromagnetic (EM) approaches to consciousness propose non-cytoskeletal interactions between EM waveforms and neurons; for example, McFadden dismissed the relevance of MTs, instead advocating interactions with voltage-gated ion channels. [2] Generally accepted EEG/MEG theory explains detected EM waveforms based on synchronized currents in apical dendrites of pyramidal cells in cerebral cortex, also without mentioning MTs. [3] Meanwhile, following Rall, dendritic signal processing models successfully employ compartmental approaches based on cable theory, neglecting interactions with EM waveforms and also neglecting MTs. [4] Is there a way to unify at least some of these diverse approaches, such as by reconciling cable theory with cytoskeleton/EM waveform interactions?--Maybe some approaches could be unified, e.g. if a subset of EM-interacting dendritic regions were relatively small such that cable theory approximations would hold despite cytoskeletal waveform interactions that can synchronize dendritic currents. This work therefore studies whether small, specialized cytoskeletal units could interact with EM waveforms in a way that changes conscious experience. Certain cytoskeletal features are compatible with transient electrical currents, e.g. via ion motion along an

MT or via cytoskeletal conductivity. [5] Transient cytoskeletal electrical currents, if they occur, could interact with EM waveforms. We examine one simple, purely hypothetical model under which transient electrical current in a dendrite's cytoskeleton could trigger cytoskeletal electrical currents in neighboring dendrites. If actual dendrites behave according to this or similar models, EM waveforms that accompany transient cytoskeletal electrical currents could be amplified when certain constraints are met. We propose further research to determine whether interactions like this cause change in conscious experience. [1] See, e.g., Woolf et al., 2009, pp. 62, 85-101, 112-117, and 227-261; see also Tuszynski, 2008, pp. 335-387. [2] McFadden, "The CEMI Field Theory: Seven Clues to the Nature of Consciousness", in Tuszynski, Ed., 2006, pp. 387-406. [3] See, e.g., Brandeis et al., "From neuronal activity to scalp potential fields", in Michel et al., Eds., 2009, pp. 1-24, and Pascual-Marqui et al., "Imaging the electrical neuronal generators of EEG/MEG", in Michel et al., Eds., 2009, pp. 49-77. [4] See, e.g., Rall, "An historical perspective on modeling dendrites", in Stuart et al., Eds., 2008, pp. 309-320, and Rabinowitch et al., "A theoretical view of the neuron as a plastic input-output device", in Stuart et al., Eds., 2008, pp. 321-349; but see Priel et al., "The Dendritic Cytoskeleton as a Computational Device: An Hypothesis", in Tuszynski, Ed., 2006, pp. 293-325. [5] See, e.g., Woolf et al., 2009, pp. 98-100 and 235-236, and Tuszynski, 2008, pp. 335-387. **C20**

134 **Synaptic plasticity and synaptic degeneration in unconscious patients with severe traumatic brain injuries. A transmission electron microscopic study using cortical biopsies.** Orlando Castejón <fundadesarrollo@iamnet.com> (Electron Microscopy and Neuros, Biological Research Institute. Faculty of Medicine. Zulia University, Maracaibo, Zulia, Venezuela)

The submicroscopic features underlying synaptic plasticity and synaptic degeneration are analyzed in severe edematous regions of unconscious patients with brain trauma, and in severe brain edema. Cortical biopsies of unconscious patients under surgical anesthesia were taken from 17 patients with severe traumatic brain injuries complicated with subdural or extradural hematoma. The biopsies were immediately fixed in the surgical room for conventional transmission electron microscopy. The following submicroscopic changes are found: enlargement of both pre- and postsynaptic endings, irregularly shaped, lobulated, stellate and bifurcated presynaptic endings, and conformational changes of dendritic spines. Numerous flat, curved and invaginated axodendritic and axospinous asymmetric synapses, and a less proportion of axodendritic and axosomatic symmetric synapses are observed. Activated or sensitized synapses show numerous frontline spheroid synaptic vesicles, prominent dense presynaptic dense projections, and increased in length of synaptic membrane complex. Perforated synapses, multiple synapses and serial synapses are also found evincing synaptic splitting and formation of new synaptic connections. The overall images observed in brain trauma suggest increased number of excitatory circuits, which are correlated with the tonic and clonic convulsion or post traumatic seizures observed in some patients. Numerous coated vesicles are observed in pre- and postsynaptic structures. The proteinaceous and nonproteinaceous edema fluid accumulated in the dilated extracellular space of cerebral cortex neuropil induces swelling and shrinkage of pre- and postsynaptic structures, increased amount of presynaptic axoplasmic granular substance, and clumping, enlargement and depletion of synaptic vesicles. In some cases filamentous hypertrophy of presynaptic endings also is observed. Osmiophilic bodies, necrotic membranes, lipid inclusions and glycogen granules are seen in the presynaptic terminals. Disappearance of synaptic densities is evident in some cases. In very severe brain edema, synaptic disassembly occurred feature by swollen and shrunken presynaptic endings with discontinuous limiting plasma appear separated from the postsynaptic structures and detached from glial ensheathment. Phagocytosis of isolated presynaptic endings, and of the entire synaptic contacts by astrocytes, microglial cells, and by nonnervous invading cells, such as monocytes and macrophages is frequently observed. Some biochemical events should be considered in relation to the synaptic degeneration in brain trauma, such as release of arachidonic acid from membrane phospholipid, release of neurotransmitters and formation of prostaglandins and thromboxanes (Pappius and

Wolfe,1982),disturbance in ion homeostasis involving cellular release of K+ and massive Ca2+ entry into the intracellular compartment (Nilsson et al.,1963, Gutierrez-Diaz et al., 1985), depletion of retrogradely transported trophic factors (Vornov and Coley, 1991), oxygen radical generation and lipid peroxidative reactions (Hall,1989), glutamate release during ischemia and activation of NMDA receptors (Koh et al., 1991), increase in intracellular Ca2+ concentration (Choi, 1993), free radical generation and release of iron, increased concentration of polyamines in brain (Lombardi et al., 1993). Some of these processes might simultaneously occur in brain edema associated with traumatic brain injuries, and can be envisaged as leading to disturbances of synaptic function, synaptic degeneration and finally synaptic disassembly. The primary vasogenic brain edema, and the secondary cytotoxic brain edema would explain the loss of consciousness of patients under study. **C6**

135 **DNA, Waves and Water** Luc Montagnier, MD <lucmontagnier@gmail.com> (Nobel Laureate, World Foundation for AIDS Research and Prevention, UNESCO, Paris, France)

The association of DNA with water is known since the deciphering of its double helical structure by X-Ray diffraction in 1953 (Watson, Crick, Wilkins and Franklin). However the power of DNA for organizing water seems to go far beyond the direct filling of water molecules within the grooves of the double helix. Indeed, we have recently discovered that some DNA sequences - so far belonging to pathogenic bacteria and viruses - are able to induce specific structures of nanometric size in water. When sufficiently diluted in water, these structures are emitting a spectrum of electromagnetic waves of low frequencies (ranging from 1,000 to 3,000Hz). This is a resonance phenomenon which is dependent on excitation by very low frequency electromagnetic waves, usually provided by the ambient background. According to the theory of diphasic water, water dipoles can organize themselves, upon low energy input,into quantum coherent domains able to receive and keep biological information. In agreement with this model, we have recently obtained evidence that some specific DNA sequences can be transmitted through waves in water by generating nanostructures readable by naturally occurring enzymes (DNA polymerases). This raises the interesting possibility that living structures are able to communicate through waves, like we, human beings, have recently started to do so for social purposes. Moreover, these phenomena may exist since the origin of life, as they involve proteins highly conserved throughout evolution. Finally, one cannot exclude that the DNA double helix and its virtual photonic counterpart, are ubiquitous entities in the Universe. **PL9**

136 **Mechanical Waves and Consciousness** William Tyler <wtyler@vt.edu> (School of Biomedical Engineeri, Virginia Tech Carilion Research Institute, Blacksburg, VA)

The influence of mechanical energy on brain function is under appreciated and not well understood. Using an extreme case to highlight the importance of this issue, mechanical energy transfer to the head of an individual (including that produced by impulse or shock waves) can profoundly alter neural activity - even rendering individuals unconscious. Such mechanical impact forces can trigger deleterious signaling cascades in neural circuits as often observed in traumatic brain injuries. On the other extreme and during normal brain functioning, axons undergo rapidly reversible structural (volumetric) changes when action potentials fire. Based on observations examining those phenomena, it is thought mechanical waves propagate along axons accompanying action potentials. At synapses, transmission events have also been associated with mechanical consequences. Mechanical impulses have been recorded at axon terminals during synaptic vesicle fusion. Dendritic spines are known to twitch and experience rapid actin-mediated contractions in response to synaptic activity and spiking. To what extent these mechanical actions influence brain function remains the source of great debate. Little attention however is placed upon unraveling these mechanical mysteries of the mind. Desiring to gain insight into how mechanical energy influences neuronal function, my laboratory began a series of studies aimed at investigating the effects of pulsed ultrasound (US; mechanical pressure waves) on brain activity several years ago. It is important to note that mechanical bioeffects of US on the excitability of nervous tissues were first described more than eighty years ago. Through our investigations we have

made the novel observation that low-intensity transcranial pulsed ultrasound is capable of stimulating action potentials and driving synchronous oscillations in intact brain circuits through nonthermal mechanisms of action without requiring surgery or exogenous factors. Offering an improvement over other transcranial brain stimulation methods, US can stimulate deep-brain structures while conferring a spatial resolution of a few millimeters. Through translational studies, we have been able to show that US can noninvasively modulate learning and memory processes, as well as to provide viable therapeutic interventions against brain diseases such as epilepsy. We are now engaged in developing functional brain mapping applications employing pulsed US, which we anticipate will help illuminate yet unresolved questions in neuroscience. This lecture will provide insight into why we should begin including mechanical waves in our emerging portraits of brain function and conscious experiences. **PL4**

2.10 Quantum neurodynamics

137 **The 90 degree topological transformation with Ikosolid - The unifying revolution to the foundations on quantum mechanics** Koei Endo , Ikuyo Endo <koei-i@msi.biglobe.ne.jp> (K.I. Research Institute, Fukushima City, Fukushima Pref. Japan)

IKOSOLID is Artificial Crystallization and the Solid Benzene and IKOSOLID has the ability of the 90 degree topological transformation. At the beginning of the quantum mechanics there were several interpretations. The mainstream is Copenhagen interpretation. Besides, there are many world interpretations, Transactional Interpretation and so on. However, because the problem of consciousness concerns, there is not decisive interpretation in the interpretation of the quantum mechanics at present. That is, the research of the quantum mechanics and of the consciousness have important relation. By the 90 degree topological transformation with IKOSOLID,IKOSOLID SCIENCE gives the unifying revolution to the foundations on quantum mechanics. The state of the existence of the positron (the antiparticle) is in the reverse of the electron (particle) and in the state of 90 degree phase to electron (particle). Therefore, the positron (the antiparticle) appears obediently in the three-dimensional world by the 90 degree topological transformation and turning a face of positron to the face side with IKOSOLID. As a result the positron made by 90 degree topological transformation with IKOSOLID becomes the outbreak-effect of positron without the pair annihilation of positron and electron. There is not a 90 degree topological transformation in the positron which is formed with the actuator. Therefore, it makes the pair annihilation of positron and electron. In the way of the occurrence, the difference of the positron made by 90 degree topological transformation and the positron formed with the actuator without 90 degree topological transformation becomes very important. However, in the present age thing reason, the high-energy physics (the elementary particle experimental physics) is mainstream. Therefore, if adding a 90 degree topological transformation by IKOSOLID as a conductor to the actuator experiment, the revolution happens to the high-energy physics. It proposes to introduce the 90 degree topological transformation which depends on IKOSOLID into the actuator experiment. As a result, the decisive result of the quantum mechanics which the scientist all over the world craves should appear. Our research is about electron and the positron. Experimentally on the actuator, it is possible to do an experiment on particle and the antiparticle including electron and the positron, too. **C16**

138 **Alpha EEG In-phase standing wave: Evidence for a quantum source of consciousness** John Russell Hebert <tmeeg@aol.com> (Anesthesiology, VA Medical Center, Houston, Texas)

The source of consciousness is currently a profound topic of scientific interest and is still an open question. Our approach to this question examines two aspects inherent in both physics and consciousness: objectified and de-objectified. The brain exists on the visible, objective level described by particle (classical) physics. Even so, this objectified existence has its basis in the sub-microscopic, quantum level of creation which is non-local, invisible,

de-objectified and field-like. As we have pointed out in our previous work, consciousness has its own objectified and de-objectified aspects. The objectified waking consciousness is characterized by the experience of memories, emotion, thoughts and sensory perceptions, expressed neurologically as localized high frequency gamma oscillations in the electroencephalogram (EEG). When one experiences objectified states one is not aware of the field-like properties of consciousness. On the other hand the de-objectified state consciousness is experienced as abstract and field-like. Field properties are fundamental to the quantum level of functioning. The de-objectified state of consciousness is variously described by neuroscientists as a ground state, a global state without sensory-cognitive activity or a self-referral state. This category of conscious experience is captured in the EEG by slower, global EEG frequencies such as alpha and theta. The EEG is the ideal tool for investigating consciousness because of its brain-consciousness interface. On the one hand the EEG is reflective of the brain's neural firing and on the other hand the EEG is a practical gauge of states of consciousness. Thus the EEG approach probes the brain- consciousness question through a measure that is functionally tied to both. The presentation of our published work will describe a unique EEG feature, called an in-phase alpha standing wave associated with the de-objectified state of consciousness. This pattern has been predicted by neural mass action theorists but never found in the research literature. Our discovery is potentially very important because it is empirical, repeatable and within the scope of current accessible technology. Through phase synchrony analysis we determined that the reason the standing wave develops is that the wavelength of alpha matches the longitudinal measure of the human cortex. Importantly this finding earmarks alpha as primary resonant frequency of the brain. We will describe how this finding of unified wholeness in electrophysiology and consciousness satisfies key features of brain functioning deemed necessary for quantum brain dynamics as delineated by quantum consciousness theorists: e.g., long-range correlation, stationary character, low noise and the missing element of the quantum observer.. Concluding remarks: From this neuroscience evidence we will propose that the basis of the objectified mind and the basis of the objectified brain are the same, the unified quantum field described by physics. This also implies that the quantum field is a field of consciousness. We will also propose that through the experience of the de-objectified transcendental state of consciousness we are connecting human physiology to the source of order in the universe. From our research we also conclude that the universe is self-aware and that conscious mind and physical body have a common source. **C12**

139 **Quantum-like open system dynamics and the process of decision making in Prisoner's Dilemma games** Andrei Khrennikov , Masanari Asano, Masanori Ohya, Yoshiharu Tanaka, Irina Basieva <andrei.khrennikov@lnu.se> (Intl. Center for Mathematics, Linnaeus University, Vaxjo, Sweden)

We present a quantum-like model of decision making in games of the Prisoner's Dilemma type. By this model the brain processes information by using representation of mental states in complex Hilbert space. Driven by the quantum master equation the mental state of a player, say Alice, approaches an equilibrium point in the space of density matrices (representing mental states). This equilibrium state determines Alice's mixed (i.e., probabilistic) strategy (see for the details the book: A. Khrennikov, Ubiquitous quantum structure: from psychology to finances, Springer, Berlin-Heidelberg-New York, 2010). **C7**

140 **Collective electrodynamic field in the brain** Jiří Pokorný <pokorny@ufe.cz> (Institute of Photonics and Electronics AS CR, Prague 8, Czech Republic)

Consciousness, a state of awareness and cognition distinguishing yourself from other objects and surrounding situations, displays a strongly unified collective biological activity of the brain with a short (sub second) time response that manifests similarly united ordering of the background physical and chemical processes. Microtubules in neurons generate an electrodynamic field that can mediate strong long distance interactions. The field is of a near zone nature, i.e. the energy periodically flows out of the source and returns to it (the radiation part of the energy seems to be very small). A part of the energy may be captured

by the microtubules of the surrounding neurons and mediate mutual interactions. Interactions among all neurons may provide coherent behavior of the whole system. Important parameters are coherent time and information transfer. The coherent time has to be considerably longer than the time of propagation of the electromagnetic wave across the brain. This condition is fulfilled at the frequency f < 100 MHz and the quality factor of the oscillation system (microtubule) Q ? 10. The amount of transferred information depend on the ratio of the transmitted power to the noise power. For a dipole source the transmitted power to a unit volume decreases with increasing distance, i.e. the amount of transferred information is diminished too. Therefore, power of the microtubule oscillations is a factor for keeping coherence of the electrodynamic field in the brain. A collective coherent electrodynamic field generated by interacting neuron microtubules may be a general feature of the brain activity. Penrose- Hameroff hypothesis of orchestrated reduction of quantum coherence in brain microtubules has a strong physical foundation. Measurements disclosed adequate data concerning microtubule oscillations in the frequency range around 10 MHz. **C29**

141 **Data flow and functional design of the brain. A model based on the assumption that electrons exist in a quantum state located to the lumen of tubular proteins of the cytoskeleton.** Jesper Ronager <jronager@biochronos.dk> (Neurology, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark)

A quantum observation exclusively takes place in a living cell, and implies transfer of information to a quantum field, eventually changing the organism's morphology, metabolism or both, thereby in a teleological way increasing the long term stability of the organism. The cytoskeleton determines the morphology of all cells, the cytoskeleton polymerizes according to quantum resonance maxima of the intraluminal field. In eukaryotes, the temporospatial organization of chromosomes is controlled by quantum resonance patterns in the electromagnetic domain. The epithelium that lines the cavities and surfaces of structures of the body contains a planar quantum field, located to gap-junctions and intermediate filaments; which via the primary cilia coordinates differentiation in developing cells. The brain processes information in the digital, analog (electromagnetic) and quantum domains. The oscillating electromagnetic fields (EEG/MEG, LPT, SCP) are not insignificant side effects of synaptic activity, but represent the interface between the physical part of the brain and a quantum field. In the brain, the dendrite trees in the gray substance, generates hundreds of functional maps in the electromagnetic domain. Complimentary and functionally integrated into each functional map is a planar quantum field maintained by astrocytes via gap-junctions and intermediate filaments where long term memory is stored by quantum resonance patterns. The quantum field is generated by gray substance, and has an outer topology matching the cerebral cortex. The location of paired structures in the midline allows synchronization of data across the midline in the electromagnetic domain. The binding of data across maps, between maps, and between the hemispheres takes place in the electromagnetic domain and is mediated by gamma oscillations. Information is exchanged by photons (with a frequency range from 1/10 Hz to 100 Hz) between a planar quantum field located in the astrocytes and the dendritic trees of the neurons. The neurons act as a quantum observer, by firing an action potential when a threshold of the membrane potential is reached. The content of consciousness correlates with synchronous gamma oscillations and SCP/BOLD signals. The oscillations originate from the map-wide quantum fields, involved in current mental activity. The labile short-term memory is located to the multiple feed-forward loops, which dominates the central connectivity, creating in effect series of echoes in the electromagnetic domain, which represent the data format for memory, cognition and dreams. Due to the slow conduction velocity of even myelinated axons, series of echoes in the electromagnetic domain are created by autoresonance, hereby representing temporal data. This is the data format for adding or retrieving memory, cognition and dreams. The future is processed in the gray substance of the motor systems. The past is processed, stored and retrieved in the gray substance of functional maps in the sensory systems. Phyletic memories (instincts and emotions) are transferred transgenerationally by quantum resonance from the parents to the embryo, located in the limbic system, it also contains relevant executive programs. **C20**

142 **Investigation of biophotons emissions, microtubule activity and action potentials in the human brain** Vahid Salari , Jack Tuszynski, Istvan Bokkon, Majid Rahnama <vahid-salari742@gmail.com> (IMPMC, UPMC, Paris, France)

Several experiments have demonstrated that living cells, including neural cells, continuously and spontaneously emit ultraweak light during the process of metabolic reactions associated with their physiological states[1]. In in vivo experiments, spontaneous ultraweak biophoton emission from a rat brain was shown to correlate with cerebral energy metabolism, EEG activity, cerebral blood flow and oxidative stress [2]. Some unpublished observations suggest that the state of the biophoton field of a human brain may be connected to the state of the brain as measured by the EEG (e.g., degree of synchronization and coherence)[3]. Here we argue that in addition to electrical and chemical signals propagating in the neurons of the brain, signal propagation takes place in the form of biophoton production. Namely, neural electrical signals (spike-related electrical signals along classical axonal-dendritic pathways) could be converted into synchronized bioluminescent photonic signals (inside the neurons) by neurocellular radical reactions (mainly via redox processes). This statement is supported by recent experimental confirmation of photon guiding properties of a single neuron[4]. We investigate the interaction of biophotons with microtubules (MTs) from a quantum mechanical point of view. MTs are particularly abundant in the brain where they form highly ordered bundles and are the best candidate as a substrate for long-range coherence and large amplitude synchrony. A significant relationship between MT activity (due to the emission and absorption of photons) and alpha-EEG diagrams is discussed in this paper. It is shown that sub-membrane cytoskeleton (microtubules cross-linked with actin filaments) in neurons is responsible for the generation of action potentials [5]. The EEG waves are deeply involved with the basic functioning of the brain but the origin and the exact function of EEG has remained a mystery. The EEG waves associated with two distant neurons are strongly correlated which supports the view that EEG waves are related to the properties of the brain as a coherent quantum system. Consequently, according to our quantum approach we elaborate on the question how MT activity can be related to electrical activity of the brain. References: [1] Isojima Y, Isoshima T, Nagai K, Kikuchi K, Nakagawa H. 1995. Ultraweak biochemiluminescence detected from rat hippocampal slices. NeuroReport 6, 658-660. [2] Kobayashi M, Takeda M, Ito K, Kato H, Inaba H. 1999. Two-dimensional photon counting imaging and spatiotemporal characterization of ultraweak photon emission from a rat's brain in vivo. J. Neurosci. Methods. 93, 163-168. [3] Bischof M. 2005. Biophotons-The light in our cells. Journal of Optometric Phototherapy. 1-5. [4] Sun Y, Wang C, Dai J. 2010. Biophotons as neural communication signals demonstrated by in situ biophoton autography. Photochem. Photobiol. Sci. 9, 315-322. [5] Pollack G., Cells, Gels and the Engines of Life. 2001. **C20**

143 **To-be-in-the-world: The action-perception cycle and the dissipative many-body model of brain** Giuseppe Vitiello, Walter J. Freeman, Department of Molecular and Cell Biology, Division of Neurobiology, UC Berkeley, Dfreeman@berkeley.edu Http://sulcus.berkeley.edu <vitiello@sa.infn.it> (Department of Mathematics and Universita' di Salerno, Fisciano (SA), Italy)

Cognitive neurodynamics describes the process by which brains direct the body into the world and learn by assimilation from the sensory consequences of the brain directed actions. Repetition of the process constitutes the action-perception cycle by which knowledge is accumulated in small increments. Each new step yields a freshly constructed frame that is updated by input to every sensory cortex [1]. The continually expanding knowledge base is expressed in attractor landscapes in every cortex. The global memory store is based in a rich hierarchy of landscapes of increasingly abstract generalizations [1,2]. The dissipative many-body model of brain [3] provides the theoretical scheme aimed to describe the basic dynamics underlying the neurological activity described above. The dissipative model is based on the fact that brains are open thermodynamic systems operating far from equilibrium. Brains burn glucose to store energy in glycogen (animal starch) and high-energy adenosinetriphos-

phate (ATP), and in transmembrane ionic gradients; they dissipate free energy in proportion to the square of the ionic current densities that are manifested in epiphenomenal electric and magnetic fields, and that mediate the action-perception cycle [4]. Brain imaging techniques such as fMRI are indirect measures of metabolic dissipation of free energy, relying on secondary increases in blood flow and oxygen depletion. The dendrites dissipate 95% of the metabolic energy in summed excitatory and inhibitory ionic currents, the axons 5% in action potentials that carry the summed output of dendrites by analog pulse frequency modulation. One of the main tasks of the dissipative model is thus formulating the thermodynamic features involved in the action-perception cycle. In this report we illustrate the occurrence of null spikes (transient highly localized decreases in ECoG to zero) in multichannel records. We discuss how energy dissipation leads to null spikes and derive classical Maxwell equations and current fields from the quantum dynamics [5] to explain how they initiate phase transitions. We stress that the emergence of classicality out of the microscopic dynamics is a central feature of the dissipative many-body model: knowledge from information. We discuss the size, number and categorization of the transient non-homogeneous patterns appearing in ECoG and EEG during non-instantaneous phase transitions we observe during perception. We explain the formation of imploding and exploding conical phase gradients observed in the ECoG by deduction from the theory. We emphasize energy dissipation as heat in repetitive emergence and disappearance of the long-range coherence required for perception. [1] W. J. Freeman, Origin, structure, and role of background EEG activity, Clin. Neurophysiol. 115, 2077-2088(2004); 115, 2089-2107(2004); 116 (5), 1118-1129(2005), 117(3): 572-589(2006). [2] W. J. Freeman, Definitions of state variables and state space for brain-computer interface. Part 1. Multiple hierarchical levels of brain function. Cognitive Neurodynamics 1(1), 3-14(2006). [3] G. Vitiello, My Double unveiled, Benjamins Pub. Co., Amsterdam 2001. [4] W. J. Freeman and G. Vitiello, Nonlinear brain dynamics as macroscopic manifestation of underlying many-body field dynamics. Physics Life Rev. 3, 93-118(2006). [5] W.J.Freeman and G.Vitiello, Vortices in brain waves, Int. J. Mod. Phys. B 24, 3269-3295 (2010). **C20**

2.11 Pharmacology

2.12 Neural synchrony and binding

144 **Applying the bounded variable of Ethic's Sigma Summation to the Goldman-Hodgkin-Katz Equation for binding consciousness with societal migration** Dallas Bell <dllsb7@aol.com> (Cosby, TN)

Data suggests that children do not want to be lied to, stolen from, or murdered. Those hardwired desires can be viewed as bounded variables that make up the set of ethics common to human behaviors in a sigma summation, n = 10 (See the works of Baars for "treating consciousness as a variable" and see Cicero's 44 B.C. "De Officiis" book 1, chapter IV, for the ancient Decalogue system of common ethics). Consciousness allows choice between neurological data from experience and applies the ethic to a situation, such as migration, for decision-making (See the works of Baars for nonmaterial aspects of consciousness and see the neuroscience books by Kandel et al. and Purves et al. for material aspects of consciousness). An ethic can be said to be positive as it complies with the common desires or an ethic can be said to be negative as it does not comply with the common desires (See the 2010 paper by Dallas F. Bell Jr. accepted for presentation at the European Conference on Complex Systems titled "Proposal for Modeling the Operator of Schizophrenic Behavior Within the Mechanism of Societal Operators"). The simplified Goldman-Hodgkin-Katz equation (GHK) used in neuroscience can be applied to find the societal "membrane potential" for migration. Vm = (61.54) log10 (PK (K+)o / PK (K+)i) + (PNa (Na+)o / PNa (Na+)i) + (PCl (Cl-)i / PCl (Cl-)o) at 37 degrees C. Societal migration potential (Sm) would replace the Vm. The common human average ethic compliance -5 of the 10 basic ethical behaviors replaces 65.54. The percentage of the population that makes up compliance with 10 ethical standards

replaces the PK where 10 replaces the K+ ion for the outside of the ethically and economically dominate society, o, being measured by the inside of that society, i. The percentage of the population (PNa) that complies with average ethical standards is 5 and replaces the Na+ ion and the percentage of population (-PCl) that is the lowest is -10 replacing the Cl- ion. Under normal conditions, these numbers apply as would the ionic conditions of 37 degrees for the GHK equation. For example, the approximate relational data for the United States (US) migration from Mexico could be stated as follows: Sm = (-5) log10 (10 x 10 / 47 x 10) + (30 x 5 / 23 x 5) + (-30 x -10 / -60 x -10). The outcome of 1.65 migration of society (Ms) is more positive than -5 and so implies that the US (i) would tend to attract persons from Mexico (o) of more average negative ethics than is the average US ethics but are more positive than the average ethics in Mexico. That change raises the positive state inside Mexico closer to -5 and lowers the state inside the US closer to -5. It is understood that each society has appropriate "leaky channels" of migration patterns. This process can then be used for analysis and predictions in situ. **P2**

2.13 Emotion

2.14 Sleep and waking

2.15 Specific brain areas

145 **Involvement of the mediodorsal thalamus in control of arousal and cognition in the mouse** Hee-Sup Shin , Sukchan Lee, Huisu Kim <shin@kist.re.kr> (Center for Neural Science, Korea Institute of Science and Technology, Seoul, Korea, Republic of)

The midline thalamus including the mediodorsal nucleus (MD) is thought to provide the necessary arousal of cortical and subcortical regions for awareness of incoming information. MD in fact is involved in interaction between the level of arousal and performance of selective attention, attending to only one target of information with excluding the others, and represents the enhancement operator of a prefrontal top-down modulation of the selective attention. MD lesions, also, have induced prefrontal-associated memory impairment in humans and animals, suggesting the important role of MD in cognition. In experiments using the mouse system, we found results showing the critical function of MD in control of arousal. Furthermore, we observed that in the triangular circuit of mPFC, MD, and amygdala, a modulation of MD neuron firing via the mGluR1-PLC-(beta)4 signaling (mimicking the corticothalamic top-down modulation) enhances the level of arousal, resulting in facilitation of cognitive function. **C12**

2.16 Miscellaneous

146 **Effect of low-level electromagnetic field on the balance of the EEG rhythms** Maie Bachmann , Jaanus Lass; Anna Suhhova; Hiie Hinrikus <maie@cb.ttu.ee> (Tallinna Tehnikaülikool, Tallinn, Estonia)

Neurophysiologic approach to consciousness presumes connectivity between different brain areas and processes in the brain [Crick,1998]. The high-level electromagnetic field (EMF) stimulation affects neurophysiologic processes, causes disturbances and possible disruptions of connectivity between brain areas, even loss of consciousness. The aim of this work was to investigate whether low-level EMF can affect electroencephalographic (EEG) rhythms and change the balance between the EEG higher and lower band powers. The experiments with 450 MHz EMF modulated at 40Hz and 70Hz frequencies were carried out on a group of 15 healthy volunteers. The first subgroup consisted the subjects whose average daily mobile phone usage was 8 minutes and the second subgroup 23 minutes. Field power density at the scalp was 0.16mW/cm2. Ten cycles of the exposure (1 min on, 1 min off) with each modulation frequency were applied. Eight EEG channels were analyzed

using the spectral asymmetry index (SASI). Calculation of the SASI as a combination of the EEG powers in the specially selected frequency bands: SASI=(Wh-Wl)/(Wh+Wl), where Wh represents the EEG signal power in the lower EEG frequency band and Wl in the higher frequency band. The Student t-test was applied. SASI value for the whole group rises significantly under the influence of microwave radiation. Modulation frequency 40Hz has the strongest influence according to SASI. While the level of SASI for the whole group averaged over all channels is the lowest for sham recordings (SASI=-0.135), the modulated EMF at 40Hz rises the average SASI value significantly (SASI=-0,073, p=9,5E-06). EMF at modulation frequency 70Hz has somewhat smaller influence. Still, the average SASI had a significant rise (SASI=-0.109, p=3,2E-03). The results showed that the first subgroup had much lower average SASI level in sham recordings compared to second subgroup (SASI1=-0.211; SASI2=-0.097; p<<0.05). Therefore, more frequent mobile phone users had also higher normal SASI value. While looking the SASI values at modulation frequency 40Hz, we can see that the first subgroup has again much smaller increase in SASI level than the second subgroup (SASI1=-0.188; (delta)SASI1=0.023; p<0.05; SASI2=-0.003;(delta) SASI2=0.094; p<0.05). The results indicate that EMF has stronger effect on frequent mobile phone users. For the whole group the modulation frequency 70Hz had somewhat smaller effect. The SASI value rises still significantly for the second subgroup (SASI2=-0.034;(delta) SASI2=0.063; p<0.05), while the difference from sham level is not significant for the first subgroup (p>0.05). We can conclude that EMF effect at modulation frequency 40Hz is much stronger than at modulation frequency 70Hz. In addition, the stronger effect reveals in the EEG spectrum of more frequent mobile phone users. The results show that EMF can change the balance of EEG powers. Since the increase of SASI values indicates the increased power in the beta band, the results also show that EMF raises the EEG beta power. It is interesting to note that increased beta power is also associated with increased arousal [Binnie,2003]. Can it also change level of consciousness? The SASI becomes even positive for subjects with depressive disorder [Hinrikus.2009]. The mechanisms behind the effects are unclear. Further investigation is needed. **C12**

147 **The illusion of owning a third arm** Arvid Guterstam , Valeria I. Petkova, H Henrik Ehrsson <arvid@guterstam.se> (Department of Neuroscience, PhD student at the Brain, Body and Self Laboratory at Karolinska Institutet, Stockholm, Sweden)

Could it be possible that, in the not-so-distant future, we will be able to re-shape the human body so as to have extra limbs? A third arm helping us out with the weekly shopping in the local grocery store, or an extra artificial limb assisting a paralysed person? Here we report a perceptual illusion in which a rubber right hand, placed beside the real hand in full view of the participant, is perceived as a supernumerary limb belonging to the participant's own body. This effect was supported by questionnaire data in conjunction with physiological evidence obtained from skin conductance responses when physically threatening either the rubber hand or the real one. In four well-controlled experiments, we demonstrate the minimal required conditions for the elicitation of this "supernumerary hand illusion". In the fifth, and final experiment, we show that the illusion reported here is qualitatively different from the traditional rubber hand illusion as it is characterised by less disownership of the real hand and a stronger feeling of having two right hands. These results suggest that the artificial hand 'borrows' some of the multisensory processes that represent the real hand, leading to duplication of touch and ownership of two right arms. This work represents a major advance because it challenges the traditional view of the gross morphology of the human body as a fundamental constraint on what we can come to experience as our physical self, by showing that the body representation can easily be updated to incorporate an additional limb. **C28**

148 **Exposure to low dose irradiation-alleviation of experimental epileptic seizures in experimental post-traumatic epilepsy of rats** Varsha Sharma <varsha.sharma@gmail.com> (School of Life Science, Jawaharlal Nehru University, New Delhi, NCR India)

Whole Body Low Dose Irradiation (LDIRR) less than 1Gy may provide an alternative non invasive therapy for intractable epilepsy. It is an attempt to evaluate the anti-epileptic effects of (LDIRR) in this model. Till date no report is available on the effect of low dose irradiation and its role in the regulation of epileptogenesis on post traumatic epileptic seizures, therefore it is important to know whether LDIRR modulates the seizure susceptibility or not? Iron when injected intracortically, in the form of FeCl3 and FeCl2 induces experimental post-traumatic epilepsy (PTE) in rats. To investigate the effect of LDIRR four groups of rats were prepared. First control group, of the rats with-no saline, no iron, no LDIRR (six rats). Second control group - with saline instead of iron, with LDIRR (six rats) and the third experimental control group- made epileptic by injecting iron ,no LDIR and the fourth experimental treated group made epileptic by injecting iron ,with LDIRR exposure (six rats). LDIRR exposure was given on 3rd day in IInd IVth group of animals, after saline and iron administration intracortically. The changes on antiperoxidative enzymatic activity and lipid peroxidative damage were evaluated overtime in all the groups simultaneously. The results showed that (LDIRR) exposure significantly up-regulated the Superoxide dismutase, Catalase, Glutathione peroxidase and Glutathione S transferase the rate-limiting enzymatic activity in iron-induced PTE in rats group IV, as compared to group III. The (LDIRR), further down-regulated the lipidperoxidative damage in group IV as compared to Group III, indicating that this might be the basic mechanism involved in regulating the epileptogenic activity and this alleviation of epileptic activity is further confirmed by the electroencephalographic cortical activity too. The study indicates that LDIRR therapy may be used as an alternative non invasive antiepileptogenic therapy for human post traumatic epilepsy. **P2**

3. Cognitive Sciences and Psychology

3.1 Attention

149 **Validation studies of the Consciousness Quotient Inventory (CQI)** Ovidiu Brazdau <office@consciousness-quotient.com> (Consciousness Quotient Institute, Bucharest, Romania)

This study reports the validation assessment of the Consciousness Quotient Inventory-CQI (Brazdau, 2008). The CQI is composed of six dimensions of the conscious experience, which form the Consciousness Quotient (CQ): physical, emotional, mental (cognitive), spiritual, social-relational and self-consciousness. This research is the first part of an extensive validation process of the CQI. In this stage, four studies to measure the concurrent validity were developed, using other validated assessment instruments, which measure different psychological constructs.The following validation criteria were used: General Mental Ability (GMA) measured with the General Ability Measure for Adults (GAMA), an IQ test which assesses GMA using reasoning and logic in order to solve problems containing abstract shapes and designs; Emotional Intelligence, measured with the Emotional Quotient Inventory - EQ-I, an empirically developed test designed to measure Emotional Intelligence, based on Reuven Bar-On theory. The CQI relation with personality traits was measured using two different personality questionnaires, in order to cover various areas of personality: California Psychological Inventory (CPI) and NEO Personality Inventory, Revised (NEO PI-R). The participants (N=120) were randomly assigned, aged between 19 and 65 years. The data was analyzed, calculating the correlation and regression coefficient. The results show a significant correlation with some of the criteria and it is concluded that the CQI may serve as a useful measure in psychological assessment. **C6**

150 **Beyond conception: The pivotal role of the deep feminine in the awakening of consciousness** Leanne Whitney <info@leannewhitney.com> (August Moon, Culver City, CA)

Consciousness is. Far from being an epiphenomenal happenstance, it is an inherent property of the Godhead. By Godhead I mean the ALL, both the void and everything that arises from it. What is unable to be perceived through the ego, the seat of our personal

consciousness, we have come to call ‘the unconscious’. This is an adequate term as long as we understand that it is only unconscious to us. ALL is one: there is only one subject, and it isn’t ‘you’ or ‘I’. Because the model of reality under which most of us live is one of separation, we not only see the conscious and unconscious as separate but also our psyche and the material world. Pioneering depth psychologist, Carl Jung once said, ‘If only a world-wide consciousness could arise that all division and fission are due to the splitting of opposites in the psyche, then we should know where to begin’ (1970/1957, pg. 299 [CW10, par. 575]). Additionally, quantum physics reveals that the perceiver and the perceived are one. There is no objective observer. What is out is in. Akin to the Copernican revolution, through the transformation of our personal consciousness, our perception of separation is radically altered. We come to understand that in any moment there is no division between our internal and external world. The material world is symbolic of the psychic. Alone, our masculine way of conceiving and logically ordering our world cannot produce the experience of consciousness. Our analytical and oftentimes compulsive thoughts have led us astray from the body’s foremost language. We no longer listen, interpret, and respond to the subtle communications of psyche. To jumpstart the revolution I am inviting you to join me in this hypothesis: that we are already existing in a unified field of conscious energy where everything is all one. So we are setting up a science experiment to test out that unity is really the reality. Our unique body/mind is our test site, the interface with this truth. The empirical proof does not come through conceptual formulation but through our embodiment, a direct incontrovertible experience of the unified field. Embodiment requires us to move beyond our intersubjective language and to understand more clearly the language between the non-physical and physical worlds. Listening, interpreting, and relating to the non-physical world are the challenges before us. Once they are surmounted the union of the personal self with the Self, the psyche’s archetypal image of wholeness, is attained. This merging brings about the awareness of feelings, intuitions, instincts, and sensations as primary perceptions. In other words, through the excavation of our feminine sensibilities the truth of the hypothesis reveals itself through our being: not our thinking. Our personal consciousness, having been transformed, is then known as a reflecting perceiver for the Godhead. ‘Something’ that has been fully conscious all along. In this paper I will explore the inseparable nature of all phenomena, and how the science of this moment lies in our own internal exploration. **C28**

151 **The influence of craving on attention bias** Shiau-hua Liu , Chih-Ru Liu <shliu@mail.ndhu.edu.tw> (Counseling & Clinical Psychol, National Dong-Hwa University, Hua-Lien, Taiwan)

Understanding “craving” is one of the urgent demands for treating substance abuse. Two primary approaches were proposed for craving studies. One is the explicit assessment, e.g. Self-report, employed to assess consciously voluntary reactions. The other is the implicit measurement adopted to assess spontaneous reactions. Dovidio, Kawakami, and Beach (2001) argued that the advantage of implicit assessment was to predict automatic behaviors out of awareness. In this study, to assess the implicit reactions to the heroin related pictures, probe-dot paradigm was used in both heroin addicted and control group. Fifteen pairs of testing photos, drug related photos with neutral photos, and another fifteen pairs of control photos, with are composed of neutral photos, were intermixed and displayed in 1st and 3rd (or 2nd and 4th) quadrants of the screen, followed by a dot appearing in one of the visual stimuli. Observers are required to press a key as the dot appears by the rule of as fast as possible and as correct as possible. There were 240 trials in total. Reaction time was recorded. Cued condition means the dots appearing in the place of previous drug-related photos appearing; un-cued condition means the dots appearing in one of the places previously displaying two neutral photos. All the procedure of stimulus presentation, timing control, displaying duration, and response recording were executed by E-Prime on PC. The results showed that reaction time to detect the dots was not different significantly between heroin addicted group and control group. Reaction time for dot detection after drug related photos and neutral photos did not differ significantly. We used self-report value of craving survey as a criterion to divide the heroin addicted group into three groups. We found that reaction time of high craving subgroup was significantly slower than that of low craving subgroup. This provided the evidence that craving levels could affect attention bias to probe-dot detection. The related findings will be included to discuss in details. **P3**

152 **Is attentional blink a byproduct of neocortical attractors?** David Silverstein , Anders Lansner <davidsi@nada.kth.se> (Computational Neuroscience, KTH & Stockholm Brain Institute, Karolinska Institutet, Stockholm, Sweden)

This talk proposes a computational model for attentional blink or “blink of the mind”, a phenomenon where a human subject misses perception of a later expected visual pattern as two expected visual patterns are presented less than 500 ms apart. A neocortical patch modeled as an attractor network is stimulated with a sequence of 14 patterns 100 ms apart, two of which are expected targets. Patterns that become active attractors are considered recognized. A neocortical patch is represented as a square matrix of hypercolumns, each containing a set of minicolumns with synaptic connections within and across both minicolumns and hypercolumns. Each minicolumn consists of locally connected layer 2/3 pyramidal cells with interacting basket cells and layer 4 pyramidal cells for input stimulation. All neurons are implemented using the Hodgkin-Huxley multi-compartmental cell formalism and include calcium dynamics, and they interact via saturating and depressing AMPA / NMDA and GABAA synapses. Stored patterns are encoded with global connectivity of minicolumns across hypercolumns and active patterns compete as the result of lateral inhibition in the network. Stored patterns were stimulated over time intervals to create attractor interference measurable with synthetic spike traces. This setup corresponds with item presentations in human visual attentional blink studies. Stored target patterns were depolarized while distractor patterns where hyperpolarized to represent expectation of items in working memory. Additionally, studies on the inhibitory effect of benzodiazopines on attentional blink in human subjects were compared with neocortical simulations where the GABAA receptor conductance and decay time were increased. Simulations showed increases in the attentional blink duration, agreeing with observations in human studies. **C27**

3.2 Vision

153 **The experiential field: A novel approach to representing perceptual experience** John Jupe , Prof. Dr. Robert Pepperell <johnjupe1@gmail.com> (Perceptual Technologies Ltd., Swansea, United Kingdom)

For many centuries we have represented human visual experience by creating pictures that conform to the laws of geometric perspective. Most current technologies for depicting visual reality are based on these laws. Cameras use lenses to focus and fix light rays on a flat plane, which is then read as if it were an accurate record of the scene depicted. So powerful is the effect of this process it has come to dominate our approach to understanding of how visual experience is constructed. Following the example set by artists such as Turner and Cezanne, however, some vision researchers have pointed to the disparity between this optically derived model of vision and the way our actual visual experience structured. Lens-based media neglect the kinds of information that our perceptual systems use to determine how we experience reality. Cameras, for example, blur the information arriving at the lens from outside the focal plane. But Jan Koenderink and Andrea van Doorn (1999) have shown that in human visual perception information is actually disordered in a very particular way rather than blurred, and that this disorder is employed extensively throughout the visual arts to more closely represent actual perceptual experience. In this paper we will outline the case for adopting a new model of visual representation based not on the laws of optics but on the facts of phenomenal experience. Using evidence from art history and vision science, and arguments from phenomenologists such as Merleau-Ponty, we will show how it is possible to build a more meaningful model for visual representation that more closely resembles how we actually perceive the world. We will present examples of working technology that

demonstrate the effects we describe, and offer the model of the 'experiential field' as a basis for new research into consciousness reconciling knowledge from across art, science and philosophy. References: Koenderink. J. & van Doorn A 1999. The Structure of Locally Orderless Images. International Journal of Computer Vision vol 31 pages 159-163. **C16**

3.3 Other sensory modalities

154 **Quantum holography and the enigma of nonlocal interaction** Raymond Bradley, Dana Tomasino <ray.bradley@neurondynamics.com> (Center for Advanced Research, Neuron Dynamics, Appleton, WI)

For mainstream science, intuition--the body's ability to receive and process information from nonlocal sources (things distant or yet to happen)--is, at best, an empirical anomaly belonging to a class of consciousness phenomena that has been especially perplexing and difficult to explain (Walach & Schmidt, 2005). While cognitive approaches view intuition solely as the product of stored memories from prior experience, the principles and concepts of quantum holography, when combined with recent research findings from psychophysiology, offer a more efficacious account of such nonlocal phenomena. Drawing on a summary of recent research on the psychophysiology of nonlocal communication (Bradley, 2010) and the principles of quantum holography (Gabor, 1946; Pribram, 1991), we further develop a theory (Bradley, 2007; Bradley & Tomasino, 2011) that describes how information from nonlocal sources is communicated and perceived by the body's psychophysiological systems to inform intuitive decision and action. In addition, we endeavor to show how the same explanatory principles may be extended to also provide an account of "mind-matter" effects--the scientifically measurable effects of focused mental attention on the behavior of inanimate objects and biological systems. Building on the work of Mitchell (2000) and Marcer and Schempp (1997), the theory describes how information about a future event is spectrally enfolded in the radiation of energy as an implicate order, which exists as a domain apart from space and time. Passionate attention directed to the nonlocal object of interest attunes the bio-emotional energy of the body's psychophysiological systems--via phase conjugate adaptive resonance (Marcer, 1995)--to the quantum level of the object. The energetic resonance between the individual's psychophysiological systems and the nonlocal object of interest establishes a two-way quantum-holographic communication channel between the percipient and the object (Marcer & Mitchell, 2001). The incoming wave field of energy radiating from the object to the percipient contains spectrally encoded, quantum-level information about the object's future potential. The body's perception of such implicit information about the object's future is experienced by the individual as an intuition (Bradley, 2007). Following a review of the extensive body of evidence documenting a scientifically measurable effect of focused mental/emotional intention on the behavior of nonlocal physical and biological systems, we postulate that the same processes of energetic resonance that enable perception of intuitive foreknowledge are also the means by which a passionate intentional focus can affect the object of interest's actualization from future potential into ontological reality--a phenomenon we label nonlocal agency. The outgoing wave field of bio-emotional energy from the individual's body contains a quantum hologram encoding the individual's passionately-held mental intention as energetic information, which is transmitted back through the communication channel to the nonlocal object. Part of the energy wave field containing the quantum hologram is absorbed by the object (Marcer & Schempp, 1997), and the information it contains in-forms--gives shape to--the object's future organization and behavior. **C99**

155 **The landscapes of synesthesia (filling out the definition of synesthesia--it's more than just color)** Patricia Lynne Duffy <plduffy@gmail.com> (United Nations Language and Communications Programme, New York, NY)

The experience of synesthesia (the blending of the senses) is often marked by the perception of colors (synesthetes typically report perceiving colored alphabet letters, colored words, colored numbers, colored musical notes and keys). But a great number of synesthetes also describe a spatial quality to their synesthesia - that is, the experience can provide a sense of 'environment' - or 'landscape' that the synesthete is part of. Writer Vladimir Nabokov, for example, described a field of alphabet letters with color, texture, and dimension; composer Michael Torke describes swimming in the 'color' he experiences for a particular musical key, or being in a 'room' of colored music; Nobel prize-winning physicist Richard Feynman described colored equations 'flying by' and around him as he explained his theories of quantum physics. In her presentation, Patricia Lynne Duffy, author of Blue Cats and Chartreuse Kittens: how synesthetes color their worlds (the first book by a synesthete about synesthesia), will report on the variety of 'synesthesia- landscapes', which both she and synesthetes she's interviewed have described. Duffy will also discuss ideas concerning why such spatial sensations occur - and the benefits such perceptions may offer to the synesthete's creative process, as abstract medium becomes concrete landscape. The landscapes of synesthesia may offer beneficial 'immersion experiences', allowing synesthetes to focus more attentively on their creative work (research shows that synesthetes are perhaps eight times more likely to be in the artistic/creative professions than those in the general population). **C4**

156 **Enacting the body? Use of distal-to-tactile sensory substitution interface does not lead to extension of body image** Tom Froese, Marek McGann; Anil K. Seth <t.froese@gmail.com> (Department of General Systems, The University of Tokyo and the Sackler Centre for Consciousness Science, Tokyo, Japan)

There is a growing amount of evidence in the cognitive sciences documenting a variety of profound personal and sub-personal transformations entailed by practical tool-use (see Maravita and Iriki 2004). In the neurosciences there is well-known evidence that tools can be incorporated into the body schema during usage. For example, distant object manipulation with rakes leads to an extension of the body schema for the arm (Iriki, et al. 1996). In psychology related effects have been observed in terms of the body image and object perception. For example, when sighted subjects had to complete tasks involving the use of elongated tools, and were subsequently blind-folded and then tapped on their arm, they consistently misjudged the position of the tactile sensations as if their arm had become extended during tool-use (Cardenali, et al. 2009). What remains unclear is which aspects of tool-use cause these kinds of transformations. Since no such effects are found in control tasks involving the use of laser pointers, tool-based changes of far space to near space, related to reachability, appear to be important (Longo and Lourenco 2006). But is it the fact that elongated tools enable the subject to perceive at a distance, like a blind person using a cane to perceive what is in front of him? Or does it have to do with the fact that such tools enable us to act at a distance, such as when a rake is used to retrieve an object that is outside of reach or when using knife and fork? Comparisons between elongated tools and laser pointers cannot help us to resolve which of these two aspects are necessary and/or sufficient to account for the observed effects (elongated tools enable both factors simultaneously, while laser pointers enable neither of them). We used a custom-built hand-held sensory substitution device, the Enactive Torch (Froese and Spiers 2007), to investigate this issue. Subjects trained in using this device, which converts distance measurements into tactile vibrations in the hand, readily report a transformation in their perceptual experience that involves the appearance of things "out there" in the world. However, in contrast to the case of using elongated tools, this novel perception at a distance is not accompanied by a change in the possibility for directly acting at a distance. We tested 20 participants with training regimes lasting between 5 minutes to 1 hour, but found no evidence of a transformation in their perceived arm length. This suggests that it is the change in the potential for action, not perception, which is the decisive factor for transformations of the body image. **C28**

157 **Counting and human number sense** Ivan M. Havel <havel@cts.cuni.cz> (Center for Theoretical Study, Charles University, 110 00 Prague 1, Czech Republic)

In 1890 William James listed several 'elementary mental categories' that he postulated as having a natural origin. Among them, alongside the ideas of time and space, he also listed the idea of number. However, a prevailing tendency in contemporary Cognitive Science is less talking about ideas and more about their representations, either in the computer or in the brain (e.g. digits, word numerals, or mental number line). At the same time, empirical studies with humans are mostly concerned with relatively small numbers. Taking up somewhat different perspective I focus on direct phenomenal experience of counts (of either real or imagined entities), and in particular, on the transition from subitizing (perceiving small counts at a glance) to a serial counting procedure (for larger collections); the latter involving a physical or imagined action. I put forth the notion of minimal, pre-reflective inner sense of counts as something non- or pre-arithmetic, innate, already built into the very structure of our experience; but at the same time something that is open to conscious reflection. The number sense (the sense of a count of given entities) is supplemented with another, perhaps originally independent, sense of numerosity. The latter is in play whenever we notice, without any actual counting, that a certain group of entities swells or shrinks in time, or that it appears to be larger or smaller then another group of entities. The sense of numerosity may even embrace the elusive notion of 'non-numbers' pertaining to collections for which various counting procedures may yield different outcomes, or for which no exact counting procedure exists at all. Motivated by well-known cases of autistic numerical savants I put forth some speculative ideas, first, about eidetic imagery of considerably large numbers, and second, about conceivability of non-arithmetic mental number processing (for instance prime number recognition). Certain experimental studies suggest that the capacity for savant numerosity is latent to us all. **C9**

3.4 Memory and learning

3.5 Emotion

158 **Mental health in the East and West: Four Arab countries and the USA** Ahmed Abdel-Khalek <aabdel-khalek@hotmail.com> (Dept. of Psychology, Kuwait University, Kuwait, Kuwait)

Background: Mental health (MH) is fundamental to health. There is no health without mental health. Mental and physical health are not just the absence of negative symptoms and signs, but they must include positive aspects and indicators. Several factors can affect the level of mental health, including nationality. Objectives: To estimate the sex-and country differences in MH among college students from four Arab countries and USA. Methods: Five convenience samples of college students (N=2055) were recruited. They were from Egypt (N=577), Kuwait (N=674), Lebanon (N=207), Oman (N=443), and USA (N=154). They responded to the Arabic Scale of Mental Health (ASMH) in its Arabic version with Arab samples, and in English with USA participants. Both versions have good reliability and validity. Results: Table 1 sets out the results. Inspection of this table indicates that the sex-related differences on MH were statistically significant among Egyptian and Kuwaiti students favoring men. It was found that the high mean scores on MH were among American men and American and Omani women, whereas the low mean scores on MH were among male and female Egyptians. Discussion: Differences in mental health may be affected with individualism (USA; high MH) versus collectivism (three Arab countries, low MH). High per capita income (Kuwait) has an impact on MH (high), whereas the low income country (Egypt) has a low MH mean score. Conclusion: Culture and national income have impact on MH level. Reference: Abdel-Khalek, A. M. (submitted). The development and validation of the Arabic Scale of Mental Health (ASMH). **C6**

3.6 Language

159 The emergence of linguistic consciousness Christina Behme <christina.behme@dal.ca> (Philosophy, Dalhousie, Halifax, NS Canada)

In this paper I offer a new perspective on the emergence of linguistic consciousness during infancy. Jackendoff (2007) observes that most work on consciousness deals 'almost exclusively with visual experience' and suggests that we need in addition to understand linguistic awareness. He proposes that phonological ability - to divide utterances into words and syllables - is at the core of linguistic consciousness. I will show how his account can be supplemented by empirical research on language acquisition. The first steps towards successful speech segmentation are taken long before the child is aware of the meaning of the words or phonemes she segments. Research has shown that newborns can already distinguish phonological relevant features of language (e.g., Moon & Fifer, 2000; Nazzi, Bertoncini & Mehler, 1998) and fine-tune phonological awareness during the first year of life (e.g., Saffran, Werker & Werner, 2006; Shi, & Werker, 2003). I discuss computational models of word segmentation and I propose what I take to be a different perspective on the emergence of linguistic consciousness: that focusing on the step-by-step emergence of semantic consciousness in infancy can offer new and potentially fruitful angles for investigating states of consciousness. My work is concerned with what Chalmers (1996) would call an 'easy' problem of consciousness. Yet, the problem is clearly not an easy one, and solving it may cast light on the so-called 'hard' problem as well. **C17**

160 **A Chalmerian poem: Translating David Chalmers' The Extended Mind Revisited into music** Alexander Jon Graur <graur@medicamus.com> (President, Medicamus Italiana Torino, Pavarolo, TO, Italy)

Music is a language: with a pre-speech, a vocabulary, a grammar, a syntax and the rules governing the phenomenon. During the wonderful presentation David Chalmers held at the 2009 Toward a Science of Consciousness Conference in Hong Kong I was translating in my mind the basic reasoning of Chalmers into Music. At the end (a couple of months after) the result was a symphonic poem for chamber orchestra, divided in four parts. Tairst (Andante moderato-Allegro) is the transposition of Chalmers' exposition of his thesis. (When a part of the external world is hooked up to the cognitive system it becomes part of the mind.) The second part (Andante-Largo-Andante) is an interpretation of the thesis according to Aristotelian logic (categories and syllogism). The third part (Allegro molto) is an interpretation of the thesis according to Goedelian logic. The fourth part (Allegro Finale) is the transposition in Music of Chalmers' conclusion. In this presentation will be shown the basic reasoning in a formal logic language, the music elements involved and, above all, the Music itself: The Chalmerian Poem. **C30**

161 **Lies, theory of mind, and the structure of consciousness** Maxim Stamenov <maxstam@bas.bg> (Institute for Bulgarian Langua, Bulgarian Academy of Sciences, Sofia, Bulgaria)

Only humans lie. Unlike deceiving with one's own behavior which is very well attested in the animal kingdom, lying is mediated by language. It depends on the possibility to say something counterfactual (that is not the case in the real world) and pretend that it is true in order to make the partner(s) believe that this is really the case. For the purposes of their proper implementation lies are dependent on the full-scale human intersubjectivity that exploits the very principle of cooperation of Grice (1975) but not merely a maxim of it, e.g., the maxim of quality. The exploitation in question is supposed to take place at the highest level of the ternary I know that you know that I know something (Schutz 1967; Strawson 1959; Grice 1975) that is enacted for the purposes of misleading one's communicative partner. And the challenge on the receiving side is to find out from the overt verbal behavior of the speaker what is her/his true intention, including the most controversial cases of suspected intentional lies. On the other hand, the possibility of applying recursively predicates

like know for the sake of identification of interpersonal meaning in terms of Theory-of-Mind (ToM) has led the evolutionary anthropologist Robin Dunbar (1998) to claim that we can have not only second-order intentionality (ToM we may share with other species), and not only the next, third-order intentionality, but also 4th and even 5th or 6th order of it: *Peter knows that Jane believes that Mark thinks that Paula wants Jake to suppose that Amelia intends to do something (Dunbar 1998, 188). In this paper I will make the point in agreement with Grice (1975) and contra Dunbar (1998) that the restriction on the possibility of having recursively nested conscious mental states is determined at the interface of (1) ToM, (2) the representational potential of the sentence and (3) the structure of consciousness per se. The analysis of the way an utterance can become identified as a lie will help us prove that the third-order intentionality is the upper limit one can identify during interaction. Higher levels are possible as reconstructions only that are supported by the structure of language but cannot become implemented as intentional mental states. **C17**

3.7 Mental imagery

162 **Olfactory Imagery - Sniffs, Dreams and Memories** Artin Arshamian <artin.arshamian@psychology.su.se> (Psychology, Stockholm University, Stockholm, Sweden)

The evidence for the ability to form mental images without any physical stimuli are convincing in vision (Farah 1989; Kosslyn et al. 2001; Richardson 1999), audition (Halpern and Zatorre 1999; Zatorre and Halpern 1993), and in the motor systems (Jeannerod 1995; Jeannerod and Frak 1999). Although some researchers have suggested that humans are unable to form olfactory images (Crowder and Schab 1995; Engen 1991; Herz 2000), support for olfactory imagery is available from different sources such as volitional imagery (Djordjevic et al. 2004), dreams (Stevenson and Case 2005), and hallucinations. (Acharya et al. 1998). Research suggests a neuroanatomical overlap between perceptual processing and mental evocation across the visual, auditory, and motor modalities (see Kosslyn et al. 2001 for a review). Djordjevic et al. (2005) investigated olfactory imagery using positron emission tomography and found that brain areas activated under olfactory perceptual processing also were activated during olfactory imagery. Recently Bensafi et al. (2003, 2007) showed that sniffing might affect the evocation and quality of olfactory images. Furthermore, preliminary fMRI experiments show that autobiographical odor memories could function as an indirect source to measure olfactory imagery. The areas activated during autobiographical odor memories is a combination of areas activated during general autobiographical memory and olfactory imagery. **C27**

163 **Mental imagery and the method of loci** Sara Bizarro <sarabizarro@yahoo.com> (Lisbon University, Lisboa, Portugal)

There is a long debate in cognitive science regarding the nature of mental imagery. Is mental imagery depictive or can we understand reports of mental imagery as descriptive and propositional? (Kosslyn vs. Pylyshyn). The depictive understanding of mental imagery is sometimes presented appealing to rotation and scanning experiments, but the propositional understanding of these tasks argues that they are simulated using tacit propositional knowledge rather than pure pictorial knowledge. There are other examples, like memorizing chess positions that seem pictorial but can be shown to rely on propositional knowledge. In this paper I want to look at a traditional mnemonic method that seems to use apparently depictive mental imagery in order to facilitate recall of certain information that could itself be propositional: the method of loci. I will argue that the efficacy of the mnemonic method of loci can indicate that: 1) we have the ability of creating spatial representations and 2) it is easier for us to memorize something, even if it is propositional, when we engage in spatial and propositional imagery simultaneously. If all imagery is propositional then what is happening in our minds when we use a method such as the method of loci and why is it easier to memorize things using the method of loci than using purely propositional iterations? **C38**

164 **Mind wandering, happiness, and human spirituality** Charles Whitehead <drcwhitehead@aol.com> (Socialmirrors.org, London, United Kingdom)

A recent study reports:"A human mind is a wandering mind, and a wandering mind is an unhappy mind. The ability to think about what is not happening is a cognitive achievement that comes at an emotional cost." The authors note that the ability to stop mind wandering and live in the present moment, according to numerous spiritual traditions, is the key to happiness. However, there are three important issues that these authors do not emphasize: (1) Mind wandering is dominated by virtual-reality social scenarios (mental theatre) in which "toy people" are able to act autonomously; (2) here-and-now spiritual experiences tend to occur in anti-structural situations; and (3) both mental theatre and anti-structural experiences appear to have a common origin in human playfulness. A further point may be added: (4) anthropological data suggests that spirituality is a "third force" affecting human behaviour: that is, a factor which is neither of cultural nor biological origin. The significance of these issues for human happiness and understanding consciousness will be discussed. **C38**

3.8 Implicit and explicit processes

165 **Implicit self-esteem in borderline personality and depersonalization disorder** Heather A. Berlin , Alexis N. Hedrick <heather.berlin@mssm.edu> (Department of Psychiatry, Mt. Sinai School of Medicine, New York, NY)

Self-identity is disrupted in people with borderline personality disorder (BPD) and depersonalization disorder (DPD), fluctuating with sudden shifts in affect in BPD and experienced as detached in DPD. Measures of self-esteem may highlight how such disruptions of self-concept differentially affect these two populations. Furthermore, implicit measures of self-esteem may capture underlying differences in self-esteem more accurately than explicit measures, which are limited by patients? capability of introspection and their susceptibility to presentation biases. Therefore, we examined implicit self-esteem using the Implicit Association Task, along with measures of emotion, behavior, and temperament, in BPD (n=18), DPD (n=18), and healthy control (N=35) participants. DPD participants had significantly higher implicit self-esteem and were more harm avoidant than BPD and control participants, while BPD participants had more frontal behavior dysfunction and impulsivity and less self-directedness and cooperativeness than DPD participants and controls. Both BPD and DPD participants had more emotional irregularities than controls. Thus, while BPD and DPD commonly overlap in terms of dissociative symptoms, emotional irregularities, and history of trauma, differences in self-esteem, behavior, and temperament can help identify where they diverge in terms of their cognition, behavior, and ultimately underlying neurobiology. Neuroimaging should be used in future studies to examine the neural basis of implicit self-esteem and self-identity in these populations. **C6**

3.9 Unconscious/conscious processes

166 **An integrated theory of consciousness** Jhone Moore <jhonemoore@gmail.com> (Consciousness and Energy Healing, Schaumburg, IL)

We are aware of the presence of consciousness in sentient being. But unless we understand the theory of consciousness in insentient being, we cannot understand consciousness in full. We need to understand the theory of cosmic consciousness and individual consciousness. This paper discussed in details the relation between individual consciousness, cosmic consciousness, sentient consciousness and insentient consciousness. **P2**

167 **Consciousness, mind, life - Spandrels of evolving correlate of language. Hand held metal mirrors rendered the ritual lithography encountered in standing stone mirrors, plastic. NewSciLet 99-2011** Peter Reynolds <reflectogenesis@hotmail.co.uk> (Reflectogenesis.com, Runcorn, Cheshire United Kingdom)

Last year I posed useful hand held mirrors of the age of metal UHM 'blow' vitally addictive constructive inter and self-sensory feedback bearing new synesthetic & mirror neurosystems, complex none-prairie dog language, writing & monotheism - superposing the perspectives of individual senses upon optical axes of reflection, defining a vanishing point and a window for a Self perspective within an Addictive Infectious Tensegrally Self Focused Neural Nietzschean Perspectivism, A Bubble of consciousness (life). This rapid evolving reward led autofocusing language, imprinting,leaving 'gaps' in ancient 'specially lithographed' brain structure, defining its own 'Explanatory 'Gap''; the evolving language unable to access its own Spandrels. This 'Reflectogenesis' also seen directly on Youtube when monkeys given UHM, judged by their orgasmic mesolimbic reactions had never seen their 'Self', borne, 'In the Zone', the 'moment'; rather than delocalised implicitly, through the eyes of their troop, despite generations reflected in water - (the bubble left stuck on the surface). In contrast, 'thought' has been posed in ancient Ice Age art. Nick Humphrey rather these artists not 'think' but behave as a speechless autistic savant, Nadia. I think this a stretch mistaking Autism for deafness citing H.G Wells legend of 'The Country of the Blind', blind people isolated by natural events adapted through evolution of remnant senses, cave artists individuating by the ability to support the deaf & blind. Super volcanism would see off megafauna, Neanderthal and cause these disabilities. Recent works support Wells and as these disabilities drew support some hominid offspring would be fully sensate whilst also retain synesthetic derived abilities (a blind, deaf homunculus) which could only have evolved in parents insensate of light or sound , evidence primary traits of the cultural explosion 40,000 years BP; parietal art with perspective, movement and spatial acuity not appearing again until the Greeks: Venus figurines also; most of which had no eyes - thus I now pose most simply - carved by the 'blind' - previously unrelated musical flutes and finer tools, all of which would have originated in synesthetic synergism between the enhanced sense of space and movement in/between the remnant senses of the deaf & blind in tune with Common Coding' reward led constructive feedback from parietal echoes of dextral efferents perhaps mediated by natural stimulants and harmonising music.The brains' of the blind/deaf wouldexperience the new stable environment of virgin caves as newly discovered internal parieta, vacant of their missing sense. Thus instantiated as their and the species' own homunculi or 'self', reaching out synesthetically and ritually to impregnate these deep core special walls believing themselves to have found a deeper burial site for fearful special memories. Simultaneously gestating, carving their own 'visible' infant homunculi- the Soul of the species (initially unwittingly 'unearthing' a suppressed special history 'book', including deeply suppressed impressions of their predators, from a time when their ancestors roamed a desertified Africa, selflessly delocalised in their troop to resist anxiety). Delivered reborn with figurative paternal souls, an animated bible of creation and an umbilical portal linked by an addictive bubble to the brane of Aboriginal DreamTime for 40millenia,'Our New Age'. **P3**

168 **The art of conscious tunnelng through the microtubules of the mind** Fiammetta Rubin <rubinartstudios@aol.com> (Naturopathic Educational Services, Philadelphia, PA)

This paper focuses on the invisible demarcations between art and science through alternative methodologies of scientific inquiry. As a visual artist (See rubinartstudios.com), I access 'mind' images from all levels of consciousness and translate them into physically accessible symbols for ordinary 'reality'. As a scientist, I cognitively analyze the 'thought-emotion' processes implied in creating 'ordinary symbolic reality' and 'anomalous' reality' through the use of various approaches. I have tested these processes in my lab and through my personal experience and have arrived to a workable explanation as to how mind-emotion, body-mind and mind to mind communication is achieved, Hypnosis, Vega Testing, Kirlian Photography. Dark Field live cell microscopy provided documentation for it. I correlate this

research not only with my personal experience on psychics and schizophrenics (Hahnemann Hospital, Philadelphia, PA, 1985)), but with observations on my own consciousness, mind-emotion connections, personal experience with PK, clairvoyance and holographic resonance with events from a very distant past, previously unknown to me. In the latter instances, I, the 'subject' become also the 'object' of inquiry. My own Mind-Brain appears to be capable (See Harte Center for Hypnosis), to dissociate at will, and observe unemotionally the self-induced trance state experiences, while being also part of them. This capacity may be due to genetics, as it is with Alex Orbito, a psychic surgeon I knew, or due to synchronicities merging from archetypal energies, as Jung, Paoli, Davis etc. have explored. It is my artist's 'hunch', as a dowser involved with neuro-muscular responses that EM Fields within the brain and every cell in our bodies serve as transmitters and receivers of data from anywhere! In this paper, various examples of PK, clairvoyance, 'resonance' from the past shall be discussed in relation to synchronicity and the subject's exercise of personal WILL at the time of perceptive generation of these 'qualia'. **C30**

169 **Alcohol increases hypnotic susceptibility** Rebecca Semmens-Wheeler , Zoltan Dienes Theodora Duka <r.semmens-wheeler@sussex.ac.uk> (School of Psychology, University of Sussex, Brighton, East Sussex United Kingdom)

Neuro-cognitive theories of hypnosis suggest that for hypnotic experience to occur frontal lobe activity must, at some point, be attenuated (e.g. Bowers, 1990; Gruzelier, 1998). Cold control theory (Dienes and Perner, 2007) further posits that inaccurate higher order thoughts (HOTs) about first order intentions may be responsible for the experience of involuntariness and/or subjective reality of suggestions in hypnosis. A candidate brain region for the production of accurate higher-order states is in the frontal lobes, and comes from an fMRI study, which demonstrated that the mid-dorso-lateral prefrontal cortex (DLPFC)was responsible for producing accurate conscious perceptions (Lau and Passingham, 2006). In this study, we administered 8mg/kg of alcohol or a placebo drink, to 32 medium susceptible participants. They were subsequently hypnotised and given 8 hypnotic suggestions. All participants believed they had received alcohol, regardless of the condition they were in. Participants in the alcohol condition were more susceptible to hypnotic suggestions than participants in the placebo condition. This finding supports the idea that impaired frontal lobe activity is necessary for hypnotic responding. This could result from impairment in the DLPFC leading to an absence of or reduction in accurate HOTs. **C33**

170 **Accessing Information Normally Beyond Conscious Awareness by Non-Invasive Brain Stimulation: Opening the Doors to Perception and Memory?** Allan Snyder <allan@centreforthemind.com> (Centre for the Mind at the University of Sydney, University of Sydney, NSW Australia)

We confront the challenging problem of how to artificially induce a less filtered view of the world by accessing information that normally lies beyond our conscious awareness--lower level, less processed information. Our perceptions, memory, and decisions are based on filtered information. We view the world top down though concepts (mental templates) which are built up from our past experience. These concepts are crucially important to our survival. They enable us to make rapid predictions about what is most likely, based on only partial information. We are able to rapidly identify the whole without being conscious of its parts. But, this strategy leaves us susceptible to certain kinds of perceptual and cognitive errors - from visual illusions to false memories and prejudice - and it makes us inclined to connect the dots in ways that are familiar, rather than to explore novel interpretations. In other words our observations of the world are strongly shaped by our preconceptions. What if we could temporarily inhibit top-down processing and access a level of perception normally hidden from conscious awareness? Might we achieve a more literal interpretation of the world, one less shaped by our preconceptions? This would have fundamental and practical implications. To approach this, my lab takes its inspiration from people with certain kinds of brain dysfunction, those involving left-hemisphere impairment together with right hemisphere compensation. Such individuals often exhibit a less conceptual, more literal

cognitive style. Accordingly, we use non-invasive brain stimulation (rTMS or tDCS) to inhibit the left anterior temporal lobe - an area associated with conceptual processing, labels and categories - in healthy normal participants. The objective is to temporally induce a more literal, less filtered, less assumption-driven cognitive style. Using this protocol, we have observed improvements in memory and numerosity estimation, enhancements to creativity through a reduction in mental fixation, and a reduction in certain forms of prejudice. What other cognitive processes might be improved by artificially going uphill against our intrinsic top down design? **PL4**

171 **Psyche as a complex adaptive system: Analytical (Jungian) psychology and complexity theory** Milena Sotirova-Kohli , David H. Rosen, Patti Henderson <milena.s.kohli@gmail.com> (C.G. Jung Institute - Zuerich, 3095 Spiegel B. Bern, Switzerland)

The developments of chaos theory and non-linear science in the last decades attract the attention of an ever-growing number of Jungian analysts. Jungian analysts such as Helene Shulman, David Tresan, Patricia Skar, Jean Knox, Joseph Cambray, Margaret Wilkinson, George Hogenson, Maxson McDowell, J. R. Van Eenwyk and others have pointed out the striking parallels between the theory of C. G. Jung and the field of complexity theory. Among the most studied phenomena in analytical psychology, from this point of view, are the theory of the archetype and the collective unconscious, where the archetype is viewed as a strange attractor, the phenomena of synchronicity and the transcendent function studied in terms of emergence, and the analytic relationship between analyst and client. In this presentation we would like to outline the current existing arguments for explaining the archetype, synchronicity, the transcendent function and the interaction between analyst-client in terms of non-linear dynamics and to further propose how non-linear dynamics applies also to the development of the individual over lifetime in the process called by C. G. Jung - individuation, which is characterized by constant integration of parts of the personality and differentiation and expansion of consciousness towards wholeness. We would like to look at this process as the process of life of the psyche as an open, self-regulating system with particular interactions between genotype, environment and the individual going through moments of emergence and bifurcating towards a set of attractors characteristic for the system which in terms of analytical psychology would be called archetypes. We would like to propose considering the quality of the archetype as an attractor taking into consideration its multimodal characteristics as a bio-, psycho-, social factor in psychic life and present some evidence for its function. We would also like to link the theory of the archetype as an attractor in the process of existence of the psyche as a complex adaptive system to the theory of the embodied condition/ image schema and current findings in neuroscience trying in this way to demonstrate its role in bringing together different layers of existence and functioning of the psyche as a system - biological (genotype), physiological (neuronal functioning), psychic (imagination, creativity, behaviour) and social (interpersonal and cultural interactions). Finally we would like to point out that looking at psyche as a self-regulating, multilayered system whose characteristic patterns of behaviour/ strange attractors have the nature of what analytical psychology calls archetype can give new impetus for research into the nature of consciousness and the relationship between personal experience and biology. **C22**

172 **Substituting “here and now” - Using virtual reality technology** Keisuke Suzuki, Sohei Wakisaka; Naotaka Fujii <ksk@brain.riken.jp> (Laboratory for Adaptive Intell, Riken, Brain Science Institute, Saitama, Japan)

Virtual reality technologies have become new tools for understanding consciousness by observing behaviors in virtual environments once accepted by users as indistinguishable from the real environment. Unfortunately, current virtual reality techniques have not reached the level at which users inevitably accept them as “real” experiences. On the other hand, increasing evidence in human cognitive systems has shown that we do not always require all the physical stimuli in order to perceive an experience as real. In case of dreaming, we actually feel present despite perceiving no actual stimuli. One major difference between experiences in a virtual environment and in dreams is whether or not we will suspect our

experience may be fake. This leads to the question of how we can create a virtual environment which users will not suspect as fake. Here, we propose a novel VR system that replaces reality itself, in which people believe that they experience present world. The system provides smooth switching from a live scene to recorded scenes, keeping natural visuo-motor coupling in a vision of head-mounted display (HMD). Using the system, people believe that they are in the “here and now” even when they are in prerecorded scenes. We let 12 naive subjects experience the system. A scene in which subjects themselves entered a room was recorded in advance, and we switched their visions from live to the recorded scene without telling them. Only one subject realized that we had switched from the live scene to a recorded scene, while every subject realized they were viewing a recording upon seeing their own image. These results indicate that a situation with an apparent contradiction (e.g. doppelganger) indeed “disenchants” participants from the fake presence. However, without these contradictions, it is difficult to notice that the scene has been replaced by something fake. The system can be a test bed for understanding how belief in reality, with a strong feeling of presence, can change our perceptual and cognitive experiences. It may shed light on possible mechanisms whereby our coherent consciousness is organized from small fragments of experiences. **C30**

173 **The mental impasse (total absence of thoughts) and its relation to the dilation of individual consciousness as result of spiritual awakening** Liliana Lorna Villanueva <lorna@lilianalorna.com> (Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Guadalajara,, Jal. Mexico)

When thoughts stop flowing and there was absolute silence in the mind, the individual consciousness dilates to the point of experiencing a continuous “here and now”, where it seems that all events occur outside of linear time into a continuous flow. From my own experience, the state of inner peace, harmony, joy and total love that is experienced, positions us as the “impartial observer” who only observes, without analysis, trial or argument, who simply “knows the truth.” My intellectual training as a mathematician and theoretical physicist hampered for many years that I learn to “let me flow” and thus find and “live” responses to the questions: Who am I? Why am I here? What is consciousness? Consciousness is manifested through the rational mind? The reality is what my physical senses perceive? What is the Universe? Is there a fuller and deeper reality that contains a physical reality? We all share one common consciousness? How to interpret consciousness and the physical and spiritual reality in quantum terms? When the intellectual mind looking for answers, finds a partial, when we quiet the mind and stopped to ask, allowing it to get total silence, then we dive into the ultimate experience of BEING, and all questions cease to have meaning, giving way to a deep, clear and transparent knowledge through the experience of spiritual awakening. Speaking of awareness means talking of levels deep respect “with how much I identify myself.” Using a simple mathematical analogy, if we consider the universe and ourselves as multidimensional, the search for answers only through the rational mind, would lead us to have a partial perception, limiting ourselves to focus on the study and observation of the surface level which we have identified (eg if I identify with my physical reality, then analyze from a physical (rational) point of view). **P3**

3.10 Sleep and dreaming

3.11 Cognitive development

174 **The oscillatory nature of embodied cognition** Shanti Ganesh , Ganesh, S; Cross, E. S. <s.ganesh@bsi.ru.nl> (Donders Institute for Brain, C, Radboud University Nijmegen, Nijmegen, Gelderland Netherlands)

A growing body of research establishes empirical evidence that our metaphorical use of the human body’s relation to Earth, gravity and movement is perceptually and cognitively grounded in our physical experience with our own bodies. For example, a recent study

showed that when participants carried heavy objects, they judged abstract topics as more important than when they carried lighter objects (Jostmann, Lakens, & Schubert, 2009). We literally do not take important topics lightly. Similarly, another study found that walking backwards improved cognitive performance in participants compared to walking forward while doing the same task (Koch, Holland, Hengstler, & van Knippenberg, 2009). Thus, taking a step back enables a broader perspective. Findings from these and other studies support the notion endorsed by proponents of the embodied cognition point of view in philosophy and the cognitive sciences. This view contends that the nature of the human mind is largely determined by the shape and affordances of the body. Parallel to the empirical development of the embodied cognition paradigm, a polarization of metaphorical terms to describe constructs of psychology and embodied cognition is emerging. Terms including approach-avoidance, introversion-extraversion, and in-group-out-group have become mainstream in psychology. In day-to-day human language, we also use polarized dyads such as "feeling up" and "feeling down" to distinguish between mental states. Implicitly, a normative bias exists towards one of the members of the dyad. Positive biases exist for approach, extraversion, up and in-group. To avoid, be introverted, down, or an out-group member is intuitively associated with negative valence. We believe that this normative bias towards one of the dyads may foster rigidity in conceptual thinking about embodied cognition and to counter this, we propose a new, dynamic framework. The aim of this paper is to explore this new framework by investigating the oscillatory nature of human embodied cognition. In relation to the up-down metaphor, being up is associated with positive valence. However, being too high may result in derealisation and depersonalization symptoms. Likewise, being down is associated with negative moods and depression. Severe depression can also yield symptoms of derealisation and depersonalization. In bipolar disorders, for example, patients oscillate with high frequencies and high amplitudes between feeling elated and feeling severely depressed. A hypothesis begins to emerge that human cognition naturally oscillates between the poles of various 'spatial' dimensions (e.g. internal-external, up-down). A stable personality may be associated with optimal frequencies and amplitudes between these oscillations per dimension. Given the hypothesized oscillatory nature of human cognition and regenerative benefits of contemplative solitude, a fine balance must be found between being up and down, introversion and extraversion, and approach and avoidance behavior. It is up to the empirical sciences to investigate the neurocognitive and behavioral processes associated with optimal oscillations. In this paper, we present a first conceptualization of a theoretical framework that can inform the empirical sciences to further investigate the oscillatory nature of human embodied cognition. **C34**

3.12 Artificial intelligence & robotics

175 **Learning how an object functions by experimentation** Anders Tunevi <anders@anderstunevi.se> (Stockholm, Sweden)

This project is about an agent that learns how an object functions by experimentation. He works in a micro world where there exists an object simulated by a forward chaining mechanism applied on rules. The agent consists of three algorithms working in three phases: 1.Experimenting and saving experiences in traces, 2. transforming the traces into examples, 3. learning rules from examples (similar to AQ15). The agent is able to handle objects with certain properties. Three different methods of generating different sets of rules have been tested. The methods use different versions of algorithm 2 and 3. The rules that were used to simulate the object were replaced with the rule sets that were learned by the agent. The object showed the same behaviour as the object with the initial rule set independently of which set of rules that were chosen. In order to evaluate the three methods the following two criterias have been used: memory used and usefulness. **C18**

3.13 Neural networks and connectionism

176 **Geometric Synesthesia** Jason Padgett <jasonquantum1@yahoo.com> (Seattle, WA)

In 2002 I received a head injury during a strong arm robbery in Tacoma,WA. In most cases, a person with a head injury ends up with some sort of neurological deficit. In my case, it is theorized that one part of my brain compensated for the injured part by making more neural connections. The part of my brain that analyzes shapes was profoundly affected. Shortly after the injury everything I see lacks the smoothness that it had before the injury. Patterns that I had never noticed before now seem painfully obvious. I had no real mathematics background except very basic algebra and I had very little understanding of geometry. After my injury, I found that I could see and understand patterns in geometry that are everywhere in nature and indeed in all things. I started trying to draw what I was seeing and found to my surprise that I could draw it. The first drawing I made was of the number Pi. Unfortunately, at the time all I could do was draw it. I had no way to prove it definitively. After meeting a physicist by happenstance I was convince by him to go back to school and start learning traditional mathematics. It was when I was in trigonometry that I was first able to write a function for Pi that described what I was seeing. Since then my description of how it applies to mathematics and physics has been greatly refined. I will explain where the error is in how Pi is calculated and how to correct for it. Additionally, I will show how all shapes can be reduced into a derivative of this one equation, geometrically. In other words, how Pi can be used to describe all shapes, angles and slopes exactly, with no error except for uncertainty which is inherent in all things. I will be discussing what it is like to see the world from the geometric viewpoint of a person with Synesthesia, what I see and will explain how it relates directly to traditional mathematics and physics. I will make a particular emphasis on the pure geometry and mathematics of Pi and how it relates to all geometric shapes and derivatives. There are unlimited practical applications for the use of this new understanding of Pi, i.e. More accurate measurements, which are most important when applied to the Quantum (or very small) and all angle. Show how this can be used to eliminate the error in angles that add up over long distances. (show how we can send rovers/probes more accurately over long distances, ie a probe to Mars etc.). **C4**

3.14 Cognitive architectures

3.15 Ethology

3.16 Self-consciousness and metacognition

177 **Hemisphere - Discovering the benefits of consciousness expansion** Naama Kostiner <nishla40@hotmail.com> (Haifa, Israel)

Light travels between the earth's hemispheres, changing night into day. The electrical activity along the human brain expresses itself in a similar notion, as firing neurons activate and light up several areas of the brain, while others stay dark and inactive. Neurological research indicates that human's tremendous brainpower, even operating bellow full potential results not just from biochemistry but also from the brain's ability to function as a holographic data storage and retrieval system that employs different light angles to read information.The concept of light as information is an old one that for centuries has found expression in various types of sacred teachings. The ancient Toltecs of Mexico describe light as energy and/or information moving throughout the universe. Men were perceived as vessels, carriers of light, who can train themselves to extend the boundaries of their consciousness and by doing that, increase the amount of energy running in their personal space improving their awareness and well-being. Einstein once remarked, "We have been all wrong. What we have called matter is energy, whose vibration has been so lowered as to be perceptible to the senses. There is no matter." The notion that everything is energy or consciousness directly

applies to human biology. The materialistic view of the body as a machine that may run on energy but is somehow distinguishable from it is fast giving way to a notion that we too, at our most fundamental level, are manifestations of conscious energy. Starting with this observation and by gaining the necessary knowledge we can learn to use our consciousness towards greater potential and manifestation of our will. People live their lives following certain patterns of learned thoughts and behavior. One may seek to broaden his vision and break trends that have, over time, become obstacles in the way of achieving goals. Meditation techniques expand awareness and establish self assurance, profound inner peace and stability that provide ultimately to a sense of completion. This expansion seems to occur in both the outer and inner dimensions of being and as a result one becomes more physically, mentally, emotionally, and spiritually awake. To the extent individuals are willing to acknowledge and consciously integrate such profound experiences; their lives may radically change in positive, productive directions. By expanding consciousness with these techniques, awareness focuses on the present moment and concrete reality is experienced unfiltered by complexes and past preferences. This practice conveys a dialogue between ancient Toltec techniques of meditation, aimed at quieting the mind and expanding conscious awareness to energy, and modern approaches from the fields of psychology and personal development. The merger of these two fields enables participants to exploit energy, while focusing on their inner strengths, expanding their mindset to a broader expression of well-being. **C36**

178 **The oneness of reality** Ruggero Rapparini <workingbrain@yahoo.com> (www.quantumbionet.org, Winkel, Netherlands)

The brain is the only piece of evidence from which consciousness and the associated image of reality can be derived through perception and introspection. It is the aim of this paper to attempt to bring about a radical change of perspective in conscious cognition by establishing a simple theoretical paradigm based on the observation that: “the observer (the brain) is part of the physical world (the observed) whose representation (qualia) as generated by the brain, include the representation of the brain itself”. We come here for the first time across the concept of qualia as the neurophenomenological representation of the physical world: on the one hand it solves the riddle of how the perceiver can perceive himself, from within, but in so doing it introduces its own transformation into the neurophysiological perception, the introspective qualia, of the brain’s neural processes. The self-conscious mind, the feeling of the self, is the introspective quale of the brain’s neural processes. Knowledge is thus transferred from the perceived neurophenomenological representations of our in-the-world-ness (sensory perception, somatic sensation, psychic awareness), qualia, to the neurophysiological perception of neural processes, introspective qualia, that we experience in the wholeness of conscious cognition. Qualia are a Cartesian tool that looks at reality from “without” resulting in its interpretation in terms of Cartesian dualism (mind and body) and cannot therefore solve the mind/body problem, Chalmers” “hard problem”. Introspective qualia look at reality from “within” and explain the relationship between mind and brain in its wholeness doing away with the artificial splitting between the conscious mind (psyche and nous) and the material body (soma). Introspective qualia establish the ontology of first-person experience being relived as a third-person sensation through introspection. This mentalistic view is rooted in a physical fact, that the mind is what the brain “feels”. Matter and psyche are two aspects of one reality: conscious cognition, the one and only reality of which we are aware. The mind and its perception are one and the same thing. A simple model shows how introspective qualia explain the identity of brain states and mental states: computational neuroscience alone will not suffice to explain all psychologically described phenomena however it seems legitimate to ask oneself what kind of a computing machine our brain is likely to compare with in view of what has been said. What present day computers do is perceiving: they have a memory, they can remember; but they have no insight in the remembrance and therefore they cannot introspect. They do not have qualia in the usual meaning of the word but they might have introspective qualia if a computing machine could perform a metacomputation (introspection equivalent in conscious cognition) to detect its own “circuitry works” (neural processes equivalent). Because a computer is a human creation, knowing what it is

to be a computer is the same as knowing how our brain works. In other words, what is it like to be a computer? **P3**

179 **Religiosity and alterations of consciousness related to aging and longevity, and their genetic correlates** Dimitri Spivak , A. Zakharchuk; T.Smirnova; G.Yakupova; V.Kupriyanova; I.Spivak <d.spivak@mail.ru> (Human Brain Institute, Russian Academy of Sciences, Saint Petersburg, Russian Federation)

A group of 154 practically healthy persons, Russian-speaking urban dwellers, belonging to a number of age levels, ranging from old age to longevity (79+/-16 years, m=76.5), was observed, basing upon the facilities of municipal Gerontological Medico-Social Center of the city of Saint Petersburg, Russia. Inventory of psychological questionnaires was applied, including the measurement of the levels of neuroticization, psychological activation, psychological defense mechanisms, creativity, intrinsic religiosity (INSPIRIT by J.Kass et al.), and of altered states of consciousness (F-ASC by D.Spivak et al.). Simultaneously blood samples were taken, analyzed further by means of standard genetic methods. As a result of processing the data obtained by means of standard statistical (factor) analysis, the following main results were obtained: 1. Age tends to be positively correlated to very few of the indices applied, whereof primarily to (a) the level of the intrinsic religious orientations and attitudes, and to (b) a peculiar polymorphism of 5HT2A gene of serotonin receptor (i.e. frequency of the A2 allele). As a result, (a) a strong tendency linking the disposition towards religiosity with active longevity was demonstrated, as well as (b) existence of a peculiar hereditary mechanism, most probably supporting it on the level of the serotonin system; 2. No direct correlation between the intrinsic religiosity, alterations of consciousness, and creativity was revealed: in fact, each of them tended to form a factor of its own. As a result, these three types of processes tend to represent three different, independent dimensions of inner life, rather than merge into a single ‘spiritual dimension’; 3. However some stable links of the aforementioned three psychological processes with other ones were revealed, e.g. level of alterations of consciousness tended to be positively linked to the degree of tensity of the psychological defense mechanisms (negation, exclusion, regression, compensation, projection, substitution, intellectualization, reactive formation), forming in this way kind of a ‘supplementary defense mechanism’, most probably involved into counteracting the age stress. This study was supported by grant 09-06-00012 of the Russian Foundation for Basic Research, and by a grant issued by the Presidium of the Russian Academy of Sciences, as part of its Program of Basic Research ‘Basic Sciences for Medicine’. D. Spivak Human Brain Institute, Russian Academy of Sciences St.Petersburg Branch, Russian Institute for Cultural Studies **C21**

3.17 Temporal consciousness

180 **Chronotop consciousness versus time consciousness: Kinetographic approach** Olga Maksakova , Lukianov Valeriy; Maksakov Vsevolod <omaksakova46@mail.ru> (Neurorehabilitation, Burdenko Neurosurgical Institute, Moscow, Russian Federation)

After Husserl the subjective experience of time is considered as a fundamental constituent of human consciousness. Essential compliance of consciousness features with its description is possible only in terms of consciousness temporality. According to numerous neuroscientific investigations it can be disturbed under conditions of mental disorders Along with these ideas in Bakhtin’s language paradigm the distinctiveness of chronotopic analysis, in comparison to most other uses of time and space, stems from the fact neither time nor space is privileged, they are utterly interdependent and they should be studied in certain manner. Further inquiry in the field calls for special experimental conditions that make possible to compare personal time perception in different state among different people. We use “Mental time travel” (MTT) as test mode. MTT phenomenon appears when an individual images himself in past or future with wishes and motives that are independent of the present motivational state. It comes into being at age of 3-4 year and disturbs after brain damages. Human ability to travel mentally in time constitutes a discontinuity between humans and higher

primates. There is idea of MTT ability to be a demarcation line between humans and subhuman primates. It may be considered as important feature of consciousness. Some recent publications analyze MTT brain activity patterns using functional MRI and EEG. In assuming internal mind-body unity we had worked out original kinetographic method for assessing human functional state. Tooling backup is sitting version of stabilography (sensory chair). Recorded signal (shift of total center of pressure - TCP) is considered as an output of complex half-open biomechanical system responding to numerous external and internal stimuli. The obtained data are analyzed in terms of theory of non-linear complex systems. Measuring of integral mechanical signal of human body allows to record changes of functional state (FS) during any cognitive or manual tasks. Kinetographic approach describes current subject's FS in terms of energy, entropy, and stability of TCP in 3-dimension space. The spectral analysis of energy lets to show up meaningful phases of the personal time. Comparison of healthy volunteers (17 persons, 23-59 years old) and patients in different periods after BI (21 persons, 19-65 years old, coma or VS from 3 days till 3 months) was carried down according to complex system characteristics during MTT. Part of patients passed the MTT-test with kinetography twice or more. 10 patients were confused or in Posttraumatic Korsakoff syndrome during the first testing. Kinetographic data of MTT test in healthy volunteers in different functional state coupled with facts of severe brain-injured patients' rehabilitation process confirms idea of chronotopic consciousness. Consideration of event as the chronotopic unit makes it possible to find true treatment interventions for patients in altered state of consciousness. **C11**

181 **Functional mechanisms underlying the perception of subjective time flow** Mario Martinez Saito <selcotsira@hotmail.com> (Tokyo, Japan)

As time passes by, we continuously store new events in memory that are typically tagged with an informative label indicating an approximate position on an abstract, mental, one-dimensional space representing time. What is this abstract concept which bears a reality which, although indisputable as an inherent property of our mental lives, cannot be perceived in the external physical world otherwise than through indirect measures and unsound inferences? A careful examination of the standard definitions and methods used in physics to measure time reveals that the time itself does not participate of the world as an independently existing entity. Nonetheless, the consistency and pervasiveness of the subjective flow of time in our mental lives is an undeniable fact. The concept of time, as we intuitively know it, plays a major role in sorting out the pieces of information we obtain from the environment and in making appropriate inferences based on them. Without a unifying temporal framework, we would not be able to make predictions about future events occurring in the environment and therefore we would not be able anymore to avoid noxious stimuli and scout around for beneficial stimuli. Furthermore, the set of events making up the episodic memory referred to a position on the abstract timeline are likely at the very core of the personal identity. In this article, I will argue that the apparently seamless and consistent time reality is actually a construct of a specialized functional entity of brain activity which does not display the intrinsically discrete nature of what we use to call the physical world. I will present a theory which gives an explanation of the apparently contradictory nature of phenomenological time in a physical world and from it I will further draw conclusions about the role memory and time play on the construction of the self. Summing up, I will (1) outline a theoretical framework to set up the grounds upon which I will (2) establish a tentative theory of a functional mechanism which accounts for the experience of time flow and the self and their relationship with memory. Thereafter, I will (3) emphasize on a neural-algorithmic analogy regarding the previously discussed theory. Following, (4) comments about the evolutionary aspects of the theory will ensue. Subsequently, I will (5) consider some apparently incoherent philosophical issues which arise from the consideration of the proposed theory, and finally I will (6) suggest some research guidelines regarding the neural functional mechanism underlying time perception that I believe could yield prolific results in the near future. **C11**

182 **A testable model for quantum effects in cognitive framing** Francis Steen <fsteen@ucla.edu> (Communication Studies, UCLA, Los Angeles, CA)

I develop a model of the interaction between consciousness and the hippocampus, using Bohm & Hiley's 1993 work on an enfolding and unfolding quantum-level order. My work as a Communication Studies scholar is focused on understanding phenomena like perspective, framing, and narrative, which are central concepts in understanding how the media work. Back in 1978, O'Keefe and Nadel wrote ''The Hippocampus as a Cognitive Map,'' and more recently Moser et al. (2008) found a systematic arrangement of spatial fields that map onto the three main kinds of perspective in the media: participant, observer, and overview. The hippocampus is also well known to play a critical role in the formation of episodic memories; one way to relate these two functions is to suggest that the hippocampus provides the spatiotemporal metadata needed for the formation of episodic memories. A study by Conte et al (2009) found tentative evidence that the perception of ambiguous (bi- or multi-stable) figures switch from one state to another in a pattern that indicates an underlying quantum process. If the selection of a particular percept among many possible construals involves a quantum process, as Conte claims, that opens for the possibility that the dynamic interaction between the hippocampus and the content of consciousness is a quantum-regulated process. I'll spell out the theoretical and practical consequences of this model, which provides an experimental way to test a detailed cognitive model with broad consequences for media studies of quantum effects in a specific part of the brain. **C11**

3.18 Intelligence and creativity

183 **A correlation analysis of transformational leadership and spiritual intelligence** Heather Christ <hjchris@sandia.gov> (Sandia National Laboratories/University of Phoenix, Albuquerque, NM)

The purpose of this study was to determine whether transformational leadership (idealized attributes, idealized behaviors, inspirational motivation, intellectual stimulation, individual consideration, contingent reward, and management-by-exception) correlated with spiritual intelligence (mindfulness, intellectuality, divinity, childhood spirituality, extra sensory phenomenon, community, and trauma). The Multifactor Leadership Questionnaire (MLQ-5X) created by Bass and Avolio (2004) measured transformational leadership qualities and the PsychoMatrix Spiritual Inventory (PSI) developed by Wolman (2001) measured spiritual intelligence. Use of a quantitative correlational design provided statistical data and allowed for calculation as to whether or not there was a correlation. Previous studies are mostly qualitative in design. A total of 115 participants associated with a non-profit organization leadership council (an Armed Forces Reserve Center) were drawn from a population of business leaders in the southwest region of the United States. Data were tabulated using standard summary statistics. Bivariate comparisons were performed using Spearman's rank correlations and partial correlations. Demographic data revealed a profile of the average respondent: male, between the ages of 20 and 29, had 1 to 5 years of supervisory and professional experience, and completed some college. A correlation between transformational leadership and spiritual intelligence was found. When controlled for demographic variables (gender, age, supervisory and professional experience, and education), spiritual intelligence had a significant positive correlation to MLQ transformational leadership. This qualitative relationship has been supported in the literature. Now it has been quantified as well. **C15**

184 **A neural correlates of creativity: MEG study for Japanese-syllogistic-riddle (JSR) solving tasks** Yoshi Tamori , Akimitsu Okumura <yo@his.kanazawa-it.ac.jp> (HISL, KIT; NPO, Neurocreative Laboratory, Hakusan-shi, Ishikawa Japan)

According to Michael Mumford (2003), creativity involves the production of novel, useful products. In most cases of creativity, it can be rephrased as a generic searching in the mental or productive space, and it often requires enlightenment. In terms of searching, we can discriminate creativity from other mental searching activities based on the search space size.

As for a problem which is intended to solve, creative mental process would not be assigned for a single line of reasoning (deductive process) toward the solution, but for searching the solution from vast search space. In order to investigate a neural correlate of creativity, we measured MEG while subjects were engaged in Japanese-syllogistic-riddle (JSR) tasks (Nazo-kake). JSR is a word play which is intended to find a whole sentence made up of three phrases. The first phrase serves as an introduction. The second phrase usually serves as an unexpected development. The final phrase puts the former two phrases together, and serves as an explanation, a climax, or a conclusion of the whole sentence. This syllogistic riddle play historically appeared in the Heian era about a thousand years ago in Japan. We required subjects in the experimental tasks to find the remaining phrases based on the pre-presented phrase of the introduction or the ones of both the introduction and the development. We measured MEG during the tasks. There are three possible questions in which we can require subjects to find (1) the whole phrases, (2) the second and the final phrases based on the given first phrase, or (3) the final phrase based on the given first and second phrases. For example, a set of questions and the answer is as follows. The first type of question is like (1) please make some three phrase story which has a surprise or an interesting ending. The second type of the question is like (2) “what is related to a phonorecord and ... ?” , keep going like that. The second type of question is like (3) what is related to a phonorecord and two letters “AB”? For those questions, whole story as the answer is: what is related to a phonorecord and two letters “AB”? It is “CD”, because both things come before “CD”. Our MEG results show estimated current dipole (ECD) activities in two different brain areas. One is in posterior cingulate gyrus (PCG) related to the task in which subjects were engaged in all the types of questions. The other one is in the anterior insula (AI). It appeared in AI, while subjects were engaged in a creativity task. We can manage and/or control the size of search space in each searching task, and then we can classify the problems into qualitatively different types. We expect that such types of searching problems can be extrapolated into creative searching by way of the size control of search space. We conclude that brain activity related to creative thinking could be in AI. This research was supported by NPO, Neurocreative Laboratory. **C27**

185 **The Psychological Flow Experience: From Phenomenology to Biological Correlates** Fredrik Ullén <fredrik.ullen@ki.se> (Stockholm Brain Institute, Karolinska Institutet (Dept of Women’s & Children’s), Stockholm, Sweden)

The flow experience is a conscious state that typically occurs during performance of challenging tasks that are matched in difficulty to the skill of the person. It is characterized by a subjective sense of concentration, control, automaticity, low self-awareness, enjoyment and - sometimes - altered sense of time. Psychological studies of flow have demonstrated that the experience can occur in a wide range of activities, and that it is associated with a high level of performance, objectively measured. Here, I will discuss work from our group on the biological basis of both flow as a state, and the trait flow proneness, i.e. a tendency to have frequent flow experiences. The studies include analyses of physiological correlates of state flow during piano playing; associations between flow proneness, Big Five personality traits and intelligence; twin data on the heritability of flow proneness; as well as recent findings on relations between flow proneness and dopaminergic systems of the basal ganglia. In conclusion, I will argue that the findings suggest that flow may be a state of effortless attention that differs not only phenomenologically but also in terms of biological underpinnings from states of high concentration during mental effort. **PL12**

186 **The non-computability of creative processes** Stephen Waldon <waldon311@yahoo.com> (Center for Quantum Artificial Intelligence: www.centerforquantumai.com, Evanston, IL)

In the Emperor’s New Mind, Roger Penrose describes the rationale for claiming that mathematical reasoning is not a computable function. In a completely separate domain Jonhjoe McFadden in his book Quantum Evolution describes a mechanism for the creation of self-replicating molecules from inorganic compounds that requires quantum computation and hence is not computable using existing computational devices. This raises the question

of whether there are other cognitive processes or other processes in general that may not be computable and whether it is possible to gain further insight to their behavior by creating an abstraction that covers all of them? I believe the answer to both parts of this question is yes and I propose that the general category of naturally occurring creative processes form the basis for a class of phenomena that are not computable. In this category I include, the creation of new ideas through the human creative process (a specific example of which is mathematical reasoning), the creation of organic life from inorganic compounds, and the generation of new species through evolution. These processes have in common the capability of generating new forms (i.e. ideas, molecular constructs, and new species) that are so unique that the new form becomes the archetype for a new category of forms previously non-existent in the universe. These creative processes are also distinguished by the fact that they have so far proved impervious to computer simulation. To the majority of the research community, the explanation of why computer simulations have failed to mimic the real world is addressed by either the need to find an improved algorithm or the need to let current algorithms execute for several additional millennia. Although I think the better answer in this case is “none of the above”, I also believe that it would be highly beneficial to develop ways to analyze the general class of creative processes. The results of this analysis would illuminate and help resolve existing debates on the role of quantum mechanics and computability. At the 2010 Toward a Science of Consciousness conference I described a quantum-classical hybrid system that has the capability to be “plugged” and “unplugged” from the influence of the underlying quantum universe. I suggested that this system could be used to study Orch OR like processes where classical computation orchestrates the evolution of a quantum system. I am now proposing that generalized quantum-classical hybrid systems can emulate the salient properties of the general class of creative processes. In addition, because it should be feasible to construct these systems with current technology it should be possible to develop a generalized experimental sandbox to study non-computational processes in relatively short order. **P3**

3.19 Miscellaneous

187 **Hallucinations, An existential crisis?** Jennifer Kanary Nikolov(a) <jenniferkanary@yahoo.com> (roomforthoughts, Wormerveer, Netherlands)

In his essay ‘Reality Adaptation or Adapted Reality’, from the book Munchausen’s Pigtail, Paul Watzlawick (1990, p. 134) reminds us that although the rest of the world has seemed to have let go of the assumption that there is such a thing as an objective Reality of which normal people are more conscious than the so called insane, in psychiatry the belief in a ‘real’ reality, that separates the ‘sane’ from the ‘insane’, has survived. In this he refers to the tendency of psychiatry to assess a persons mental health by their ability to adapt to reality. In this paper the artistic researcher Jennifer Kanary will investigate how this claim still holds up 20 years later, by taking a look at the concept of hallucination - from alternative perspectives on reality in relation to modern day psychiatric diagnosis and treatment. Having hallucinations is often seen as one of the key symptoms of mental health problems, in particular to that of schizophrenia. In the DSM-IV hallucinations are defined as followed: A sensory perception that has the compelling sense of reality of a true perception, but that occurs without external stimulation of the relevant sensory organ? (Bentall, 2004, p. 350). What is a true perception? How can we be sure that there is no external stimulation? These questions become especially pertinent when we take a look at recent research that shows that people diagnosed with schizophrenia are not fooled by optical illusions (Dakin, 2005, Dima 2009). And that sometimes their vision can be more accurate than non-sufferers. If a hallucination is experienced as a compelling reality by those who seem to have a better grip on what is actually there in time and space, it becomes imperative to look at concepts of hallucinations from alternative perspectives on our reality. One such alternative perspective on reality could be to look at the concept of a hallucination from Nick Bostrom’s (2003) speculative claim that there is a high probability that we are living in a computer simulation ourselves. We might wonder if the concept of hallucination even has the right to exist. **C36**

4. Physical and Biological Sciences

4.1 Quantum theory

188 **Elastic membrane based model of human perception** Alexander Egoyan <alex-21cen@yahoo.com> (IT, National Center for Disease Control and Public Health, Tbilisi, Georgia)

Undoubtedly the Penrose-Hameroff Orch OR model may be considered as a good theory for describing information processing mechanisms and holistic phenomena in the human brain, but it doesn't give us satisfactory explanation of human perception. In this work a new approach explaining our perception is introduced, which is in good agreement with Orch OR model and other mainstream science theories such as string theory, loop quantum gravity and holographic principle. It is shown that human perception cannot be explained in the terms of elementary particles and we should introduce new indivisible holistic objects with geometry based on smooth infinitesimal analysis - elastic membranes. The example of such a membrane is our Universe which is an indivisible whole. It is shown that our perception may be considered as the result of elastic oscillations of two dimensional (2D) elastic membranes with closed topology embedded in our bodies. Only one elastic membrane responsible for its perceptions will correspond to the selected organism, but there may be other membranes, even at the cell level. In other words, reality may be considered as the process of time evolution of holistic energetically very weak macro objects - elastic membranes with the geometry based on smooth infinitesimal analysis. An embedded membrane in this multidimensional world will look different for the external and internal observers: from the outside it will look like a material object with smooth infinitesimal geometry, while from the inside our Universe-like space-time fabric. When interacting with elementary particles and other membranes, a membrane will transform their energy into its elastic energy (a new form of energy) - the energy of stretching of the infinitesimal segments. The theory postulates that these elastic deformations will not be observable from the point of view of the internal observer. Heisenberg's uncertainty principle will work in this physics only from the point of view of the internal observer. For the external observer each embedded elastic membrane may be stretched and even a very small region will become observable. For example, living organisms play the role of internal observers of the Universe, and at the same time they serve as external observers for 2D membranes embedded into our Universe. We can observe our 2D self-membranes through our perceptions, which are encoded in elastic oscillations of the elastic membrane. According to the theory, elastic membranes occupy energetically favorable positions around microtubules involved into Orch OR. The theory not only gives us a really multidimensional holistic picture of reality, but it also provides us with a new method for understanding such phenomena as perception, self-awareness and will. **P4**

189 **Temporal Nonlocality in Bistable Perception** Harald Atmanspacher <haa@igpp.de> (Theory and Data Analysis, Institute for Frontier Areas of Psychology, Freiburg, Germany)

The concept of temporal nonlocality is used to refer to states of a (classical) system that are not sharply localized in time but extend over a time interval of non-zero duration. We investigate the question whether, and how, such a temporal nonlocality can be tested in mental processes. For this purpose we exploit the empirically supported Necker-Zeno model for bistable perception, which uses formal elements of quantum theory but does not refer to anything like quantum physics of the brain. We derive so-called temporal Bell inequalities and demonstrate how they can be violated in this model. We propose an experimental realization of such a violation and discuss some of its consequences for our understanding of mental processes. **PL2**

190 **On quantum mechanics and panpsychism** Uziel Awret <uawret@gmu.edu> (School of Quantum Computation, George Mason University, Falls Church, VA)

Is Panpsychism compatible with Quantum Mechanics? Panpsychism claims that if we do not want our theories of consciousness to rely on radical emergence then our physical 'ultimates' must posses some intrinsic 'proto-consciousness'. According to common interpretations of QM it is meaningless to talk about the intrinsic properties of its ultimates without embedding them in a physical context. I will use Itamar Pitowsky's contextual interpretation of QM to argue that our ultimates are 'intrinsically contextual' and that this realization favors brain based theories of consciousness. The relevant question now is why does the brain constitute such a special physical environment or, what is it that makes the brain ideally suited for determining the properties of its ultimates, presumably through top down processes. As a possible example of such a top-down process I will consider Koch's Claustrum and recent findings that are based on the Nernst Effect in high temperature two dimensional superconductivity that seem to produce physical singularities in three dimensions. (1) I will argue that the hierarchically nested structure of the brain can cause some of its ultimates to become reflexive. Galen Strawson claims that the proto-consciousness of our ultimates is intrinsically reflexive. The contextual approach suggests that we suspend questions about the intrinsic properties of our ultimates and try to explain how our ultimates can become reflexive in highly specialized physical environments. When an ultimate is made to act on itself it must do so in a non-relational manner. The only example I can think of is that of self-collapse producing a singularity. I will conclude by claiming that if one embraces the contextual interpretation of QM one must reject most forms of panpsychism unless they make the rather benign claim that our ultimates posses potentialities that cannot be separated from their environment. 1) Nature 448, 1000-1001 (30 August 2007) | doi:10.1038/4481000a **C37**

191 **Direct Experimental Evidence for the Quantum States in Microtubules and Topological Invariance** Anirban Bandyopadhyay <anirban.bandyo@gmail.com> (Advanced Scanning Probe Micros, National Institute for Materials Science, Tsukuba, Ibaraki Japan)

Microtubule works as a nano electromechanical oscillator. It oscillates at eight resonant frequencies and this classical oscillation makes the microtubule compatible to quantum information processing. In the last two years there have been significant breakthroughs in this particular aspect. It has been shown that giant classical structures can carry out quantum information processing in room temperature if they are excited to the resonant frequencies. The earlier concept that quantum states survive only at cryogenic temperature and only at quantum dimension is not right. Several systems are now found to exhibit quantum information processing at room temperature and in giant architecture of micrometer to millimeter dimension. We will demonstrate quantum interference pattern of the microtubule to provide its dispersion and quantum state overlapping in the room temperature and in ambient atmosphere condition. Finally I will discuss the topological symmetry and invariance issues related to microtubule and how these symmetries would enable microtubule to process quantum information in a very delicate manner. **PL10**

192 **The statistical dispersion of particles in quantum physics is an error** Matti Bergstrom , Rudolf Alarik Matias Bergstrom; Pia Ikonen; Erkki Makela <juliasbrain@kolumbus.fi> (Brain Science, Helsinki University, Helsinki, Finland)

In quantum physics shows in two-slit experiments a statistical dispersion of particles, that, among other results as in Heisenberg uncertainty phenomenon, has led physicists to draw the conclusion that the base of reality in nature is a statistical reality. This is against Einsteins view, that the reality is not statistical ! Heisenberg states that it is the mental 'Questioning' by the observer, that causes the dispersion of the particles. Laurikainen, a Finnish physicist, who always spoke about single case vs. statistical causalities, calls it an 'irrational' dispersion. Also Bohm points to the same direction. This has led us to look at the system 'observer-object' during the observation in a physical experiment. It is necessary to remember the following basic functions of the human brain: 1) A precondition for all observations is the brain stem arousal function, otherwise the sensory functions are not possible. 2) Subconscious brain stem processes occur in an imaginary (i) space, whereas the

conscious cortical processes, like the sensory ones, occur in a real (r) space (an empirical study by Bergstrom 1964). 3) In an observation situation the (i)- and (r)-effects meet in the limbic system, forming a fractal, complex number Mandelbrot space, c=f (i,r), that is our Self, where the thinking (and 'Questioning') occurs. 4) In the Mandelbrot space operates a Julia-equation (Z02+C=N, where C is the stimulus from outside, Z0 the immediate answer of Self, N the sum). The iteration fullfills the thought process. It can take three modes of thinking, r = physical, i = psychological, c = spiritual, where i and r are melted together to our highest, abstract spiritual thinking mode (comp. Math. Number theory). The observation of each item brings into the Self the stimulus C, and the Self answers with Z0, if the arousal is functioning. The position of C and Z0 in the (i,r)-space depend on how much information (r-dimension) and subjective psychological, subconscious effect (i-dimension) is in them (Bergstrom,Ikonen 2005, Copenhagen). But in typical observations in physics only the r-dimensional time-local end result is notified ! What the i-dimensional result is, is not taken care of. So in double slit experiments only the diffraction of quanta on an r-dimensional film is registered ! We have simulated results where the i-dimensional (slit <-> film) Julia-process also is registered as a vector dynamics, and shown that if id = 0, then no statistical spreading of particles occurs, whereas, if id > 0, it occurs ! The difficulty of course is, in experimental situations, that if id = 0, the observer is not able to observe anything ! BUT: An error thus exists in quantum-physics ! It can be avoided only in registering the Julian vector dynamics in the (i,r)-space during the experiment ! This dynamics guides the way of the particles in the (i,r)-space from the slit to the film. Bergstrom R.A.M, Ikonen P, Makela E, Helsinki University, Finland and Institute of Neurophysics, Helsinki Finland **C14**

193 **Quantum Properties in Ion Channel Proteins and their Effect on Neural Signal Segregation and Perception** Gustav Bernroider , Johann Summhammer <gustav.bernroider@sbg.ac.at> (Organismic Biology, University of Salzburg, Salzburg, Austria)

By solving the Schroedinger equation for the quantum mechanical states of K+ ions within the carbonyl derived oxygen cages that characterize the filter-region of voltage gated ion channels, we demonstrate how quantum mechanical properties inside membrane proteins can be expected to modulate the molecular characteristics of ion conduction in nerve cells. The ions in the filter region are confined by a time dependent potential derived from the motion of surrounding carbonyl groups, water molecules and other potassium ions present in the channel. We demonstrate that, depending on the size of the confining potential and thermal energy of the ion, the ion's wave-function can become very delocalized with its probability distribution extending over almost the entire length of the filter region. Due to the interaction of the ions with a time-dependent potential, the energy of ions is not conserved. Instead, we observe terra-hertz oscillations of ionic wavepackets that become damped, giving off their energy to the environment either via the vibrational modes of the surrounding carbonyl dipoles or by radiation, or both. These effects will cool down the ions in the filter domain dramatically. We will discuss how this energy transfer can effect filter-gating and thereby modulate channel states, channel selectivity and ion currents across cell membranes. Taken together, the present results indicate that quantum state correlations in channel proteins can propagate into classical ion-channel conformations that determine the electrical signal properties of neuronal membranes. In particular, we demonstrate how oscillations of short time ion-filter coherences can play a role for the combinatorial nature behind signal segregation in the brain. Along this view, the classical action potential distributed within a functionally defined activity pattern of neurons (such as iso-orientation columns in the cortex) can serve for periodically resetting the gating state of channel filters of neurons engaged in the same population code. We discuss a testable conjecture that suggests that the short lived quantum-mechanical ion state oscillations correlate among ion channels that are engaged in the same sub-modality of a consciously perceptive state. **PL9**

194 **Quantum reduction connects subjective I with the world of objective matter** Gerard Blommestijn <gblomm@gmail.com> (Amstelveen, Netherlands)

First, a clear distinction will be made between (pure) consciousness or I-ness or mind (that which ultimately experiences everything) on the one hand, and the contents of this consciousness such as experiences, thoughts, feelings, memories, plans, choices, decisions etc. on the other hand. Before Quantum Mechanics (QM) philosophers and scientists thought that there could not be such a thing as I-ness (mind) in an ontological independent sense, as something on its own, because the flow of choices/decisions from the I, the mind, to the brain would need some physical energy transfer from mind to brain, and that this energy flow had never been measured experimentally nor would it ever be. Now with QM we know that the QM reduction process itself (or its equivalent in QM interpretations without reduction) does not involve energy transfer, although its outcome may give rise to quite different courses of action by the physical world, for instance the brain. So, since the advent of QM we can at the same time have a subjective, non-material I-ness and an objective material world without any contradiction and connected by the QM reduction processes. These QM reduction processes are then the perceptions in the inward direction from nerve molecules to I-ness and the choices/decisions in the outward direction from I-ness to nerve molecule states that cause firing etc.. Together they form a kind of screen (reduction boundary) between the essence of consciousness (I-ness) and the world of objects (starting with the molecules of the nerves). Perception, which is the last brain processing step towards experience by I, is then a QM reduction process of a wave function in a molecular substrate such as microtubules in the perception part of the brain. This wave function will range over a group of neurons possibly QM-connected by Josephson tunneling at their gap-junctions, and it contains all possible experiences that we can have at a certain moment: the whole phenomenal perspective with all its modalities such as sense perceptions and mental perceptions (thoughts, emotions, memories, fantasies, ...) coded into one complexly entangled wave function. The QM entanglement of this wave function then binds the totality of the interrelated parts of the perception together. Another QM aspect of the ongoing stream of perception is that at every moment one outcome is selected of a superposition of different ways to experience a certain totality of phenomena. (In QM the reduction process is the step from a superposition, a number of possible outcomes, to only one outcome, in this case: one total experience.) In the outward direction, from I-ness to a physical state of neurons, the same type of QM reduction takes place, namely from a superposition of possible actions to one chosen state of motor neurons. The brain at every moment presents a wave function to the I, that contains a superposition of all possible motor activities (mental as well as physical) to choose from. This and more will be explained in detail. **C14**

195 **Quantum mechanics and the origin of consciousness** Casey Blood <caseyblood@gmail.com> (Physics, Rutgers University (ret.), Sarasota, FL)

Perhaps the most fundamental question in the study of consciousness is whether our conscious awareness is strictly a product of the physical brain, or whether it corresponds to an aspect of reality outside physical law. The answer given by most neuroscientists is that the origin of consciousness is almost certainly physical-only. Their strategy is to probe the neural correlates of consciousness, which is a necessary, useful and interesting endeavor no matter what its origin. But these experiments have not shown that consciousness depends solely on the physical brain, and the brain is so complicated that there seems little chance of obtaining a definitive answer from this strategy. So it makes sense to start instead from a careful consideration of quantum mechanics, which describes physical reality so well. We find quantum mechanics does not imply that our (conscious) perceptions can be accounted for by physical law alone. To explain, we recall that quantum mechanics often gives many simultaneously existing versions of reality; Schrodinger's cat is both dead and alive at the same time, for example. But quantum mechanics does not tell us which version we will perceive (be consciously aware of); instead it tells us the probability of perceiving a particular version. Interpretations of quantum mechanics are potential explanations for this

most peculiar probabilistic feature. There are currently three major interpretations, all of which are physical-only. The first is to suppose the universe consists of physical particles so there really are electrons, photons and so on. A careful, detailed analysis, however, shows that, all expectations to the contrary, there is no evidence for particles. And further there is circumstantial evidence that only wave functions exist. A related interpretation, championed by Bohm, is to suppose there are particle-like hidden variables. Again, there is no evidence for these, and the construction of viable hidden variable interpretations runs into substantial theoretical difficulties. The second physical-only interpretation is to suppose the wave function 'collapses' to just one version, and it is that version which is perceived. Again, there is no evidence for collapse, but there is circumstantial evidence against the current GRW-Pearle form of the theory. The third physical-only interpretation, Everett's many-worlds interpretation, assumes that all quantum versions of reality exist, so there are many simultaneously existing versions of each of us! However, it has recently been shown that the many-worlds interpretation cannot account for the probability law, and so it cannot be valid. So there is no credible evidence for the three physics-only interpretations (and there is, in my opinion, a better than even chance that none of these will ever provide a valid interpretation). This means there is absolutely no current evidence that our perceptions can be explained solely within a physics-only reality. Thus, since the perceptions of which we are consciously aware cannot currently be fully explained within physical theory, the door is certainly not closed on the possibility that the origin of consciousness is outside the physical universe, outside physical law. **C14**

196 **Quantum mechanics A model for consciousness also showing uncertainty, superposition and timelessness** Franz Klaus Jansen <jansen.franz@orange.fr> ((ret.), Assas, France)

At the level of elementary particles in the atomocosm, the uncertainty principle of Heisenberg defines that location and velocity cannot be determined with certainty for the same time period. At the level of the macrocosm, consciousness observes reality of the present with certainty, but considers potential actions in the future with uncertainty. Since the future is unknown, realisation of future actions necessarily implies uncertainty. As long as events are only projected, they do not belong to reality but to potentiality, since they may or may not arrive. Due to their uncertainty multiple actions can be projected in the future for the same time period, as if they were in superposition, for instance walking, swimming or skiing for the next morning. This resembles superposition in quantum mechanics, where different physical states are superposed in the wave function. Similar to quantum mechanics superposition requires probability to estimate the chance of realisation of future events. There may be greater chances for skiing tomorrow with respect to the expected climate. Probability estimations generally show entanglement with multiple environmental factors, since the probability to reach an appointment by car in time depends on several factors such as rush hour, roadwork, or police controls. Projected actions in the future show non-locality in consciousness, since there is superposition of at least two opposite potentialities, realisation or non-realisation. In a similar way superposition of physical states in quantum mechanics renders trajectories and therefore location impossible. Time undergoes the same problem for projected events, which may or may not be realised thereby rendering time coordinates unconceivable. A second reason for inducing timelessness is the consideration of constant behaviour as well in consciousness as in physical formalism. Physical and societal laws are generally based on constant behaviour, which can be interpreted as timelessness, although it is based on movements and would be inexistent without movements. Therefore a higher order information level, like constant behaviour, induces timelessness by rendering time unobservable, but not inexistent. In general consciousness evolves between two situations: observation of the present with certainty versus prevision of the future with uncertainty, since it cannot always be realised. Potential events are projected in the mental states of consciousness in the future, as if they were in superposition, but they have necessarily to collapse to only one, the one corresponding to observable realisation. This resembles the collapse of superposition in quantum mechanics during measurements. In consciousness, it is in general ignorance of the realisation of potential events, which induces uncertainty and leads to superposition of at least two opposite situations, realisation or non-realisation of potentialities. They have therefore to collapse to the only one, which becomes observable reality. Under consideration of the interpretation of the Copenhagen School, there seems to be isomorphism of the general concept of quantum mechanics, including uncertainty, superposition, probability, non-locality and timelessness, between elementary particles in quantum mechanics and future potentialities in consciousness. **C7**

197 **Quantum Physics and Eastern Philosophy** Tarja Kallio Tamminen <kallio.tamminen@elisanet.fi> (Kalpa Taru, Helsinki, Finland)

Quantum physics has obscured the prevailing concept of reality - the particle-mechanistic world view which was created at the turn of the modern era. The quantum revolution gave rise to a prolonged interpretational debate which disclosed that the metaphysical ideas adopted along with the Newtonian physics are deficient: it is far from obvious how we should understand the qualities and status of the fundamental substance of reality, the relation between the parts and the whole and the role and locus of human beings. The new features encountered in the quantum realm revealed a new kind holism, an immediate intrinsic connection between local and global phenomena which is contributing to the formation of things. Atomism, reductionism and determinism turned out not to be universally applicable ideas. This fact repudiates the dogma of nature as mechanical which was the main rationale for Descartes to present his substance dualism. There exists no corporeal basis for the outrageous mind-body distinction that has haunted philosophy throughout the modern era, preventing a proper understanding of what is the role of consciousness in nature, or how mental phenomena and human decisions contribute to the change and evolution observed in nature. In its search of new metaphysical presuppositions and starting points natural philosophy may once again benefit from the ontological and epistemological hypotheses that were discussed in antiquity within the schools that opposed the atomists, but valuable resources can also be gained from the insights of Eastern philosophy. Both traditions cherished the concept of reality as an interrelated, hierarchically leveled whole, a view which is in accordance with the idea of causally active humans who still remain subordinate to the balanced, lawful action of the whole. If our knowledge, values and goals are intrinsic to the fabric of reality, our struggle for deeper knowledge naturally affects the formation of ourselves as well as the environment around us. An enhanced awareness of the inner and outer structures existing in the world grants us with a greater autonomy and responsibility - bestowing some dignity and sense of purpose for human life. Contrary to the promises of the Newtonian clockwork, yoga philosophy has never accepted the fundamental gap between mind and body. The mental and material aspects of nature are intrinsically integrated, and the formation of man's mental machinery always stays in connection with his conscious decisions. The universe does not resist personal growth or the attainment of human objectives. Rather the internal development and ethical advance are prerequisites for a proper life and an ecologically sustainable future. **PL6**

198 **Psi-psychism: The most likely explanation of consciousness and quantum phenomena** Colin Morrison <csdm1@o2.co.uk> (Philosophy, Independent Researcher, Cupar, Fife United Kingdom)

Since everything that science has been able to describe successfully is formed out of properties that are evident (or expected to be evident) in elementary particles, we should clearly expect the same to be true of subjective experiences like the blue in my 'mental image' of a clear midday sky or the pain I get when I stub my toe. This paper shows that our whole subjective experience (or consciousness) is most likely to constitute the reality behind the superposition of states described by the wave function of a quantum particle or system situated in a part of our brain involved in selecting our focus of attention at each moment in time (a position that I call 'Psi-psychism'). Most 'Quantum Consciousness' theories either posit that consciousness arises from, and at, the moment of collapse of a quantum wave packet, or else they view consciousness as a totally separate entity that arises mysteriously

in certain structures such as human brains and causes quantum wave packets to collapse through its observations. In this paper I propose instead that consciousness is the very reality that the wave function describes. My proposal differs from others of this nature because it insists that every quantum particle has (and, in fact, is) a separate consciousness, and that while some of these consciousnesses do cause the wave packets of other quantum particles to collapse they do not determine the states that the particles associated with these wave packets are found to occupy when such so-called 'measurements' are made. Those observed states are determined prior to the measurement by the consciousness that constitutes the very wave packet that collapses - a consciousness that ceases to exist (at least temporarily) at the moment of measurement. It is shown that if this theory is true and a suitable quantum mechanical system can be identified in the structure and activity of appropriate neurons, then the organisation in human consciousness (or, at least, in my human consciousness) that is inherent in the functional completeness of its information content and the fact that each type of information is always encoded in the most appropriate type of qualia can be fully explained by the effects of natural selection acting upon changes in our ancestors' brain activity that arose from mutations in the genes for particular neural structures. Since science has successfully accounted for all similar types of organisation that are evident in non-mysterious parts of the human brain and other biological structures by an explanation of this sort, it is argued that even if no suitable quantum system can at present be found a truly rational person ought still to expect that this theory of consciousness - rather than one that posits a different sort of explanation for that observed organisation - is closest to the truth. A careful justification of this latter claim is provided utilising an objective procedure called 'Inference from the Best Methodology' (IBM) that I recently developed for this purpose. **C39**

199 **Possibility of quantum computation in the brain from the standpoint of superluminal particles** Takaaki Musha <takaaki.musha@gmail.com> (Research Center, Technical Research and Development Institute, Yokohama, Kanagawa-Ken Japan)

R.Penrose and S.Hameroff have proposed the idea that the human brain can attain high efficient quantum computation by functioning of microtubular structure of neurons. But Tegmark estimated the duration of coherence to be on the order of 10^-13 seconds, which is far smaller than the one tenth of a second associated with consciousness and it is normally expected that any macroscopic coherence of a quantum state in a warm wet brain to be destroyed almost immediately. However it can be shown theoretically that the quantum coherent state can be maintained in the brain at the room temperature contrary to the Tegmark's estimation from the assumption that the evanescent photon is a superluminal particle called a tachyon. In this presentation, the author has shown the possibility of quantum computation in the warm wet brain from the hypothesis that superluminal particles play an essential role for the information processing in biological systems and he has also shown that the mechanism of biophoton generation can be explained by the Cherenkov radiation from tachyons created in a biological system. **C7**

200 **Learning with quantum annealing in the presence of incorrectly labeled training examples** Hartmut Neven <neven@google.com> (Google, Malibu, CA)

Learning from examples is a key ability of intelligent systems, biological or technical. Frequently the situation arises that a learner is confronted with inconsistent data in which some training examples associate an input with an incorrect output label. Following computational learning theory one can cast training of a classifier as an optimization problem. The optimization attempts to simultaneously minimize the error the classifier commits on the training samples as well as the complexity of the classifier. The latter leads to improved generalization error which is the error the system makes on new unseen data. In their native format learning problems tend to be formally NP-hard. Moreover it has been shown that convex relaxations that are typically invoked to render the optimization tractable are not suitable to effectively deal with label noise. Thus the learner is confronted with tackling a hard optimization that can not be solved to optimality with classical hardware. Recent advances in quantum computing, in particular in adiabatic quantum optimization, have shown how quantum resources can be employed to obtain solutions to hard optimization problems that are of higher quality than available classically. In this talk we present new results that show how learning in the presence of label noise can be cast into a format amenable to quantum annealing. We report results from numerical experiments indicating that mapping to this format comes at no cost in accuracy. Our formulation ensures that any gain in objective value due to quantum effects will translate into a gain in training accuracy or reduced complexity of the final classifier. **C18**

201 **Consciousness and Physical Law** Roger Penrose <rouse@maths.ox.ac.uk> (Oxford University, Oxford, United Kingdom)

A profound puzzle of quantum mechanics is that the discontinuous and probabilistic procedure adopted for measurement is in blatant contradiction with the continuous and deterministic unitary evolution of the Schrödinger equation. An inanimate measuring device, being made from quantum particles, ought to follow the unitary laws, so many physicists take the view that consciousness is ultimately needed for measurement. I here express the almost opposite view that the unitary law must be violated for massive enough systems, and that it is consciousness itself that depends upon this violation, requiring new physics and exotic biological structures for its manifestation. The issue of what kind of universe history could provide laws fine-tuned enough for consciousness to arise will also be raised. **PL11**

202 **DNA: On the Wave of Coherence** Giuseppe Vitiello , Giuseppe Vitiello University of Salerno and Istituto Nazionale Di Fisica Nucleare, Gruppo Collegato Di Salerno, 84084 Fisciano (Salerno), Italy <givitiello@unisa.it> (Dept. of Mathematics and Infor, University of Salerno, Salerno, Italy)

Some bacterial and viral DNA sequences have been found to induce low frequency electromagnetic waves in high aqueous dilutions [1,2]. This phenomenon appears to be triggered by the ambient electromagnetic background of very low frequency. On the other hand, evidence has been accumulated on the influence of electromagnetic fields on living organisms. The above experimental observations fit into the physical view which addresses biological dynamics as an interplay of chemical processes and electromagnetic interactions. We interpret [3] the above experimental results in the framework of a recently proposed theory of liquid water based on Quantum Field Theory. This theory is intrinsically non-linear and it provides the suitable tools to describe a complex ensemble of processes which are also non-linear. [1] L. Montagnier, J. Aissa, S. Ferris, J-L. Montagnier and C. Lavallee, Interdiscip. Sci. Comput. Life Sci. 1, 81?90 (2009) [2] L. Montagnier, J. Aissa, C. Lavallee, M. Mbamy, J. Varon and H. Chenal, Interdiscip. Sci. Comput. Life Sci. 1, 245?253 (2009) [3] L. Montagnier, J. Aissa, E. Del Giudice, C. Lavallee, A. Tedeschi and G. Vitiello, DNA waves and water, 2010, arXiv:1012.5166 **PL9**

203 **Consciousness in the Early Universe** Paola Zizzi <paola.zizzi@unipv.it> (Dept. o Psychology, University of Pavia, Pavia, Italy)

The theory of Inflation describes the very early universe as expanding at an exponential rate. Inflation lasted an extremely short time. During inflation, the universe is a de Sitter universe: is totally empty, expands exponentially, and has an event horizon. Quantum de Sitter horizons can be modelled by the quantum holographic principle, that is attaching a qubit (a quantum bit) of information to each pixel of area. The quantum de Sitter horizons of the early universe were superposed quantum memory registers. Through considerations of the actual entropy of the universe, we computed that the quantum information processed during inflation was 10^18 qubits. This means that at the end of inflation, it was selected, by self-decoherence, the n-th 10^9 quantum register. In the Orch OR model of Penrose-Hameroff, 10^9 is the number of tubulins-qubits which are superposed in a state of pre-consciousness, giving rise to a conscious state up to decoherence, and 10^18 is the total number of tubulins-qubits in our brain. Then, we suggested that at the end of inflation the universe had a cosmic conscious experience. **PL3**

4.2 Space and time

204 **Vedic Approaches to Consciousness and Reality** Deepak Chopra MD <carolyn@chopra.com> (The Chopra Foundation, Carlsbad, CA)

According to Vedic science, consciousness is the ground of all existence that differentiates into mind and matter, subject and object, energy, information, space, time, and the entire universe. In other words, the totality of the universe is nothing other than consciousness in all its diverse forms and aspects. In my talk, I will explain how the Vedic world view looks at morphogenesis and differentiation and postulates how consciousness becomes the universe. In the Vedic world view consciousness is not limited to the domains of mind or matter, but is the precursor and substratum of both, the basis of both personal and collective reality. This includes cognition, emotions and moods, perception, social interactions, personal relationships, environment, the forces of nature, and all biological expression. The Vedic world view also holds that we have no way of postulating a reality outside of consciousness as we have no experience or knowledge of being outside of consciousness. I will also discuss the expansion of awareness to higher states of consciousness, from deep sleep, dreaming, wakeful consciousness, soul consciousness, cosmic consciousness, divine consciousness, and unity consciousness. Finally, I will discuss various states of expanded consciousness (Lokas in Vedic traditions), how reality differs among them, and how they may correlate with different frequency and spatial scale domains in spacetime geometry. Deepak Chopra, MD - www.deepakchopra.com **PL3**

205 **The Grand Design of our Universe** Leonard Mlodinow <len@caltech.edu> (Pasadena, CA)

When and how did the universe begin? Why are we here? Why is there something rather than nothing? Is the apparent 'grand design' of our universe evidence of consciousness or a benevolent creator who set things in motion - or does science offer another explanation? The most fundamental questions about the origins of the universe and of life itself, one the province of philosophy, now occupy the territory where scientists, philosophers, and theologians meet - if only to disagree. In my talk, The Grand Design, I will present the most recent scientific thinking about the mysteries of the cosmos, and describe the current theories of the fundamental forces of nature, and the origin and evolution of the universe in nontechnical language. **PL3**

206 **Time dilation and Em wavelength variations as the consequence of temperature changes in body and brain for affect life signals and time perception** Mojtaba Omid , Mohsen Omid Abdolrazagh <cowami.omid@gmail.com> (Islamic Azad University - Tabr, Member of Scientific Association, Veterinary Medicine, Islamic Azad University, Tabriz, East Azarbayjan, Iran (Islamic Republic of)

At first step we focus on Scripps Institute researchers findings about relationship between reduced core body temperature and increased life span that they emphasize on the role of core body temperature changes in lifespan variations. But they don't know what is the reason for this relationship. The aim of this paper is that shows, temperature because affecting emitted EM wavelength of body and space time, lead to affect life span. Temperature is subject in physics that its intensity is related to electromagnetic wavelength and frequency on rule of Wien displacement and Planck constant and with reduces temperature, electromagnetic waves deal to higher wavelength and shorter frequency. On base of Hasselkamp, Mondry, and Scharmann experiments, the lower frequency can be attributed to the time dilation effect in absence of Doppler Effect. In body and brain the most useful molecule for metabolism process is glucose and with glucose metabolism, raises the local organ and body temperature. In cancer patients especially breast cancer patients and in brain tumor, scientists detected high density of glucose metabolism with increase body temperature and it is clear that in these patients life signals reduce prominently and in patients with abnormalities in brain and mind functions, there are also disorders in brain glucose metabolism with symptoms of disorder in time perception (e.g. in ecstasy abusers - attention deficit hyperactivity disorder (ADHD) - Depression - opioid and Alcohol dependent - in Alzheimer's Disease - in Parkinson disease). We are studying Wien displacement and Planck constant equations and results of Hasselkamp, Mondry, and Scharmann experiments to find the processes that cause to affecting life span by temperature variations. And also for studying in variations of glucose metabolism (FDG) and heat and temperature in cancer patients and mental disorders patients we consider near infrared spectroscopy and PET (positron emission tomography) and thermography images. FDG PET imaging and near infrared spectroscopy and also thermography of local tumor in cancer patients for example in breast cancer and brain tumor shows high density of glucose metabolism and high temperature that reduce life span inverse of Scripps institute results (reduce core body temperature increase life span) and we can say that low body temperature contains EM wavelengths with higher wavelength and lower frequency that lead to time dilation and for high body temperature this results is inverse. In brain of mental disorders patients that mentioned before, FDG PET imaging and near infrared spectroscopy show disorders in range of glucose metabolism and also temperature variations. All of these findings on string of Wien and Planck laws and Hasselkamp, Mondry, Scharmann experiments proves the processes that indicate, life signals in body and time perception in mental disorders affected by EM wavelength and frequency and space-time variations in relationship with temperature changes that influenced by glucose metabolism variations in body and brain. **P4**

207 **In Iranian myths time has historical and vague meaning: Avesta (Iranian Holy Book) said more time about the special God, his name is Zarvan** Mohammad Reza Raeisi <arash.raeisi@hotmail.com> (Islamic Azad University Fars S, Islamic Azad University Fars Science and Research Branch, Shiraz, Iran-Fars Iran (Islamic Republic Of))

In Iranian myths time has historical and vague meaning. AVESTA (Iranian Holy Book) said more time about the special God his name is Zarvan. We recognised from Zarvan Traits that we don't have any inception and ending for the time. John Hintz about the Universe evolution said "Cosmos limited the universe and having supervision to this." Some of ethnics believed that time is the result of motion. Anaximander said, "The discipline of the universe is according to the time's determination." But in 1915 Albert Einstein give a new mathematical paper that name was General Relativity. This theory shows that Time and Space are joined to each other and nobody can't without pass the time, Curved the Space. And in This Paper we conclude that Time Has Shape and... **C39**

4.3 Integrative models

208 **Empirical virtuality and transcendental consciousness: A paradigm about two approaches to life** Piero Benazzo <pierobnz@gmail.com> (Sollentuna, Stockholm Sweden)

The analysis is based on a paradigm which has been called the null-whole paradox (Benazzo, 2001). This purports the equivalence of what is indicated by four concepts: the null, the whole, the cosmos, God. In such equivalence, God needs to coincide with the whole. If God were exterior and superior, then the whole would be less than the whole. Each one of these four is analysed as the aggregate of the universe, in the sense of observed universe, together with the observer, in the sense of physiological processes of the act of observation. For the equivalence of the whole with the null stems, as much as two hands pressing horizontally against each other have a resulting horizontal null force, forces in the cosmos would result annihilating partially when considered in partial aggregation, and annihilating totally into the null when considered all of them, including the act of observation, including the last atom (empirical findings in Benazzo, 2010B). Such annihilation, as it involves also the observer, remains forcibly transcendental to the observer. In cosmological terms, the cosmos needs as such to curve on itself such that time flows backwards as well as forward, as the totality of the cosmos would be beyond time and beyond any dimension. Space needs also to curve and return back, matter and energy to interact with their anti-form (Charon, 1987).

The model of such a null-whole cosmos entails a virtuality of the observed universe, while remaining in agreement with empirical evidence from NASA Science Team (2008) and accepted empirical evidence concerning Supernovae measurements (Benazzo, 2010A&B). The observer lacks the possibility to physically live a paradox, in the immanent observed universe. This may well happen concurrently to a transcendental experience of a paradoxical cosmos which closes itself in a circular closed loop with dimensions cancelling out into the null. Thomas Young's double-slit experiment, performed on the double nature of electromagnetic radiation, shows that the scientist's act of observation empirically alters the results of the experiments. The observer that remains transcendental to empirical observation, as part of the cosmos, affects the empirical evidence of the empirical universe; influences the observation of its fundamental universal laws. On the other hand, the fundamental cosmic laws would rather be those of the cosmos, resulting though transcendental to empirical observation. Physical space travel by the observer would uncover such duality, by unraveling distant virtuality while approaching it, to recompose it into a local experience. There are as such two levels of consciousness, one is based on empirical experience, that which may be shared concurrently and agreed upon by more than one observer. This is immanent however it results as incomplete, since it embraces less that the whole. The other contemplates the whole, and as such it is complete however it remains transcendent. The consciousness pursued in only one of the two domains remains curtailed, while the balanced living of both covers immanence, empiricism, transcendence, wholeness (and nullity). The null-whole paradox paradigm provides a precise frame for such third approach targeting consciousness enhancement. **C22**

209 **A relational model for the nature of consciousness** Julia Bystrova <julfire@yahoo.com> (Intersect Productions, Sebastopol, CA)

What is the primary operative at work in both the subjective experience and in the objective study of consciousness? Identifying this commonality can offer a potentially profound way to bridge the split between our subjective and objective inquiries in our pursuit of understanding what consciousness actually is and how it might evolve. The relational model I will present here, or 'relationality' is an integrative philosophy that offers that the most basic operative at work in the phenomena of consciousness is the dynamic of relating. This claim offers it as more foundational than any single scientific or spiritual view on its nature. I first offer a basic model for understanding this concept and then explore some significant ways we see it at work in science, philosophy and religion. Building on this commonality to both science and spirituality, I offer this philosophical model as a way of understanding the nature of reality and consciousness. This meta-view recognizes an ultimate principle at work in consciousness and all life, while yet recognizing the need to accommodate certain reductionistic approaches for functional reasons. Relational concepts assist in integrating the splits in our thinking between our scientific approach and more spiritual sensibilities. Additionally, bringing together in mutual importance the rational processes of our mind with our experience of the body will help to bridge the perceived mind-body dualism. In this way, it is my hope that I can offer some tools to facilitate our thinking towards this interface and thus assist a resolution for some of the most troublesome challenges in our exploration on this subject. This will be done, in part, with a presentation that will utilize certain techniques effective for bringing the listener into an experience of the information presented. **C40**

210 **Consciousness and the Universe: Non-Local, Entangled, Probabilistic and Complementary Reality** Menas Kafatos <kafatos@chapman.edu> (Schmid College of Science, Chapman University, Schmid College of Science, Orange, CA)

The riddle of consciousness remains the last frontier of science. Whereas the physical universe is primarily studied through physics with exceeding successful results, most if not all, attempts to address the fundamental nature of consciousness through science have failed. The dilemma is real and the usual approaches are two-fold: Either completely ignore consciousness, or account it by appealing to some future, unspecified and unknown scientific

theory. Both approaches are decidedly unscientific. Yet, quantum theory is showing us the way that one should proceed. It was developed to account for processes in the microcosm but it has also opened the door to the issue of consciousness. Many quantum physicists hold the view that the participatory role of observation is fundamental and the underlying 'stuff' of the cosmos are innumerable quantum processes, rather than some immutable material substance. Despite the successes achieved, some fundamental problems remain, most notably the issue of self-awareness: How does one address the self-aware subject as an object? As such, consciousness may ultimately have to be addressed in an integral way and may well be the case that it is primary, rather than secondary epiphenomenon. Physics describes the structure, evolution of the universe and processes within it. Can present day physics, and particularly quantum theory, though fully account for consciousness? Can we devise a theory of consciousness? We show here that the problem is either exceedingly difficult or exceedingly simple. The simple ontological approach we favor here, is that we cannot extract consciousness from the physical universe, we cannot study its nature as an object. The act of observation, quantum theory tells us, is inexorably tied to the nature of what we are studying. We discuss here why this leads to an unfolding view of the universe, a new science, much richer and unfathomable than we ever imagined. The opposite approach, to delegate a secondary nature to consciousness or, even worse, to completely ignore it, will not yield anything of practical value in understanding reality and how we fit in the universe. The new science we propose here will accept the qualitative aspects of conscious Reality or Being, which cannot be put in an algorithmic development: A Reality of infinite entangled possibilities described by probabilistic mathematical theory, a Reality containing ever complex complementarities, a non-local and undivided wholeness, exhibiting scale-invariant, holographic structures and relationships. These fundamental principles provide clues as to the properties of consciousness and hint at the ultimate nature of Reality. They will form the foundation for a new physics of consciousness, wherein we will give up trying to externally define the nature of consciousness, and instead aim to understand its properties, how it operates. We anticipate that more fundamental mathematical developments than differential geometry and dynamical equations will take us to the next step and our understanding will have at some point lead to qualitative and perennial statements. The new science of wholeness will be as much scientific as present day science but it will based on the fundamental role of consciousness in the universe. **PL6**

211 **The Holoscendence Method for psychotherapy and for advancing personal and spiritual growth** Sergey Kuprijanov <serkupri@hotmail.com> (East-West Psychoconsulting Ltd., Helsinki, Finland)

The Holoscendence Method (HM) is a therapeutic method based on experience from clinical work, and an integration of Eastern spiritual traditions and Western therapeutic orientations. It represents an embodiment of and provides experiential evidence into the integral interconnectedness of all of life's phenomena, which theoretically seems to be well delineated by Ken Wilber's integral approach. HM is unique worldwide in its comprehensiveness, flexibility and depth; it is a single method that may be applied to a very wide spectrum of consciousness on both personal and transpersonal levels, and to subjective and objective individual and collective spheres of the human experience. The range of potentially manageable problems and tasks is very wide within many areas of life, not only psychotherapy and personal and spiritual growth, but also many other. HM gives a very special opportunity to work simultaneously on the cultivation of high transpersonal states of consciousness and on the development of personal structures. Working with states and stages simultaneously enables more efficient personal development and growth. It helps the individual to get better access to problematic experiences/structures, to disidentify from them and find deeper, more authentic levels within him/herself. HM is based on the systematic development of simultaneous experiencing of different expressions of life (again, not by alternating between them, but by systematic practical expansion and inclusion - in a Wilberian sense). This enables access to the subjective and objective individual and collective fields. The method is also

unique in the simultaneous use of fields of awareness (visual, audio, physical, subtle/bioenergetic, interpersonal). Through the interpersonal field the therapist/facilitator is able to perceive the individual from within, instead of approaching him/her as a mentally represented object. The practical application of correlation of energy resonance with perception is one of the central aspects of the method. Energy flow within the interpersonal field is dynamically witnessed and purposefully influenced. Stepping into the non-local dimension is used as a means to overcome limitations of mind-bound reality. HM represents a unique style of therapeutic communication, in which communication is taking place on many levels simultaneously. The use of a wide variety of altered states of consciousness (both within the individual and the therapist) contributes to the actualization of hidden resources. The use of therapeutic interpersonal trance leads to extreme growth of the therapist's sensitivity. Altogether the method gives the therapist a possibility to work with flexible involvement and detachment. HM may be used as such, or it may be incorporated into other therapeutic methods, adding them new dimensions and depth. An example of this is the expansion of the Gestalt Method to the transpersonal level. HM has been used in therapy context with definite subjective improvements experienced by individuals suffering from a very wide range of psychopathology, as well as significant increases in the quality of life of healthy individuals. **C16**

212 **Superluminality as possible explanation of quantum non-locality** Marta Sananes <martasananes@gmail.com> (Barcelona, Spain)

S. Harti (Mind Field, Should activate Information, and Zero-Energy Tachyons, http: // mind-and-tachyons.blogspot.com/) following Margenau and Eccles proposes that 'mental fields' interact with the brain and that the intermediary "psicons" are tachyons, that is to say, superluminal entities theoretically definable although their existence has not been demonstrated till now. A. Goswami (God is not dead, 2008) describes the 'descending causality' in the context of the quantum physics and the associated non-local phenomena. The non-locality implies the instantaneous connection of entities independently of the spatial distance. A way of explaining the non-locality is to suppose also the existence of tachyons that act as linkage of the seemingly instantaneous connections. From this hypothesis it is possible to speculate on the extraordinary nature of these entities not only as agents of the mind and of the conscience but also of the spirituality. Tachyons could be the entities that connect the realm of matter with the realms of mind and spirit. **C7**

213 **Integral leadership and the role of entrainment: Synchronizing consciousness** Danny Sandra , Sharda Nandram <danny@sandra.be> (Kortrijk, WVL Belgium)

When we review the academic literature on leadership we can make two distinctions. First, leadership by compliance and obedience whereby employees' performance is driven by negative or survival motivations. Second, leadership by inspiration and upliftment, where the individual is inspired to become self-actualizing, driven by genuine ideals and values in achieving the goals of the organization. This paper argues that an integral approach to leadership has more impact. The term ''integral' was first introduced by Sri Aurobindo to describe the multi-dimensional nature of consciousness comprising mainly the physical, vital (emotions, desires, cravings), mental and psychic (soul) levels of consciousness. Traditional science looks at phenomena in isolation and from a purely material perspective while the integral approach seeks to develop a holistic view in order to understand all the levels and the underlying oneness in which everything participates. While integral theory can be explored through reading or attending lectures, it goes way beyond a conceptual way of knowing that consciousness is multi-dimensional. This aspect can only be grasped through direct, inner experience which leads to perception and then realization of our inner, divine spark. This paper will elaborate on the principles of Sri Aurobindo's Integral Philosophy and the application in the context of leadership. The concept of entrainment will be introduced to support and enrich the interconnectedness of the multi-dimensional nature of consciousness. Entrainment is broadly defined as a phenomenon in which two or more independent rhythmic processes synchronize to the rhythm being more powerful or dominant. It is considered as one of the fundamental processes of a living system. It is assumed that when entrainment occurs, energy flows more effortlessly and performances are enhanced. In the human body, it is the heart that entrains other physiological processes, including the brain. Moreover, the heart significantly influences how human beings perceive and react. Since consciousness should be considered as a living system, the learnings from the functioning of the human heart are applied to enrich the understanding and experience of the multi-dimensional levels of consciousness. Finally, this paper argues that the degree of synchronisation, within an individual or organisation, influences the level of consciousness. **P5**

4.4 Emergent and hierarchical systems

214 **Science-based understanding of the consciousness at two levels: Own life system and own brain system. Lesson from the education program of Gnothi Seauton, knowing yourself through your body.** Yoriko Atomi , Miho Shimizu; Eri Fujita; Tomoaki Atomi; Noboru Hirose <atomi@bio.c.u-tokyo.ac.jp> (Radioisotope Center, The University of Tokyo, Tokyo, Japan)

Analysis era begun from the middle of the 19th century to the end of the 20th century brought us enormous progress understanding humanities, both in the scientific and literature worlds. When we think about our human beings, life scientific knowledge is so important, however it has been not connected to our existence having two levels of consciousness, which are organizing memory-relating and body-mind relation systems. Science-based education is essential for not only understanding ourselves but also formation of our knowledge. Previous methods of Humanities education can be divided into two types. The first is the method of knowledge transfer, and the second is the one with only practice. By either type of education method we cannot know own possibility and mechanism of self-learning and self-recognition, which may be characteristic of human beings to form a basis of scientific consciousness. This study shows new type of education system to "know thyself", which was introduced to 3000 first-year students of the University of Tokyo from the academic year of 2006. The program, which consists of five essential components to the understanding of our own body and existence, is as follows; we should know 1) the gaps of expectation and reality, 2) human standing and walking system, 3) running intensity to keep global homeostasis, 4) cell unity as an autonomous life system, and 5) resuscitation principle. In particular we focus on and discuss the importance of two new fields of recently developed life and brain sciences that had not been academically recognized in the physical education learning. Only human beings can learn and realize ourselves through scientific visualization of "own action" and representation of their own activities with words. This method is based on understandings of two systems of life, such as cells in our body and brain, both of which are a unity of living system. We are able to scientifically understand both and connect them through active motions/doing something planned to be understandable. Since both systems of cells and body might be evolved under the gravity on the earth, force production with energy transformation against gravity is essential for sustain living conditions. Therefore the cytoskeleton including microtubule and actin filaments inside of the cell is essential for our living system connecting outer filamentous system like collagens, which make our body system. To perform something using body is to functionate cell systems in our body and to activate our systems of cells to body and body to cells in both directions. Principles of both life and brain are "activity-dependent" system, of which example at cellular level are gene expression, protein synthesis and degradation workable under cell theory to keep homeostasis, as well as body level, of which example softness, resilience, balance realizable and obtainable in physical practice of yoga meditation and Tai Chi associating with consciousness. This new management of oneself through action with scientific visualization of our body-mind system can be regarded as "human sustainability" and constitute one part of the area of "Alliance for Global Sustainability to keep earth environment". **P4**

215 **Artificial consciousness: A computational approach to understanding consciousness** Peter Breznay <breznayp@uwgb.edu> (Information and Computer Scien, University of Wisconsin - Green Bay, Green Bay, WI)

We investigate the proposition that every genuine scientific problem is, ultimately, a computational problem. Phenomena in the physical, biological and social spheres of existence, can, theoretically, be modelled and simulated in a computing device with arbitrary precision, given unlimited computational resources (which are not available in practice). In addition, every phenomenon can be interpreted as a computation (running of a program), performed by some sub-system of the physical universe. Starting from this computational perspective, we propose that the problem of consciousness can also be investigated as a computational problem, in carrying out a scientific program aimed at building artificial entities that show verifiable emergence of consciousness. Our hypothesis is that consciousness in an artificial device is unlikely to manifest itself originating in a detached computer, but rather in a humanoid robotic device that has full sensory capacities and is capable both of active interaction with its physical environment and of full sentence communication with humans. As a result, we propose that in an attempt to create artificial, man-made devices that are capable of acquiring true consciousness, we need to build a small society of fully sentient robots that are maximally inter-operational with their environment, with humans and with each other, and that have the following features: 1. A learning-enabled, self-restructuring, artificial neural network-based central cognitive organ ("brain"). 2. A global communication subsystem of the brain that separates conscious sensation from unconscious by filtering out conflicting sensations, in order to form a coherent view of the robots' environment. 3. The ability of abstraction by generalization to allow memory forming, storage and retrieval. 4. The ability to recognize and synthesize human language, in form of full sentence communication. We present preliminary simulation results regarding the learning ability aspect of the proposed central neural organ. In the simulation we use a mirror neuron mechanism to reproduce rudimentary social learning, performed by a "child" neural network of a "parent" neural network and achieved by a form of imitation-based learning. **C18**

216 **Complexity theory and the "science of being": The relationship of insights from scientific and contemplative practices of investigation** Neil Theise <ntheise@chpnet.org> (Pathology and Medicine, Beth Israel Medical Center, Albert Einstein College of Medicine, New York, NY)

The mind may be used to discover and describe the world in two ways, by moving outward, through our sense organs, to accumulate data which is then woven together into a model for existence. Alternatively, usually in the context of spiritual traditions, the mind may be used in a contemplative fashion, turning inwards to explore the nature of existence. For many in our contemporary society these approaches are felt to be in opposition; even for those with sympathies toward both approaches, they are at best felt to be complementary, but not, in fact, yielding the same understandings of how existence is structured or comes into being (historically or moment by moment). However, applying complexity theory principles to the contemporary "Western" sciences of physics, chemistry, biology, and cosmology, reveals a different, more integrated perspective. Complexity theory shows how systems of interacting individuals that fulfill basic criteria self-organize into larger scale structures. Such systems exist in hierarchies, e.g. cells self-organize into bodies, bodies self-organize into larger scale social structures (e.g. ant colonies, human cities, ecosystems). Cells themselves emerge from interacting, self-organizing biomolecules which arise from interacting, self-organizing atoms, and so on, down to the smallest, indivisible, Planck scale units. These smallest things (perhaps "strings"), too small to arise from smaller things, come in and out of existence from an "energetic vacuum." This scientific "everything-as-complex-system" (what I have referred to as a "Science of Being") differs in terminology, but not in substance from descriptions of the divine made by theologians and contemplatives of diverse traditions (e.g. Buddhist, Jewish, Hindu). Thus, concepts of moment by moment creation from the Jewish tradition (e.g. Lurianic "Four Worlds" Kabbalah) and the Hindu tradition (e.g. the relationship of Ishwara to Brahman) may be derived precisely and directly, in Western terms, from this complexity analysis. Also, principles of Buddhist metaphysics (i.e. emptiness of inherent existence, interdependence, impermanence, karma) can be exactly described in Western terms. In particular, "emptiness" is revealed from both scientific and contemplative perspectives to arise from the fundamental granularity of not only matter and energy, but of space and time at the Planck levels of scale. Scientific method has revealed this granularity through the repetitive cycle of hypothesis formation, experimentation, and hypothesis revision. In contemplative practice, these insights arise through direct experience arising with contemplation-enhanced perceptive capacities as described by Bushell (see following talk, this session). Similarly, synesthetic experiences are reported to be sometimes brought to awareness, or amplified above baseline, or even initiated through contemplative practice, phenomena perhaps relating to quantum level entanglements also manifesting in conscious awareness through such increased sensitivity of perception. It should be emphasized that the perspective of this speaker is that these considerations are neither an attempt at "verification of religion by science" nor "religious justification for science", but independent, investigative techniques coming together for mutual benefit and more completely integrated human understanding. **W Syn**

217 **Sentience everywhere: Complexity and evolutionary emergence of sentient activity across all scales of existence** Neil Theise <neiltheise@gmail.com> (Pathology and Medicine, Beth Israel Medical Center, Albert Einstein College of Medicine, New York, NY)

That nervous system components developed very early in Earth's evolutionary history is evidenced by the presence and activities of components of neuronal cellular physiology in single cell organisms. For example, when Paramecium encounter an obstacle, deformation of the membrane at the point of contact leads to ion channel alterations and a subsequent voltage change (through altered ionic flux) that sweeps across the cell membrane, similar to neuronal action potentials, thereby reversing ciliary beats and moving away from the obstacle. Thus, there is sensing of the environment and subsequent response at the single cell level, a simple form of sentience. With the development of multicellular organisms, this evolved into specialized cells accomplishing such purposes and, eventually, the emergence of nervous systems in more complex organisms. Thus, where there is life, there is sentience, concepts that certainly relate to theories of autopoiesis first robustly stated by Varela and Maturana: that mind or consciousness are co-arising. However, sentience itself, a fundamental subcomponent of mind/consciousness, which we may define as sensing and response, may be located in less complex patterns below the scale of the single cell. Examples at all levels of scale will be offered. Complex biomolecules, e.g. the DNA helix, may have dissociated electron clouds that allow sensing of the environment and adaptive response. In DNA, "holes" in this electron cloud protect genomic coding regions from mutations by trapping ionizing radiation and moving it to non-coding regions. Indeed, all molecules interact with each other through the electrons of the component atoms. Atoms interact with each other through interactions between their electron shells, larger subatomic particles sense each other and interact through exchanges of smaller subatomic particles such as quarks, and so on, throughout the quantum realm where non-local effects between all smallest entities (e.g. particles, strings, etc) represent the simplest, least complex forms of sensing and response, i.e. sentience. While one may argue that mind and/or consciousness is limited to the smallest, autopoietic elements of life, namely the cell, sentience, as a component of mind and/or consciousness is, however, inherent and universal in all structures of existence across all levels of scale. **C10**

4.5 Nonlinear dynamics

218 **Shadows of thought: Soliton brain dynamics and consciousness** Hunter Adams, III <serunj@yahoo.com> (Lifeways Sciences Institute , Chicago, IL)

Diverse soliton activity has been experimentally verified to occur throughout the living state, in for example, myelinated nerve axons, microtubules, muscles, biopolymers and

DNA. However, the dynamics of various interacting solitons in biological systems at classical, quantum and phenomenological levels is not well understood or characterized. To model brain-based soliton interactions in an integrated way, I advance the concept of the neural soliton lattice (NSL). The NSL is hypothesized to form from multisoliton interactions, which typically leave in their wake a redistribution of energy and information. The products of multisolitonal interactions can be more complex solitonal interactions, such as soliton-phonon, soliton-biophoton, or soliton-electromagnetic field. Such interactions may become nodes that self-organize, creating an elastic lattice-like structure in the manner of quantized magnetic flux lines or Hopfield's spin glass neural network model, but with a difference. A node on the neural soliton lattice is not a one-dimensional point as a defect in a crystal (anharmonic lattice in condensed matter), but a multidimensional coherent structure as a breather (soliton). Associative activity between nested NSL nodes and their dimensions is thought to occur via temporal and spatial patterns of interference and resonance The NSL is proposed as an explanation of macroscopic to microscopic to macroscopic transitions in a neuron. It is hypothesized that this solitonic cross-correlational coupling of neural system elements and complex solitonal computations generates neural phase space (NPS), which is the locus of cognitive processes such as memory and subjective experiences like emotions. This model alleviates the need for a collapse of the wave function in quantum brain models to explain the emergence of consciousness. It is conjectured to be quasi-isomorphic with actual brain activity at several levels, hence a 'neural solitonal correlate of consciousness.' We conclude with some speculations on how the neural soliton theory can address phenomenological experiences, and eliminates the mind/brain problem. **C29**

219 **Localized wave modes in tubulin lattices** Muniyappan Annamalai, L. Kavitha; S. Zdravkovic; D. Gopi; M.V. Sataric <muniyappancnp@gmail.com> (Physics, Periyar University, Salem, Tamilnadu India)

We study the modulational instability (MI) and the generation of localized excitations in microtubules. Modulational instability (MI) is a universal process in which tiny phase and amplitude perturbations that are always present in a wide input beam grow exponentially during propagation under the interplay between diffraction (in spatial domain) or dispersion (in temporal domain) and nonlinearity. Microtubule (MT) is one of the most essential cytoskeletal elements in the eukaryotic cells, which supports mitosis, cell architecture and motility as well as intracellular transportation. Tubulin dimers in a GTP-binding state (GTPtubulin) are assembled onto MT-ends and make them stable. Microtubules are essential cytoskeletal polymers of alpha- and beta-tubulin that can switch between growing and shrinking phases; this phenomenon is known as dynamic instability and is linked to GTP hydrolysis in beta-tubulin. Microtubule polymerization dynamics are of fundamental importance to the intracellular functions of the microtubule cytoskeleton and are therefore highly regulated. Proteins that regulate microtubule dynamics fall into two main classes: proteins that stabilize microtubules and proteins that destabilize microtubules. The former class of proteins is exemplified by the classic microtubule-associated proteins (MAPs), which are thought to bind along the length of the microtubule polymer and enhance their stability. The polymerization of tubulin into microtubules is accompanied by the hydrolysis of GTP at the exchangeable site into GDP and Pi. MTs participate in a wide variety of dynamic cellular processes ranging from mitosis to signal transduction, to information processing. During cell division they serve as a kind of track for the transport of chromosomes. In the neurons they are the pathway for the transport of neuronal vesicles towards the synapse. In non-dividing cells they form a network in the space between the nucleus and the cell membranes being possibly involved in the transport of material from the surface to the center and vice versa. MTs are considered as lattice and in each site MTs subunits are located. Each subunit is bounded by GTP molecule which is highly unstable and releases energy in a nonlinear fashion namely soliton. We employ the localization of energy in the MTs using modulational instability. **C7**

220 **A Torsional model in nonlinear dynamics of microtubules** Slobodan Zdravkovic, Miljko V. Satari <szdjidji@gmail.com> (Fakultet Tehnickih Nauka, Univerzitet U Pristini, Kosovska Mitrovica, Yugoslavia)

A new nonlinear model for dynamics of microtubules is described. A rotational degree of freedom is assumed as well as a continuous approximation. This torsional model is compared to the similar vibrational one where longitudinal degree of freedom is assumed [1]. The obtained nonlinear partial differential equation is solved using modified extended tanh-function method [2]. It is shown that the dynamics of microtubules is described by a kink soliton. Also, some estimations of the existing parameters are discussed. [1] M.V. Satari, J.A. Tuszynski, R.B. Akula, Phys. Rev. E 48 (1993) 589-597. [2] S.A. El-Wakil, M.A. Abdou, Chaos, Solitons and Fractals 31 (2007) 840-852. **C29**

4.6 Logic and computational theory

221 **Considerations concerning the overall unification** Shantilal Goradia <sg@gravityresearchinstitute.org> (Gravity Research Institute, Inc., Mishawaka, Indiana)

The fine-structure constant is already believed to link to consciousness. We use Boltzmann expression, originally written by Planck and admired by Einstein, not so famous then, to derive the fine-structure constant, and also to link it to the cosmological constant, thus satisfying Gamow, the originator of the big bend theory and first thinker of four nucleotides, who meant that the fine-structure constant is linked to cosmological constant introduced by Einstein. Here, we illustrate classical type macroscopic uncertainty relation: 'No one else except the conscious driver can accurately predict both the position and velocity of a car' Is it the consciousness of particles that leads to the uncertainty relation? Vedic answer in Katha Upanishad is implicitly 'Yes' Without that, after a century of hard work, Theory of Everything (TOE) and fundamental consciousness are both on unsettled debate. We say that the issue cannot be settled. Unrecognizable consciousness, implicitly in the Vedic word 'particle soul' (Anu-atma in Sanskrit), resolves those issues, thereby supporting Einstein's quest to address the correspondence principle questioned to Bohr. How can physicists, otherwise, explain the wonders of trillions of quantum particles to clone baby sheep Dolly? How do they communicate? We use existing theory on quantum informatics. Our efforts to contribute to physics presented and published all over the globe since March 1919, also contribute to consciousness simply, in this millennium, as originally thought. See www.arXiv.org/pdf/physics/0210040v5 for more of the same, including quantum tunneling and other issues. Non-physicists may escape our slight mathematical modification on the 'Newton's inverse square', that depicts gravity, too, as probabilistic. That preprint silently, but implicitly, addresses many other issues, such as Einstein's spooky action. What Einstein meant is that our observation of a probability is a decision of the observed with some supernatural entity therein, like the conscious driver of a car, here presented as the particle-soul. We substantiate our proposal by the derivation of the constants of nature, thus enhancing quantum physics to unify with consciousness and vice versa, and extending the prehistoric omnipresence of the supernatural entity in the quantum particles, derived from meditation and not mathematics. Is God a mathematician? Our answer is 'Obviously not' - No mathematical formula disproves that obviousness. I follow suit, standing on the shoulder of the same giant, the one we all know, whether one is physicist or not. The past of science is based on multiple postulations? Why should the future be different? So help me God. **C14**

222 **Theorem required for a minimum contradictions theory of consciousness** Athanassios Nassikas <a.a.nass@teilar.gr> (Mechanical Engineering, Technological Institute of Larissa, Larissa, Greece)

The use of Goedel's theorem possibly creates a weak point in Penrose's theory on non-computational thinking. The main purpose of this paper is to present the final version of a theorem which could overcome such a weakness. This theorem is compatible with Penrose's theory mentioned; it leads to a minimum contradictions physics different from the physics

related to Penrose-Hameroff's theory of consciousness but with some similar elements. We may notice that every theory includes, beyond its particular axioms, the principles of the basic communication system (language) through which it is stated. This system obeys the Aristotelian logic (Classical Logic), the Leibniz Sufficient Reason Principle and a hidden axiom which states that "there is anterior-posterior everywhere in communication". If we denote by "L" a logic consisting of the Classical Logic and the Sufficient Reason Principle regarded as a Complete Provability Principle, the following can be proved: Theorem I: "Any system that includes logic "L" and a statement that is not theorem of logic "L" leads to contradiction." Statement I: "Any system that includes logic "L" and the anterior-posterior axiom leads to contradiction." Despite this, we do communicate in a way we consider logical. Since contradictions are never vanished, we try to understand things through minimum possible contradictions. On this basis we can state: The Claim for Minimum Contradictions: "What includes the minimum possible contradictions is accepted as valid." The axioms and the claim mentioned constitute the Principles of the Active Language; when we communicate we persist in logic despite of the existing contradictions. On this basis a minimum contradictions physics can be stated whose principles are the principles of the active language; this physics is a stochastic matter-space-time QM implying a Quantum Gravity and under certain simplifications the GRT. Minimum contradictions physics, described in a Hypothetical Measuring Field (HMF), implies that, "locally", matter-space-time can exist and not exist at the same time and that always exists "somewhere" [in the (HMF)]; matter-space-time is distributed according to a probability density function. This is incomprehensible; however, the existing contradictions are accepted as valid because of the claim for minimum contradictions. The "dimensionless" "where there is not space-time" is the core of consciousness and it is active i.e. it includes the "deciding" which is related to the notion of free will. Note that the minimum contradictions stochastic space time cannot be defined on the basis of boundary conditions imposed. Thus, the "dimensionless" behaves as if it possessed all of the hidden variables required. There are co-existing (g-real)-mass and (em-imaginary)-charge space-time which interact-communicate through photons [(g) or (em) particles with exactly zero rest mass]. The stochastic matter-space-time is fractal and this permits its communication with the "dimensionless" "where" the consciousness appears. The Universe was possibly created by splitting of the "dimensionless", through photons, into (g) and (em) matter-space-time; the evolution can be explained on the basis of the Universe fractal matter-space-time compatibility with its "surrounding dimensionless". **C7**

4.7 Bioelectromagnetics/resonance effects

223 **Consciousness Causes Real Magnetic Fields** Shoichiro Komaki , ; H.Yoichi.Y.Ono,S. Sakurai <kgh03115@nifty.com> (Headquarter, The PSI Science Institute of Japan, Ichikawa, Chiba, Japan)

In this report is described the experiment results which shows the occurrence of considerably strong magnetic field (reaches to 100 milligauss at spaces of 10cm apart from a person's body) when the person, a quigong master points out places of quigong spots of his client.The person has an extraordinary ability and sense of finding out his client's health status by touching his hand fingers to client's hands. This is the whole procedure of the moment of the anomalous magnetic fields occurrence. Only when he says just "Here it is", this must be the reason of his consciousness sourrounding person could observe and the magnetic fields occurs. In this report the measurement system, procedure and the result data are explained. **C31**

224 **Electromagnetic Field Theory of Consciousness: The Shape of Conscious Fields** Susan Pockett <s.pockett@gmail.com> (Waiheke Island, Auckland New Zealand)

The electromagnetic field theory of consciousness proposes that conscious experiences are identical with certain electromagnetic patterns generated by the brain. While the theory freely acknowledges that not all of the electromagnetic patterns generated by brain activity

are conscious, until now it has not been able to specify what might distinguish conscious patterns from non-conscious patterns. Here a hypothesis is put forward about the 3-D shape of electromagnetic fields that are conscious, as opposed to those that are not conscious. Seven predictions arising from this hypothesis are described. Existing empirical evidence shows that five of these predictions have already been successfully tested. Requirements for experimental testing of the other two are discussed. **PL1**

225 **Information Processing within a Neuron via Electrodynamic Signaling by the Dendritic Cytoskeleton** Jack A. Tuszynski <jackt@ualberta.ca> (Department of Physics,, University of Alberta Edmonton, Edmonton AB,, Edmonton Canada)

A model describing information processing pathways in dendrites is proposed based on electrodynamic signaling mediated by the cytoskeleton. Our working hypothesis is that the dendritic cytoskeleton, including both microtubules (MTs) and actin filaments plays an active role in computations affecting neuronal function. These cytoskeletal elements are affected by, and in turn regulate, a key element of neuronal information processing, namely, dendritic ion channel activity. We present a molecular dynamics description of the C-termini protruding from the surface of a MT that reveals the existence of several conformational states, which lead to collective dynamical properties of the neuronal cytoskeleton. Furthermore, these collective states of the C-termini on MTs have a significant effect on ionic condensation and ion cloud propagation with physical similarities to those recently found in actin-filaments and microtubules. We also discuss experimental findings concerning both intrinsic and ionic conductivities of microfilaments and microtubules which strongly support our hypothesis regarding internal processing capabilities in neurons. Our ultimate objective is to provide an integrated view of these phenomena in a bottom-up scheme, demonstrating that ionic wave interactions and propagation along cytoskeletal structures impacts channel functions, and thus neuronal computational capabilities. The issue of quantum versus classical character of these interactions will be discussed. Acknowledgements: This research was supported by NSERC (Canada) **PL10**

226 **Transcranial Stimulation and Consciousness** Eric Wassermann <wassermanne@ninds.nih.gov> (NIH/NINDS, Bethesda, MD)

Transcranial stimulation and neuromodulation techniques can fire neurons, modify synapses, and influence the course of neurobehavioral disorders, such as depression. However, despite their interest to researchers and 'neurotechnology' enthusiasts, they remain on the margins of clinical practice and, perhaps more notably, there seems to be little risk as yet of their being abused by recreational users. A few dramatic demonstrations, a psychiatric model focused on 'biological' treatments, a strongly localizationist view of cortical function, and the novelty of stimulating the brain transcranially may have influenced expectations of its effects on behavior and perception. This speaker will discuss instances where noninvasive stimulation could impinge on consciousness and give his personal view of its promises and limitations. **PL4**

4.8 Biophysics and living processes

227 **Human microbiota and consciousness** Daniel Beal <dmbealmd@msn.com> (Psychiatry, Cincinnati VA Hospital and University of Cincinnati, Cincinnati, OH)

This presentation will argue for the effect of the human microbiota (symbiotic enteric bacteria) on consciousness. While initially this argument may be seen as either a category error or null set, evidence from neurobiology, evolution, genetics, and combinatorics can show a robust relationship between enteric bacteria and consciousness. Another 20 years of research in consciousness is more likely to elaborate the effect of the human microbiota on consciousness than to show that a cybernetic singularity is upon us. Ley and Lederberg, microbiologists, have emphasized the importance of having a broad ecological view of our relationships with [enteric] microbes. In this view, ?we are seen as superorganisms composed

of an amalgam of both microbial and Homo sapiens cells, where the survival of the microbe and human is interdependent. We carry 100 trillion microbes in our gut; this is 10 times the number of our own cells, and these bacteria carry at least 10 times as many genes as found in the human genome. This bacterial component of our biological makeup is nothing new, as cross- species studies suggest that mammals have been co-evolving with symbiotic bacteria for millions of years. We have only recently been able to know the gut microbiota in some detail. Genomic assay techniques have shown us the genus and species diversity which was unknown to us earlier. We remain unable to culture most of the fastidious anaerobic bacteria and archaea (ancient bacteria) in the gut. There is dynamic inter-kingdom communication between symbiotic and commensal bacteria and their human hosts. The signaling involves hormones, neurotransmitters, neuropeptides and signaling gases like CO, NO, and H2S. There is clear evidence of reciprocal communication between enteric bacteria and the gut, including the gut's enteric nervous system. The enteric nervous system communicates with the brain through the vagus nerve and sympathetic roots with roughly 80 percent of these autonomic fibers sending afferent signals. There are examples in the medical literature of changes in gut bacteria leading to clear changes in the brain. The bulk of these examples find that the immune system is an intermediary between intestinal microbiota and brain, but the role of circulating neurotransmitters from microbiota as well as immune (toll-like) receptors on neurons suggests direct communication. Animal literature shows specific microbiota-brain communication. Campylobacter jejuni infection in the mouse simulates c-Fos expression in the hypothalamus before any systemic response. Bifidobacterium infantis shows evidence of a direct antidepressant response in rat models. The most intriguing aspect of this new characterization is the following: We are in the earliest days of appreciating the influence of the microbiome (symbiotic bacterial genes) and their associated cells. We currently only know the most superficial and obvious things about this microbiota. But the large number of genes and cells can yield a large effect. The capacity of the microbiota to communicate using human neurotransmitters enables direct communication with the human nervous system. It is a next step to elaborate direct effects on consciousness to be discovered and characterized in years to come. **C33**

228 **Functional physics of life; functional physics of biomolecular self-organization** Wolfgang Hebel <wolfgang.hebel@telenet.be> (EU Scientific Coordinator Retd., Tervuren (Brussels), Belgium)

Although it has been possible to discover the complicated structures of many bio-molecules in recent decades, especially of the famous DNA and of many functional proteins with an amazing precision down to their atomic details, nevertheless, a fundamental understanding of the functional molecular physics in a living cell eludes us.All molecular processes that occur inside a living organism serve one principal purpose, namely to sustain life by replacing the actual molecular system at the appropriate moment with an essentially identical, but younger one. However, classical physics knows of no basic principle that distinguishes such purposeful molecular processes in living organisms from ordinary molecular reactions in inanimate matter. This study discusses a fundamental premise that underlies apparently the functioning of biomolecular self-organization. **C40**

229 **The physics of perception and redefining the human body as literally a specialized type of star, or solar form** William McDougal <wmcdougal@roadrunner.com> (Housatonic, MA)

Human beings are literally extremely specialized kinds of star. This is true for every physical form on the planet. Dogs, cats, insects, flowers, trees, each is a very specialized container which expresses the cosmic spark of Life. The energies which may be expressed depend entirely on the physiology of the form it is found in. Also, there is a fully functional physics (of perception) which is built into the physiology. It is with this physics of perception that the fight or flight principles are able to function. Based on one's perception of one's local environment that person will express a wide variety of energies, with differing magnitudes of radiance, magnetism, gravity and all the rest. In large part, the thesis explores cellular function all explicitly relative to perception relative to stress and any PTSD and how the expressions of one's energies is effected or facilitated. There is much implication which comes from this set of ideas. Very briefly, dependent upon the types of energy a person is likely to express in his lifetime, these energies result in hypothetical types of environment or atmosphere which are also maintained. Thriving environments may potentiate the manifestation of a wide variety of life, such as the oceans and seas facilitate with all of their abundance. **P4**

230 **The sun as super-consciousness** Oleksandr Potashko <ale-potas@bigmir.net> (SF 'Fractal', Kiev, Ukraine)

The purpose of the Sun stars of planetary systems - in terms of our understanding - of global governance processes of planetary formation until the origin of life and its maintenance. The origin of life comes together / in parallel with the formation of planets. Settling a niche at the micro and macro levels On the solar emissions, the mission of the Coronas-M This position of the Sun - above planetary life we may consider as super-consciousness **P4**

4.9 Evolution of consciousness

231 **It is in our DNA to sense how long we can live** Guy J Ale <lifespanseminar@yahoo.com> (Lifespan Seminar, Valley Village, CA)

Dear reader: I am the president of Lifespan Seminar, based in Los Angeles, California. Lifespan Seminars explain that it is in our DNA to sense how long we can live, and teach how to do this. We introduce the awareness of this latent genetic feature as a natural step of evolution. This is not a highfalutin theory but a practical approach to life, which provides individuals and organizations with a structure of balance and wellness in their personal and professional lives by helping them master the energy and resources inherent in their makeup. Obesity is becoming the most prevalent public health problem in industrialized nations, the Organization for Economic Cooperation and Development (OECD) said in a study published in Paris on September 23, 2010. "If recent trends continue, projections suggest that more than 2 out of 3 people will be overweight or obese in at least some OECD countries within the next 10 years," according to the study, Obesity and the Economics of Prevention. What is to be done? I find myself to be the best version of myself at fifty, without the use of drugs, pills, or enhancements of any kind. Therefore, my job, as someone who teaches wellness, is to show you, dear reader, what I see in my life, which is a framework of life-affirming choices. I have known how long I can live for the past eighteen years. To address skepticism head-on, this is not a fact but a potential, something that might come true if I make the right decisions. I have lived with this notion since 1992, and the more I live it the more I believe it. I have initially struggled with it, mistrusted it, researched it, gradually accepted it, understood it, and finally came to rely on it. Now I teach what I've learned. Albert Einstein said, "There is no logical way to the discovery of these elemental laws. There's only the way of intuition, which is helped by a feeling for the order lying behind them." My research over the last eighteen years, along with my intuition, tell me that the awareness of the amount of energy our body contains is a dormant capacity in us, currently unknown, as the introduction of fire, the invention of flying, and the discovery of radio waves were before we revealed them. We are made of the same energy and matter of which the planets and stars are made. We are an offspring of the same cosmic forces. The notion that we use only 10% of our brain capacity might also reflect the fact that we know only that amount of the universe. The discoveries of the worlds within and without are interconnected and interdependent. Consciousness in the universe has been developing for the -past- 15 billion years since the big bang. We, the carriers of this consciousness, are at the -present- stage of evolution, and have not reached our final form. The perception of our duration is a natural step in our -future- progress. **C16**

232 **DNA consciousness** John Grandy <khyber_john@yahoo.com> (White Stone Consulting LLC, Orchard Park, NY)

The purpose of this presentation is to investigate a potential source for the emergence of neuron-based forms of consciousness. Another objective will be to justify the theory of DNA consciousness as a legitimate form of consciousness and to promote it as a new subspecialty within the science of consciousness. The results that were found are that the DNA molecule is autopoietic, dynamic, and evolving, which are all validated by this molecule's behaviors and objective activities. In addition, there is objective proof that DNA consciousness influences neuron-based consciousness, which is supported by the field of neurogenetics. Consequently, the main conclusion that is derived is that the proposal of DNA consciousness is implicitly a legitimate form of consciousness but of course different than humankind's own neurological consciousness. This will provide investigators with an objective model to study the potential source of the emergence of neurological consciousness. **P4**

233 **Consciousness: New paradigm in philosophy** Taras Handziy <handziy@yahoo.com> (Philosophy, Maria Curie-Sklodowska University, Lublin, Poland, Lublin, Poland)

Let us believe that there exist many possible universes (M-theory, our interpretation). Let us suppose that our universe has some something in common with another universe or other universes, more advanced and sophisticated. In mathematical terms, at least they may be adjacent in the geometric point. Let us take this geometric point as an object of mental imagery and concentration. This point is visualized as the point full of power, love, light and wisdom. Geometric point is not the subjective mental imagery comparing to other imageries, for example to the mental imagery of Buddha or Christ. In the case of Buddha or Christ, everybody visualizes them in different ways. The geometric point is the object that is visualized and should be visualized in the same way by all people. On another hand, in the case of the geometric point, the "pressure" on the object from the human being's mind will be the largest. The only desire should be to transfer consciousness to this geometric point. It may result that the stream of consciousness will begin its continuous flow to the "geometric point". We have coined the Quantum Mechanics System model of the "geometric point". The coined model "Uniborder" consists of Planckian black hole (our universe), traversable wormhole (the exact border), and Planckian white hole (another universe or other universes, more advanced and sophisticated). The final destination of the consciousness continuous flow is the event horizon of Planckian white hole. Being conscious there means to be the external observer outside our universe. Eternal altered state of consciousness reached intentionally by meditation has been achieved there. The hypotheses of our research are the following: the mind of a human being may have the direct influence on the Uniborder, influence, known under the term "telekinesis"; a human being may be conscious in the Uniborder. We have achieved the first, practical results, in proving these hypotheses. We think the hypotheses will have been proved completely by December 2012. According to Consciousness new paradigm, the person conscious in the Uniborder influences the person unconscious in the Uniborder in a greater way than vice versa. The main aim of the influence is the evolution of consciousness. We have shown the failures of inductive and deductive reasoning. At the same time the first success in experimental method has been achieved. After the person has transferred consciousness to the Uniborder and become mindful in the Uniborder, he or she may not become older with age. His or her time may have stopped in the event horizon of Planckian black hole relative to time on a clock that remains safely back on the Earth. Moreover, he or she may become younger with age in the case of being mindful in the event horizon of Planckian white hole. Conclusions of the possibility of a person being immortal and not becoming older with the age are based on: the practical experience of consciousness flow, laws of Quantum Mechanics, Tibetan Philosophy. **C22**

234 **Noosphere Spiritual Ecology** Boris Petrovic <zlatnojaje@gmail.com> (Noosphere Forum, Belgrade, Serbia Yugoslavia)

"The Noosphere will become a way of knowing as a way of being, completely integrating Noosphere downlink in human resonance systems. The way of Noosphere Spiritual Ecology is the only way to resolution of the planetary crisis. The mental field is the world of cause as we only see the poisonous effects growing on this planet. The plants, the waters, the animals, humans and moments - They all fall from the heavens rather than grow from the ground. It is the poisons of the global mind that poison the Earth. To change the course of humanity, we need to take away the pollution between the planetary causal and phenomenal so that all can become the embodiment of truth." Boris Petrovic, World Forum of Spiritual Culture, Astana 2010 **P4**

235 **Vedic science: The origin and evolution of consciousness** Chandraprakash Trivedi, Aseem Trivedi and Aditi <cp_trivedi01@yahoo.co.in> (Botany, Former Principal MJS, P.G.,College, Bhind, Ratlam, M.P. India)

The life energy has been described as Consciousness. It appears at its own due to the movement of charged particles, and streaming movements of the protoplasm in the cell and disappears with the aging of cells. It is just like the magnetic energy generates in the atom. It appears from the pre-existing cells only. In the Vedic Biology, the Sudhanvan coaservate has been synthesized from the Angirasa -viscous sap, accordingly the cell Ribhu and its various stages Ribhu, Ribhukshan, and Vaja came into the existence. The components of the Ribhu are nucleus-Brihaspati, chromosome-Yama, the DNA-Tvashta, Vivasvat, and the chlorophyll-Parna-Mani, and Bhrigu. Once the first cell body has taken its shape, it has maintained its continuity from generation to generation. The cells are the source of organic matter on the earth. Hence they have been termed as celestial race and wealth for nature. The generation of the consciousness has been expressed by the hallowing word of the vibrations and Soma. They who for Indra, with their mind formed horses harnessed by a word, Attained by works to sacrifice Rig.1-20-2. The generation of the charged ions and their vibrations has been expressed. With the movements of the charged ions in the coaservate, the actions and the interactions have set in motion. Here, O ye Ribhus, is this sea for all the Gods: sate you with Soma offered with the hallowing word Rig-Veda1-CX-1The natural forces (Gods) have synthesized the cell with generation of the life energy. Where the cell is the vast ocean for the natural forces. When seeking your enjoyment on ward from a far, ye came UN to the home of liberal savita Rig-Veda1-110-2. Accordingly the enzymes (home of savita) have been synthesized in the cell. The savita gave you immortality, because ! ye came proclaiming him whom naught can hide.+-this drinking- chalice of the Asura, which till that time was one ye made to be fourfold Rig-Veda1-110- 3. The sacrificial ladle, wrought new by the God Tvashta's hand, four ladles have ye made thereof Rig-Veda 1-20-6. The enzymes have given the immortality to the cell, and the Tvashta-DNA has given the potentiality for the cell division in four fold manner, accordingly the single cell became new with the help of the Tvashta- DNA.The DNA on one hand regulates the course of life through the hereditary characters, and the streaming of the protoplasm is the source of consciousness. The metabolic reactions are just like its fuel. The consciousness gets further strength with evolution, through the movement of the sap in plants, circulation of blood in the animals, and the evolution of the nervous system, and brain in the human-beings. The generation of the life energy- consciousness is related with the functions of the physical cell body, heart and the brain. **C32**

236 **The sense of presence: Reflections on ontogenic and phylogenic changes in the nature of consciousness** John Waterworth , Eva Lindh Waterworth <jwworth@informatik.umu.se> (Informatics, Umeå University, Umeå, Sweden)

By sense of presence, we refer to the feeling of being somewhere in the world, in the present moment. It is the means by which an organism knows when something is happening in the world at the present, and is the manifestation of an encoded ability to know when consciousness is occupied with situations in the immediate, outside world. For organisms in a natural environment, it is obviously vital for survival to pay conscious attention and respond rapidly to present threats and opportunities. This need is a key driver for development, both within the developing organism and when viewed as evolutionary change. Through evolution, this fundamental ability of all conscious organisms has developed in humans into

the ability to distinguish external, physical events and situations from events and situations realized mentally, internal reflections in thought and imagination. This is a necessary distinction that cannot be made on the basis of emotional appraisal or reality judgments, because imagined situations trigger the same emotional responses as physical situations (Russell, 2003) - and may also be judged real or unreal (as may physical events). To do this, they need to be able to feel directly when they are attending to the current external world; this is the feeling of presence. The feeling of presence is in this way analogous to the feeling of emotions; it is informative, direct, subjective, and has a long evolutionary history. It is closely bound up with the intention to act, of mental and bodily readiness for action (see Riva et al, 2011 for our account of presence as the missing link in descriptions of the relation between intention and action). As with simpler organisms, the sense of self of the newborn infant is underdeveloped, but the feeling of presence is already there. The newborn infant is either present or unconscious, since the capacity for mental reflection has not yet emerged. Mental reflection is conscious mental activity that does not elicit a sense of presence; it also underlies the development of the self. The self develops largely through social interaction, and as this increases through development so does the capacity for varying degrees of presence. As the child becomes increasingly mobile and also capable of reflective thought, so a calibrated sense of presence supports action on and in the external world. The developed adult draws continuously on a sophisticated sense of presence to support successful action in the world, actions that embody both long and short-term intentional strategies for carrying out activities. In old age, capacities for action decline as the sense of presence diminishes. Attention is increasingly directed towards the self and away from the external world. The common dementias of old age are accompanied by a partial breakdown in the sense of presence. This is reflected in the familiar problems experienced by the demented elderly in distinguishing internal worlds of reflection from the external world around them and in completing planned activities. Without a conscious sense of presence, we can no longer act successfully on our intentions. **P4**

4.10 Medicine and healing

237 **Transcranial ultrasound (TUS) effects on chronic pain and mood: A double blind crossover study** Emil Annabi , M Trakas, C Duffield, MB Gerace, JJ Badal, P Boyle, S. Hameroff, Department of Anesthesiology,The University of Arizona Health Sciences Center <eeannabi@gmail.com> (Department of Anesthesiology, The University of Arizona, Tucson, AZ)

Introduction: Ultrasound (US), mechanical vibration above 20 kilohertz, is used for imaging and therapy, the latter primarily through heat effects. However in recent years focused sub-thermal ultrasound has been used for neuronal modulation in brains of animals and humans, for applications like trauma, stroke, tremor, dementia, memory, anxiety, depression etc. We investigated sub-thermal transcranial ultrasound (TUS) vs placebo applied at the temporal scalp of chronic pain patients, evaluating subjective report of pain and mood. ***Methods:*** With IRB approval and informed consent, 31 chronic pain patients from UPH Hospital volunteered and entered the study. Subjects, unable to distinguish TUS from placebo, sequentially received both in a double blind crossover, i.e. TUS then placebo, or placebo then TUS separated by 40 minutes. A physician, also blinded for TUS vs placebo, applied the probe with gel to the temporal scalp area contralateral to maximal pain for 15 seconds. A second investigator operated the ultrasound machine and randomized TUS vs placebo for each subject. For TUS we used a 12L-RS probe and a General Electric LOGIQe ultrasound imaging machine, set to 8 MHz B mode at 100% power, with harmonics and crossXbeam on (mechanical index 0.7). Vital signs (blood pressure, pulse rate, oxygen saturation) were recorded and two visual analog scale tests, the Numerical Rating Scale for pain (NRS), and the Visual Analog Mood Scale (VAMS) were filled out by each subject just before, and 10 minutes after each of the two applications. NRS and VAMS are standard pain and mood assessments, ranking zero to 10 (NRS) and zero to 100 in 8 categories (VAMS). From VAMS, Global Affect (GA) and Global Vigor (GV) are derived: (GA = 10 x [(happy) + (calm) + 20 - (sad) - (tense)] / 4; GV = 10 x [(alert) + 30 - (sleepy) - (effort) - (weary)] / 4). ***Results:*** Data for TUS vs placebo were analyzed using Welch's two sample t-tests for NRS/pain, GA and GV for both 10 and 40 minute changes from baseline. For TUS compared to placebo GA increased at 10 minutes by an average of 5 percent (t=1.718, df=57, p=0.0456), and at 40 minutes by an average of 8 percent (t=1.836, df=24, p=0.039). ***Discussion:*** We found slight but significant improvement in Global Affect 10 minutes and 40 minutes after TUS, relative to placebo. The mechanisms by which non-thermal TUS modulates brain function are unknown, but are suggested by others to involve neuronal membrane receptors, channels and potentials. However we suggest instead that TUS acts on intraneuronal microtubules, known to resonate in the 10 KHz to 10 Megahertz range. TUS is a promising therapeutic tool for noninvasive modulation of conscious and unconscious mental states and disorders. **C29**

238 **Demystifying energy healing** Nancy Clark <oneenergy@comcast.net> (Arizona Integrative Therapies, Tucson, AZ)

This is an interactive presentation utilizing photos and audience demonstrations. Energy field imaging reveals human electromagnetic fields, chakras and meridians as well as imbalances, blockages and illness. Participants will participate in demonstrations plus learning new energy healing techniques. Presentation Objectives: 1. Provide a greater understanding of how healing energy is used as a means of transforming the subtle body frequencies to produce homeostasis in the physical body. 2. This understanding will permit the audience to become aware that illness often begins (in adults) with thoughts that become emotions. These lead to chemical imbalances and eventually affect the physical body in the form of illness. Discovering energy problems and balancing them in the subtle bodies can even restore equilibrium before the problem reaches the physical body. 3. Participants will see a PP presentation showing the chakras, meridians as well as the results of illness, surgery and other traumas. Photos will also show before and after energy treatments by healers. 4. The audience will experience energy healing by participating in demonstrations and doing energy healing exercises on each other. Content Outline: A practical perspective on energy as the medicine of the future #1 Introduction to energy medicine #2 Energy photos with improvements after energy treatments as described above. #3 Demonstrations on the size of the electromagnetic field (matrix) and individual chakras followed by techniques to clear blockages and balance energies #4 Participants learn to use energy procedures on one another #5 Conclusions showing the benefits of restoring balance to all subtle bodies **C33**

239 **Mindfulness versus medication in treating ADHD and a related hypothesis that the brain does not produce conscious mental experience** Ross Grumet <rfg@psychiatry-atlanta.com> (Atlanta Psychiatric Specialists, PC, Atlanta, GA)

Introduction: So-called "mindfulness" strategies are taking over the psychotherapy field, attaching themselves to the more than 400 interventional and relational psychotherapies (behavioral, cognitive, dynamic, etc.). The primary mindfulness instruction/skill is to "notice what your mind is doing", a Buddhist related theme in which "awareness...of the present moment...nonjudgmental acceptance" are the generally invoked motifs. The sought after therapeutic effect is a kind of intentional/observational stance toward your own mental activity, followed by a reduction in impulsiveness and emotional reactivity, such as less depression, anxiety, anger. (Note: We could assume that attendees at this Conference, who may often be spending their careers in informal mindfulness, are experiencing improved equanimity and reduced suffering.) Clinical: I report on a series of 32 adult patients with attention deficit hyperactivity disorder (ADHD) who have received both stimulant medication and brief mindfulness psychotherapy, in several different sequences. Target symptoms included social inattention, work inattention, planning skills, and hyperactivity/impulsiveness. This naturalistic study explores the hypotheses that medication is more effective than mindfulness, and that mindfulness is a useful augmentation to drugs. Both premises are supported. Several patients, after pleasant mindfulness experiences, reported "meta-mindfulness" states, in which they found themselves outside the conventional location of the mind, and this led

to a further mind-brain hard problem hypothesis. Hard Problem Conjecture: Let us suppose that the brain is not what produces conscious experience (CE). Instead, picture the body and the brain jelly interacting in a physical material way with each other as well as each with its environment. These extremely complex interactions of body-brain-environment-body-brain are commonplace findings, and in fact they are the subject matter of ecological science and biology (e.g., extended phenotypes). Now let us place CE not just wherever a brain product would be, but rather out there in ecological space, where environment-body-brain action is taking place. (I apologize for the mixing of spatial, functional, anatomical metaphors- an attempt to put formal topics into brief ordinary prose). Therefore, CE is a material expression, a thing that matter does, a product of this world. But CE is not "all in your head". There is no movie in the head, nor any theater in the mind. There is only the movie, and only the theater. No one is watching. What "you" are consciously experiencing right now is That Out There, a property of matter as it interacts. Scientific or experimental evidence for this conjecture can be adduced from Libet's work and from dream research. Experiments can be devised to test changes in CE when the environment is varied, and compare these findings with variations in CE when the brain or body is altered. **C13**

240 **A triple blind study of remote viewing a virus in tomato plants** Melvin Morse , Lance Williams Beem MS, Stephan A Schwarz, Deba Katz MSW <melvin.morse@yahoo.com> (Spiritualscientific.com, Georgetown, DE)

Overview: Remote Viewing (RV) is a non-destructive validated method by which the viewer can 'see' an object, through non local perception. RV has been scientifically validated for over 3 decades. We propose a novel scientific question of medical importance: 'Can RV substitute or augment current methods for evaluation of virus particles found in living cells of plants and animals?' Although we can currently image viruses to the atomic level, such methods have limitations including physical distortions, lack of real time signature, significant expense, and problems with accurate clinical assessment of viral presence. We tested our hypothesis designing five different triple blind remote viewing protocols. We selected Tobacco Mosaic Virus (TMV) for its similarity to human AIDS and hepatitis C viruses. We wanted to attempt to view a virus in a living organism, e.g., tomato plants. There were a total of 1500 attempts to identify the presence of the virus with a total of 19 separate viewers. Our accuracy rate was between chance and 100% depending on the protocol and the viewers. During the trials, a true random number (RNG) generator was used to monitor selected viewers. Additionally, for unknown reasons, virus infected plants maintained a longer life expectancy compared to healthy non-infected plants. This needs to be further investigated separately. Background: Our research group is interested in developing medical applications for RV. Our goal is to train and utilize remote viewers in clinical situations involving AIDS, hepatitis C and other chronic viral illnesses as part of the patient's medical team. A current clinical problem in treating humans infected with these viruses is the uncertainty of how long to treat patients because of clinically silent quiescent and replicating periods making the virus unavailable by blood sampling. Relapses are common after cessation of treatment with both viral illnesses. Materials and Methods: Tomato plants were grown under uniform, controlled conditions. Selected plants were infected through a virus brushing technique. Presence or absence of virus was then confirmed by Dr. Robert Gilbertson, UC Plant Virologist, Davis, California. A total of 5 different remote viewing protocols were used. For two of the protocols, 5 and 8 viewers respectively made 50 attempts each to identify whether or not a plant had a virus. A Psyleron Random Number Generator (RNG),based on the electronic white noise of a semi-conductor was used to monitor selected viewers. Results: One preliminary but lengthy protocol produced 100% accuracy in predicting the presence of virus. Subsequent briefer viewing protocols ranged from chance to 67% accuracy, the latter being statistically significant. (270 correct/400 attempts Significance confidence > 99%). Another protocol was accurate 135/250 attempts (54%, p=0.115) By combining the results of the RNG and one viewer's efforts, we were able to predict whether or not a plant was infected 32 times out of 35 attempts. (92% accurate, Significant confidence > 99%) Certain viewers were accurate 10/10 attempts. **C31**

241 **Sacramental Plants of Amazonia: Consciousness Expansion, Self Knowledge and Religious Experience** Padrinho Paulo Roberto <pauloroberto@ceudomar.org> (Church St. Daime, Rio De Janeiro, Brazil)

In this presentation, I will talk about the sacramental plants of Amazonia and how they have been used by the local native cultures for the last thousand of years. Ayahuasca, a sacred drink, Ruman or Yopo, an herbal snuff, Sananga, (translation: the light of the lightning in your eyes), a visionary enhancing eyes drop and Kamboo, a frog detox medicine. These are just some in a whole universe of medicinal plants of the Greatest Forest on earth and its incredible biodiversity. And how important it is to preserve the ancient knowledge from the indigenous people about this huge biological treasure that, like the Library of Alexandria, is burning, but at a rate of 20 football fields per minute. 20 years ago it was just one per minute. I'll address the effects of the sacramental plants in the human mind and how they produce the opening of the doors of perception, expansion of consciousness and enhancing of cognition capability. In a consciousness expanded state, unconscious becomes conscious, then self knowledge happens plus cleansing, purification, healing, personal transformation and self realization. It's a triple act of knowledge done simultaneously in the relationship between you and yourself, between you and your next, between you and the Cosmos. In the meeting with the Cosmos in an altered state of awareness, depending on a certain intention in the attention and the quality of the visionary contents, a religious experience may happen. Finally I would like to discuss about the right to believe in the mystical and visionary experiences: Are they real or not? What is real? And, the fundamental differences between hallucinatory state and the visionary state, which will lead us to the questions of the multiuniverse within and the several levels of what we call reality, outside and inside of ourselves. **PL7**

242 **Using fMRI to evaluate the non-local, 'entangled' mind hypothesis: The effects of distant Qi Gong on blood flow in gliomas and healthy human brains** Leanna J. Standish , Todd Richards, PhD; Jeffrey Ojemann, MD; L. Clark Johnson, PhD <ljs@bastyr.edu> (Bastyr Univ. Research Inst., Bastyr University, Kenmore, WA)

Background: Our laboratory has developed sensitive and rigorous methods for evaluating non-invasive means of modulating blood flow in normal human brains and in malignant brain tumors in patients. This methodology has allowed us to measure the functional magnetic resonance effects of external Qi Gong, a form of Traditional Chinese Medicine (TCM), on cerebral blood flow. Qi Gong masters claim that it is possible to alter biological systems, including brain tumors, at a distance using mental intention and directing qi. Using fMRI technology we investigated this claim. Our work addresses challenges in both clinical neurology (improving treatment for brain cancer) and basic cognitive neuroscience (fMRI methods for studying transpersonal brain states and evaluating the non-local and 'entangled mind' hypotheses regarding human consciousness). ***Methods:*** Two healthy adults and four GBM patients participated in this single, 50 minute visit per subject MRI experiment. We compared functional magnetic resonance blood oxygen level dependent BOLD signals and their temporal rhythms in normal brain and in brain with tumor and surrounding healthy tissue in GBM patients during two conditions (Qi Gong 'on' and Qi Gong 'off'). We used a random time block design and controls that have been developed by our team (Standish et al 2003, Richards et al 2005, Achterberg et al, 2005). FSL MELODIC software was used to conduct 4-dimensional independent component analyses of BOLD signal during the 50 minute fMRI session scan. The experiment consisted of two sessions randomly selected for order: either a 'verum' session (12 minute session with Qi Gong master 30 feet away from the subject outside of the EMF-shielded scanner room containing the 3T magnet and the subject), or a 12 minute 'sham' session with the Qi Gong master absent from the building. The voxel by voxel BOLD times series was processed separately for each fMRI session with a filtered Fourier transform to perform a spectrum frequency analysis of the BOLD signal during each12 minute fMRI session scan. ***Results:*** Distant Qi Gong induced a BOLD frequency at 0.16 Hz that was not present in the off condition These preliminary data indicate that distant Qi Gong 'intention' can alter BOLD activity in the brains of both normal adults

and GBM patients and can target brain tumors in GBM patients. ***Conclusion:*** We present evidence that Qi Gong 'intention' can alter blood flow in a targeted manner and that it may offer a non-invasive novel technology for altering the biology of tumors prior to application of surgical, radiotherapeutic or chemotherapeutic interventions. Because the replicable Qi Gong effect occurred despite electromagnetic shielding of the subject suggests that the Qi Gong 'signal' is either an unusual EMF signal or evidence of a non-local signal. Functional MRI brain imaging provides the scientific technology to address the non-local ('entangled mind') hypothesis regarding the nature of human consciousness. **C6**

4.11 Miscellaneous

243 **Self-navigating signals** Anders Wallenbeck <anders.wallenbeck@telia.com> (independent researcher, Vattholma, Sweden)

Controlling signals are signals that may act autonomously within a network and such signals can be understood as self-navigating signals. If signal patterns represent information we may discriminate between systems that operate only by controlled signals and/or by controlling signals. It seems as if living organism applies controlling signals both to control its own development from a single cell to the adult individual and to control its own behaviour by the neural system. Computers on the other hand operate by controlled signals. How the brain produces conscious control and experience is according to David Chalmers the 'hard problem'. Identifying the 'neural correlate of consciousness' (NCC), is to figure it out how the brain activity corresponds to conscious experience. Stuart Hameroff proposed (2009) that 'Dendritic webs are mobile integrators with agency, the ability to alter and control neurocomputational behaviour.... Gamma-synchronized dendritic webs (or any NCC model) could provide the vehicle for an underlying process or condition which addresses the hard problem'. A number of finer-scale underlying processes have been suggested by other authors. Hameroff proposed that lateral dendritic web is 'a vehicle for a conscious agent' and that 'the conscious agent itself may be some finer-scale process extending within neuronal interiors through the dendritic web'. The problem to identify the conscious agent is in line with the problem that it always seems to be something behind the scene as e.g. in Bernard J. Baars theatre metaphor..The increasing knowledge of the brain has widened its complexity. Such a system may probably need a simple robust principle to operate. If we assume that there is a hidden variable and this variable is the information pattern itself, then we may interpret information as an autonomous entity per se, in the manner we interpret energy and matter when describing complex systems. In addition, if information in living organism is represented into electrochemical and biochemical signal patterns, then the signals per se may be interpreted as the conscious agent. This interpretation is the inverse of the normal way we interpret 'things'. In this inversed view the neural network is the method that the self-navigating signals apply to perform. It seems to be difficult to explain neural information as something inherent and explained by the physical substrate of matter that builds the brain or inherent and explain by the energy consumed. Thereby time and space frames seem to need an additional frame to cooperate with patterns in the description. In addition to the quantum mechanical principle it may be interesting to explore what the principle of self-navigating signals may add to the insight of the mysterious brain. The simplest thinkable self-navigating signal includes the information embedded as the signal route pattern within the network. Gamma synchronized signals may be such signals. This fact raises the question if nature through natural selection has chosen to develop brains by applying the simple principle of self-navigating signals to cope with information. Stuart Hameroff, 2009, 'The 'conscious pilot' "dendritic synchrony moves through the brain to mediate consciousness" **P4**

5. Experiential Approaches

5.1 Phenomenology

244 **What it's like to be 'Abdu'- Ed.(1)** Abdellatif Abujudeh <amalwaanan@yahoo.com> (Teaching (English Language), Ministry of Education, Rusaifa, Jordan)

Abdu is a 'typical' human being but he knows that he has two different integrative looks related to the visual conscious experience: The First Look (FL) which hypothetically takes a normal A-B-C track, and the Second Look (SL) which takes an A-C-B one. (A, point of view of the onlooker CONSCIOUS SELF; B, physical object location; C, is what, in a previous abstract, I called the"Heavenly Screen"(HS) on which 3-D coloured pictures/photos appear). The FL goes from the physical macro to the so-proposed-here-non-physical micro: from matter to light (bearing in mind E=MC2); meanwhile the SL extraordinarily seen going from light to matter. It follows that what is 'perceived' by the former is this External World (EW) of physical objects where matter prevails, and that what is 'seen' by the latter is the Internal World (IW) of non-physical objects, so unfamiliar a world of a different nature of photos/representations where light prevails. The latter belongs to consciousness and attention. Sizes of these two worlds are best described by E. Dickenson:"The brain is wider than the sky/ For put them side by side/ The one the other will contain/ With ease and you beside". For Abdu, this is absolutely with no sense of metaphor, but mere facts. The SL enables Abdu to: (1) See both worlds separately or combined and watch the subjective experience on site with an ability to manipulate. (2) Use the content of the HS, which might be the electromagnetic field or even the GRAVITY/the binding matter of both the EW& IW. A replica of a physical object can be made immediately on site by 'intention' + 'attention', shown on the HS and seen while the eyes are open. In a dark room, close your eyes or open them, you will still see the same view of darkness, nothing or whatever, an indication of sameness and connection. Darkness is driven away just at the royal arrival of the returning-to-brain CONSCIOUS SELF. Its return to brain after sleep or even coma makes you conscious again. Such a return to brain is escorted with light (Is it a GAMMA synchrony? Can such events be recorded on any system monitor? If yes, then a halo of such light can be made at Abdu's will, and let alone that it is quite visible to him, and he, therefore, can tell you before any system can do of what is going on. The halo occurs the way natural lightning does in the EW. (3) Watch darkness (black-coloured clouds) shown on the HS, transform to sharp bright colours in a systematically-amazing geometry which separates the yellow-orange-red colour group from that of the dark blue-indigo-violet one once the SELF comes back to brain along with consciousness (a new-never-claimed-before-now CONSCIOUSNESS CORRELATE: Depolarization of colours being first one colour- in inertia- in an unconscious condition such as sleep .. etc.). **C24**

245 **Higher levels of consciousness beyond Vedas and their attainment in religion of Saints and Radhasoami faith** Sukhdev Roy <sukhdevroy@dei.ac.in> (Physics and Computer Science, Dayalbagh Educational Institute, Agra, Uttar Pradesh India)

Eastern meditation traditions have since ancient time examined the domain of consciousness in great detail, based on first-person intuitive and experiential science under the tutelage of a living adept. The Vedas, Upanishads and Bhagavad Gita provide an insightful outline of meditational practices that lead to self-realization and enlightenment. The concept of man as a perfect microcosm of the macrocosm (man in the image of God) and the revelation of the vital centers of spiritual energy and consciousness-chakras led to their activation through yoga, which cover different states of consciousness in the physical plane and the lower regions of pure Universal Mind-Brahmanda. Over the past millennium, many Sufi faqirs and mystics that include Shams-i-Tabrez, Hazrat Khwaja Moin-ud-din Chishti, and Maulana Rumi between 12th to13th century AD in Central Asia and many Saints(Sants) between 15th to19th century in the Indian sub-continent that include Sant Kabir Sahab, Guru Nanak Sahab (August Founder of Sikhism), Sant Dadu Sahab, Sant Paltu Sahab, Sant

Jagjivan Sahab, Sant Tulsi Sahab of Hathras and Huzur Soamiji Maharaj (August Founder of the Radhasoami Faith), described higher levels of spiritual consciousness that lie even beyond Brahmanda and have not been revealed in the Vedas. A comparative analysis of their descriptions interestingly yields identical terminologies, characterization of different states of consciousness and the meditational technique. According to their teachings, the spirit force-field possesses prime energy and all other forces of nature have been evolved with its association with media (mental or physical) of different kinds. There are eighteen subtle senses or centres within man as a microcosm, namely, six ganglia (or chakras), six nerve centres (or Kamals) in the grey matter, and six apertures (or Padams) in the white matter of the brain, which when rendered kinetic can hold communion with the corresponding six sub-divisions each pertaining to the physical/material region-Pinda, the states of Universal Mind-Brahmanda, and of Universal Spirit-Nirmal Chetan Desh, respectively. The higher states of consciousness are characterized by perception of spiritual sounds (Om, Rarang, Soham, Sat and Radhasoami) and the meditational practice is the art of unifying one's spirit with these sound currents called Surat-Shabda-Yoga, under the guidance of a Sant Satguru. It is only on transcending Brahmanda into the region of Universal Spirit can one experience everlasting bliss and attain salvation. In this paper, a comparative study of the teachings of various Saints over the past millennium has been undertaken to ascertain (i) universality with respect to different levels of spiritual consciousness and meditational practice, (ii) continuity of their teachings to the present through living Saints in the Radhasoami Faith, (iii) their unprecedented revelations towards establishing a science of consciousness, particularly the recent formulation of the systems theory of consciousness, and (iv) to develop a detailed map of the entire spectrum of consciousness. Mapping theories and introspective accounts in other spiritual traditions onto it would provide a means to understand them in the right context, which pertains to the specific range of levels open to respective awareness. It could also lead to resolution of major empiricist-rationalist conflicts. **C16**

246 **A counterexample for weak representationalism** Andrea Borsato <andreaborsato@hotmail.com> (Bassano Del Grappa, Italy)

Weak representationalism is the view that, if two intentional mental states have the same representational content, they also must have the same phenomenal character ; hence, if weak representationalism is true, then it must be impossible to find two acts which have the same representational content and different phenomenal character. Are there counterexamples for this view? We propose to take into consideration the phenomenology of what Husserl calls the 'intuitive fulfillment of an intention' ("anschauliche Erf llung einer Leerintention"). Husserl admits the possibity for an intuition to fit an intention 'like a suit' ("als wie ein Kleid"): that means the possibility, for a given intention, to be fulfilled by an intuition which has the same representational content. Is Husserl right? We think he is, but only if we consider the fulfillment of a very simple perceptive intention, f.i. the fulfillment of a protentional intention. Think of an intermittent red light flashing on a dark background at a steady pace: this will generate, after a while, a protentional expectation (we will expect the same light again and again). The protentional expectation and its fulfillment now exhibit the same representational content, but not the same qualitative character. The way the protention feels is not the same way its fulfillment feels; nonetheless, the expectation and its fulfillment both represent the same light, flashing on the same place, appearing with the same color. This counterexample, however, only works in such simple cases. It does not work if we deal with protentional expectation of more complex objects. Suppose you see again and again (by repeatedly closing and opening your eyes) the face of a friend before you. After a while you will expect the same again and again, and your expectation may be fulfilled and confirmed again and again. But in this case the representational content of the expectation cannot be as rich as the representational content of the perception which fulfills it: our memory is limited, and we cannot remember all particulars of the faces, and what we expect (the representational content of the protention) is exactly what we can remember of the perceived object, since we expect the same again and again. So, the fulfillment of the expectation of the face of a friend would not fit the expectation 'like a suit', because there is much more in the fulfilling perception than we expect. The fulfillment would be, in this case, what Husserl calls 'Inklusion': an Inklusion is f.i. the fulfillment of 'red' through the perception of a red flower (see Hua XIX/2, VI. LU, ? 12, pp. 578-579). The case of the red light is different: the perceptual situation is impoverished enough, and the information which we must record is very simple, and it is possible that there is nothing in the representational content of the perception of the red light which we would not remember; so it is possible that there is nothing in the representational content of the perception that we would not expect. **C1**

247 **Empathizing with the unconscious: A point of relevance of phenomenology for the cognitive sciences** Roma Hernández , Christopher Lay, Ph.D / University of California, Irvine / Clay@uci.edu <romadavila@gmail.com> (Philosophy, Universität zu Köln, Köln, NRW Germany)

Vast amounts of research confirm the existence of unconscious behaviors. Phenomenology, as a research method, seems to be left behind insofar as it restricts itself to a purely first-personal endeavor. Here, cognitive science, methodologically a third-personal endeavor, seems better suited to the task. But phenomenology's first-personal basis does not require it to deny unconscious behaviors, and does not prevent it from researching them. Through the structure of empathy phenomenologists can investigate certain unconscious experiences. When empathizing, one subject directly and immediately (that is, non-inferentially) experiences the intentional-contents of another subject, though not as they are experienced originally. When I see you fumbling about for a kerchief while wincing as a result of being squirted in the eye with grapefruit juice, I am directly aware of your intention to find a kerchief to rub into your eyes. The way that I experience your intentional-content is direct insofar as I immediately perceive what you are doing: you are painfully reacting to the presence of some foreign substance in your eye and are frenetically searching your pockets for something to absorb that substance. While I may not know if you are searching for a packet of tissue papers, or for your favorite kerchief, I nevertheless know that you are searching for something. What you are doing is not hidden away in your mind, and veiled by your body; it is available to me through your body. My experience of your bodily movements yields my awareness of your intentional-content. Having gone through a lifetime of experiences myself - experiences that are embodied - I have acquired a kind of know-how that allows me to deal with the world and its occupants; just as I have non-inferential know-how that facilitates my ducking so as to miss a low-laying branch when fleeing from an assailant, I have non-inferential know-how of your body movements that facilitates my awareness of your intentional-content. And this process of empathy applies equally to certain unconscious behaviors, like sleepwalking. When I see you unresponsively making your way down the hall, I am aware that you are attempting to get somewhere, though I may not be aware of any of your other (perhaps dream induced) intentional-contents. Insofar as your bodily movements are understandable to me, I am aware of at least some of your intentional-contents, even if you are not. At least for certain unconscious behaviors, phenomenology is not silent. **C9**

248 **Empathy, behaviorism, and the perception of other minds** Joel Krueger , Soren Overgaard <joelk@hum.ku.dk> (Philosophy, University of Copenhagen, Copenhagen, Denmark)

According to the "direct perception" (DP) view of social cognition endorsed by some phenomenologists, we can, at least in some cases, attain knowledge of others' mental states simply by perceiving them (by directly perceiving the patterns of expressive behavior in which their mental states are embodied) (cf. Fuchs and De Jaegher 2009; Gallagher 2008; Gallagher and Zahavi 2008; Merleau-Ponty 2002; Scheler 1954). A direct perceptual account of our knowledge of other minds, DP advocates insist, explains our basic capacity to understand what another person is thinking and feeling, and thus renders inferential accounts (Theory Theory, Simulation Theory, etc.) superfluous. One recent criticism of this view is that by denying the widely-held assumption that another's mental states are unobservable,

DP advocates are forced to embrace a kind of crude behaviorism (Jacob forthcoming). This is because another's bodily expressions and various body-related traits-posture, movement, facial, hand, and whole-body expressions, etc.-either constitute their cognitive and emotional states, or they do not. If they do not, then we don't ever truly perceive another's mental states, only their behavioral expression. If they do-if emotions, for example, are identified with patterns of observable behavior like smiling, forehead-wrinkling, etc.-it seems that DP advocates have backed themselves into a behaviorist corner, which brings not only a cluster of well-known philosophical objections but, additionally, the difficulty of reconciling behaviorism with the phenomenologists' stated intention to preserve the centrality of experience when accounting for various mental phenomena. This talk offers a response to the behaviorist objection. We defend a DP approach and show how bodily expressions and various body-related traits might be said to constitute proper parts of (some) mental phenomena without resorting to behaviorism. We defend a model of the hybrid mind according to which some cognitive and affective processes straddle both internal (i.e. neural) and external (i.e. gross-bodily, environmental) processes, making material aspects of some mental processes publically (i.e. directly) perceptible. We show that this view needn't entail phenomenology-rejecting behaviorism. We then discuss the epistemic significance of this view and demonstrate that it constitutes a genuine alternative to inferential models of social cognition (Theory Theory, Simulation Theory). Along the way, we respond to several additional objections to the view that we can directly perceive another's mental states, including the asymmetry objection (i.e. I can only have direct knowledge of my own mental states, and never those of another) and the argument from illusion (i.e. the expression of real anger versus play-acting is perceptually indistinguishable; thus I can never be certain that I truly perceive another's mental states). We conclude that DP remains a viable model of social cognition. The discussion will draw upon debates over the extended mind thesis, as well as empirical work on, among other things, the link between gesture and thought, Moebius Syndrome and emotional experience, and infant social cognition. **C34**

249 **What I draw I know** Ana Leonor Rodrigues <analeonor.rodrigues@gmail.com> (Drawing and Visual Communicati, Faculdade de Arquitectura - Universidade Técnica de Lisboa, Lisbon, Portugal)

My paper will observe the experience of consciousness when drawing from life. Artists often state that they see with a pencil in their hands, meaning that Drawing is a form of record and research, as well as a way of understanding reality - whether an inner reality or an outer reality - and a creation often made from that prior research. It is a thinking process, a method, a skeleton, but also an explanation (better than words), an illustration, and even an artistic object (and the enumeration goes on). Drawing is as much the action of performing as the resulting object. Drawing establishes a link with visual reality that embodies a very personal process of research. **C30**

250 **From 'feel' to 'feeling': The enactive approach reconsidered** Feifei Zhou <zhou@feifei.ws> (School of English, Faculty of, The University of Hong Kong, Hong Kong, China)

In their book 'The Embodied Mind', Varela, Thompson, and Rosch (1991) introduced 'the enactive approach' into cognitive science. One of the central ideas of this approach is that cognition is a form of embodied action and cognitive structures and processes, rather than deriving from computational workings of interacting neurons, emerge from sensorimotor coupling between the human body and the world. In this paper, I will focus on one article by O'Regan, Myin, and Noe (2004) which seeks to bridge the explanatory gap (Levine,1983) by giving an account of what they term 'feel'. They put forward two concepts, 'bodiliness' and 'grabbiness', in order to account for the 'clinging' quality of sensory stimulation during conscious experience. It is true that when holding a tomato in the hand, we have the 'feel' of holding and seeing a whole tomato due to the 'bodiliness' and 'grabbiness' of our perceptual experience, but I will argue that it is also true that even when holding a tomato, we can go

beyond this 'feel' to have a certain 'feeling': a feeling arising from the here-and-now, from memory of the past or anticipation of the future. Based on this observation, I agree with Max Velman (2007) that their account of the 'feel' does not do justice to the complexity of human experience, in that it reduces conscious phenomenology to the interactions between organisms and the external world. Thus I will encourage a move from 'feel' to 'feeling' in order to provide a richer and more nuanced picture of phenomenal human experience, which according to Humphrey (2000), emerges from temporal thickening of subjective present. He also holds that this subjective present is different from present in physical time. So I will argue that this difference makes it possible for the feeling self to 'detach' from physical present time and integrate the past and the future with the here-and-now in sense-making activities (Harris, 2010). Moreover, in order to give an account of 'feeling' besides 'feel', we need to acknowledge the role played by the self, especially pre-reflective self-consciousness, which gives our experience an immediate 'first-person' character. **C34**

5.2 Meditation,contemplation & mysticism

251 **Five stages of mystical consciousness in two dimensions** Puran Bair <puran@appliedmeditation.org> (Institute for Applied Meditation, Tucson, AZ)

Mystics have described five stages of consciousness, including two stages of Unity, Alpha and Omega, through two dimensions of consciousness, vertical and horizontal. Four types of subtle energy are recognized in support of consciousness, with energy and consciousness interacting through intentionality. The goal is to become a conscious microcosm of the macrocosm, harnessing the ego to love, in service of the purpose of life. Sufis described the objective of microcosm long before the word was invented by saying, "I am a part of all things, and all things are a part of me." Modern Sufis describe it thus: "Awaken the consciousness of humanity to the universal in every individual." In a holistic process, no part of the human being can be discarded: the process used by Sufis values and incorporates the body, mind and ego into a whole and integrated being that is simultaneously conscious at many levels. Our objective is not merely to attain higher consciousness as passive, impersonal observers -- we are active agents in the formation of the hardware of reality out of the software that is the mind of the universe. The Sufis do not see a nothingness between short bursts of existence, which is the digital view of off-on states of reality put forward in Vedanta. Rather, Sufis see an analog existence that never ceases, like the submerged mountain range that appears as a series of islands but is actually continuous beneath the surface. Therefore the objective of a Sufi is not to become nothing, by which to access the state of nothingness behind existence, which to the Sufi is only an appearance of non-existence, but rather to become everything, capable of assimilating and contributing to the experience of all life. The slogan of modern spirituality is not, "Be here now," but, "Be everywhere always." Higher consciousness sees the pull of the future upon the present, to harness and redirect the push of the past. Our responsibility to be creators of the future requires advancing two steps beyond the liberation of consciousness from its physical and mental structures. Rather than roll the "wheel of becoming" backwards to re-experience a state of unity prior to limitation, we are directing the forward evolution of life towards a common re-union that weaves the strands of individuality together into an all-inclusive fabric that recognizes the One in each one and assimilates the lessons of all Life's experience into a unified, collective consciousness. In the vertical dimension of consciousness, seven planes of reality are recognized, from physical matter to oneness in transcendence beyond time and place. In the horizontal dimension, consciousness expands from the personal to the cosmic and from the present moment to pre- and post-eternity. The Sufis recognize two states of unity consciousness: Alpha and Omega. Alpha is the transcendent unity in which the lower planes drop out of consciousness; Omega is unity with existence, conscious of all the vertical planes AND the horizontal dimension of all forms and beings throughout time. **C32**

252 **The universe in an atom: Quantum/fractal self-similarity in yoga, perception, and cosmology.** William Bushell <wcbphd@att.net> (Anthropology, Massachusetts Institute of Technology/Tibet House US, Cambridge, MA)

The title of this paper borrows from the title of HH the Dalai Lama's recent book, which begins with a quotation from the Buddhist scripture, The Great Flower Ornament: "In each atom of the realms of the universe, There exist vast oceans of world systems." This idea resonates with the fundamental alchemical yoga idea of microcosm/macrocosm homology (Douglas, Chakra 1970-1, Vol1: 25), as well as, quite intriguingly, with cutting-edge developments in astrophysical/cosmological theory (Oldershaw, First Crisis in Cosmology Conference CCC-I: 1-3); and this essential principle of fractal self-similarity across scales has also recently been demonstrated to generally play an integral role in human perception (Billock et al, Physica D 148: 136-46). This paper goes beyond a general consideration of these resonances to consider the radical idea that advanced alchemical, or Indo-Tibetan Vajrayana Buddhist yoga meditation, may provide an 'interface' for the physical/cosmological and the human sensory-perceptual realms. This potential interface is mapped out by a new neuroscientific/quantum physical model (Bushell, Annals of NY Academy of Sciences 1172: 348f; Bushell et al, in preparation), which claims that certain advanced yogic/meditational practices may transform sensory-perceptual systems through an intensive process of neuroplastically-mediated perceptual learning, to a new and unexpectedly radical threshold of perceptual access/awareness. This model is based on the already-established human capacities for single-photon detection; hyperacuity, in which the visual system is capable of resolution on the scale of a fraction of the diameter of a photoreceptor cell, ie, within the range of millionths of a meter; enhanced capacity for change detection and the overcoming of the ubiquitous and powerful human phenomenon of change blindness; and the more recently proposed capacity for direct perception of the ubiquitous/universal property of fractal self-similarity across micro- and macro- levels of scale (Bushell et al, in preparation). Specifically, yogic exercises in both (a) focused perception and (b) eidetic mental imagery training are proposed to lead to profoundly enhanced 'subtle awareness,' eventually resulting in the capacity to perceptually move beyond both blur and the (purportedly) inaccurate sensory-perceptual constructions which systematically distort dense spatiotemporal textures into solid objects. These yogic exercises are designed, the model argues, (1) to 'de-automatize' powerfully deterministic habitual cognitive-perceptual tendencies according to a highly sophisticated Vajrayana Buddhist hermeneutic and pedagogical system; and (2) to enable a 'reprogramming' of normally inviolable algorithms of invariant perception on both top-down and bottom-up sensory-perceptual levels of functioning. The model provides evidence that these powerful exercises are based on eidetic/visuospatial mechanisms involving the osculatory packing of infinitely reflecting spheres, as well on as the generation of fractal tiling patterns, specifically including the pentagonal Penrose tiling: as will be seen, perception is accordingly both transformed and assisted by highly developed eidetic memory/imagery. This meditationally trained and transformed sensory-perceptual system of 'the yogic direct perception' of the spatiotemporal particulate nature of phenomena, is then analyzed in terms of the Penrose-Hameroff model of quantum consciousness, and the resulting 'subtle awareness' which purportedly also enables access to the bardo state is analyzed in Hameroff's anesthesia-based model of fundamental conscious awareness. **C24**

253 **The Swedish Association for Contemplation in Education and Research: A collaboration with researchers from various faculties using meditation as contemplative inquiry on research questions** Walter Osika , Stenfors, Cecilia; Bojner-Horwitz, Eva; Edwards, Eleanor; Zajonc, Arthur. <walter.osika@stressforskning.su.se> (Stress Research Institute, Stockholm University, Bromma, Sweden)

1. The effects of different meditative practices have been the object to an increasing number of studies using various techniques such as psychological measurements and brain imaging (third person perspective, with external measurements). The first person perspective available through meditative introspection has been less used. By adopting a scientific, phenomenological approach to experiences that arise during meditation, new insights can contribute to the research process of the meditative researcher. 2. Using meditation as a form of contemplative inquiry, a new research methodology has been developed over the last several years among a network of researchers from various disciplines, mainly in the Stockholm area. Methods and results: Researchers have met monthly (10 times) during the last year. At these sessions they have practiced different contemplative exercises designed to 1) deepen and clarify their understanding of their research questions, and 2) to explore mental and emotional processes directly. The research method practiced within the group stays close to the varied phenomena that arise in meditation and resists the tendency to see them as neural mechanisms only. Journaling has been used to document and explore the meditative content and also as a way to track the development of the different researchers' projects during the year. Discussion: It is possible to use meditation as means of contemplative inquiry in a group of independent but mutually supportive researchers. Participants have been able to apply their meditative experiences directly to their ongoing research projects. We find that subjective or first-person reports show increased insight after meditation. These results should be studied in a systematic, phenomenological way. **C33**

254 **On perception of "reality"** Lisa Romero , Diego Kricek Fontanive <femmodemorg@iol.it> (End of Fear Community Project, Milano, Italy)

On perception of 'reality' An analysis of what 'reality' is requires enough honesty to be able to get rid of the concept of reality itself which, basically, comes from the social background where the researcher lives. Therefore; an analysis on 'reality' must be assumed that when we are talking about reality, we are talking about only its concept. So, we can just interpret what the 'story of the conceptualization of the perception' is. The history of human perception of what 's true and what is not is represented by the constant conflict between the perceptual apparatus (right brain) and the logical apparatus (left brain). It is necessary to get the point that everybody live such perception in two ways at the same time: 1-The perception of reality decoded by the five senses and then translated by the brain through the social manipulation. 2-The perception of intimate (defined as 'imagination', 'sensitivity', and recently summarized by the term 'spirituality"). Such dual perception is constantly in conflict. When a person uses its own intelligence to make a self-analysis, by getting rid of the 'identity' that society in which he lives give to him, this person lives an inevitable conflict because of the feeling to live two parallel realities at the same time. Where a community provides a system of rules and attitudes aimed to planning the lives and the perceptions of its participants, the subjective use of the own intelligence is reduced ... so, also the conflict between the two perceptions is mitigated. The phenomenon of 'new age ' is concerning, in fact, the expression of the will to live a different perception of reality, eliminating the artificiality and the identity. The 'new age' phenomenon represents a new 'perceptive hope'... an hope which is coming from an unconfortable feeling experienced in the own society from where a person is coming from. That's why so many western people moves to India (or somewhere else) to find peace and new perceptions in some ashram or gurus. We can call the perception of reality as the perception of the energetic field in which we live, (called universe), filtered through our senses and decoding by our brain...). The phenomenon of globalization, moreover, is creating a tendency to generate an unique global platform of perception: a global culture represented by a manipulative world where the perception of themselves disappear. Globalization thus increases the conflict (between separation and division) in those who are using their intelligence, standardizing instead all the others. The perception of reality, therefore, can not be connected to an addiction, a practice, a knowledge, a teaching or one help coming from outside. With the globalization of the perception of reality (as we see right now) people become depending of the reality globally defined... in order to perceive themselves as real inside such network ! The perception of reality becomes awareness only when we get rid of our concept of 'reality'. That's because every 'decoding of reality' it will inevitably involves in a conflict. As every observer know; the history of humankind awareness, it is the history of its conflicts... conflict caused basically by different perception of reality. **P5**

255 **Living without conscious thought; What happened and how functioning is affected** Gary Weber <happinessbeyondthought@gmail.com> (Port Matilda, PA)

Following over 20,000 hours of meditation and yoga, continuous self-reflective thoughts, desires, and fears fell away and were replaced with deep stillness and peace. The efforts of an empirically-trained scientist and leader of several research laboratories and organizations to reach this state and then to understand through emerging cognitive neuroscience, complex system mathematics, contemporary physics and participating in various current studies, what might have happened. Personal experience in functioning without conscious thought in management positions and in everyday life. **C32**

256 **Meditation, mindfulness, visualization and retroactive recall** Stephen Whitmarsh , Dick J Bierman <stephen.whitmarsh@gmail.com> (Computer Science, Radboud University, Nijmegen, Netherlands)

Stephen Whitmarsh and Dick J. Bierman University of Nijmegen, University of Amsterdam Meditation and Mindfulness have often been confused. Two independent formulations of meditation and mindfulness are precisely defined with alpha lateralization as the critical variable. Meditation is operationalized as the practice of consciously engaging and disengaging focal attention to investigate the conditions under which one's attention behaves. Mindfulness refers specifically to the ability to be aware of one's attentional state. By measuring neural oscillations through magneto-encephalography, the ability to report on one's attentional state was objectively tested. In a collaborative effort with the University of Amsterdam subjects also participated in a replication study of the retroactive recall paradigm as recently published by Bem. A theoretical approach explaining Bem's results suggest stronger retroactive effects for meditators. The blind recall task is based upon visualization which arguably could be related to meditation experience thus allowing us to predict better general recall results independent of retroactive reinforcement. By moving meditation-neuroscience concepts from a philosophical stalemate towards empirical operationalizations it is hoped that a fruitful dialogue between neuroscience and mediation practice can be accomplished. **C3**

5.3 Hypnosis

257 **The techniques of clinical hypnosis and 'altered states of consciousness' in pain and suffering relief, at the end of life** Paola Brugnoli <paola.brugnoli@libero.it> (Scientific Director, AIST, AIST Italian Association for the Study of Pain Therapy and Clinical Hypnosis, Verona, Italy)

Cancer pain and chronic non malignant pain, can have devastating effects on patients' end of life. Clinical hypnosis at the end of life care concentrates on improving the quality of life and that of the family. It focuses on controlling pain and other symptoms, and meeting a person's social, emotional and spiritual needs. The hypnotic trance is essentially a state of heightened and focused concentration, and thus it can be used to manipulate the perception of pain and suffering. The use of hypnosis involves control over the focus of attention and can be used to make the patient less aware of the noxious stimuli. It is acknowledged that consciousness includes whatever gives a person meaning, value and worth in their life. Clinical hypnosis at the end of life: - It provides relief from pain and other distressing symptoms. - It integrates the psychological and spiritual aspects of care. - It embraces life and regards death as a normal process. - It offers a support system to help patients live as well as possible until death. - It offers a support system to help families cope with their loved one's death and to help them cope afterward with their own bereavement. Since the mind reflects habitual thoughts, it is therefore our responsibility to influence our brain with positive emotions, thoughts and energy as the dominating factors in our mind. Hypnosis can help patients enter a relaxed, comfortable, trance state for obtaining specific therapeutic outcomes. With clinical hypnosis, the therapist can make suggestions designed to help the client formulate specific internal processes (feelings, memories, images and internal self-talk) that will lead to mutually-agreed-upon outcomes. After experiencing many levels of clinical hypnosis, we become able to live in the higher consciousness state continuously at the end of life. This talk will focus on the utilization of hypnotic suggestions, and modified states of consciousness, for palliation of symptoms, self-regulation and alleviation of pain and suffering. It will focus on the techniques of clinical hypnosis at the end of life. **C13**

258 **Systematical and long-term training of alternative states of consciousness for excellence in sport and life** Lars-Eric Uneståhl <lars-eric@unestahl.com> (Psychology, Örebro University, Örebro, Sweden)

IMT, a systematic and long term training of cognitive, emotional and social skills and attitudes, based on alternative states of consciousness like self-hypnosis, has during 50 years been used by more than 3 million Swedish people. Starting with the National and Olympic Teams and the Swedish School System in the seventies, IMT has then been applied to most areas of the Swedish Society (Business, Work, Leadership, Health, Personal development) IMT is defined as a systematic, long term and evaluated training of mental processes (Thoughts, Images, Emotions, Beliefs, Attitudes) to detect and develop resources, needed to reach Excellence in Sport and Life. Background: Integrated Mental Training was created in 1970 based on a number of studies in the sixties. These studies focused on two areas: A. Hypnosis, Self-Hypnosis and other Alternative States of Consciousness (ASC) B. Mind and Body issues, especially directed to Sport Performances (The author was an athlete himself) IMT is based on the use of alternative states of consciousness (ASC1), mostly on Self-Hypnosis, which is operationally defined as the 'Inner Mental Room'. (IMR). The state is characterized by a holistic EEG change with similar base activity in all 4 brain quadrants. The state has also 'divine section' characteristics with 5 ratios between beta, alpha, theta and delta showing the 'golden number' 1.6 ('the harmonious brain'). This makes it possible to use: Alternative systems of Control (ASC2) like 'triggers and Images'. It also enhances Alternative systems of change (ASC3) from very structured and 'voluntary effort' based changes over to 'cybernetic programming'. IMT is also replacing the traditional clinical- and problem-based model with a solution-based and life-long developmental model. This means that a. Goals are identified instead of problems ('Creating your own future') b. Change is related to satisfaction instead of dissatisfaction and direction is changed from away from to towards c. Life is looked at as a life-long and flow-related journey, where an exciting future and the best from the past are integrated into a now-focused life-process. The 50 training programs (1 week per program) provide significant changes in most areas of Life. 3. The cognitive, emotional and behavioral changes are integrated and give stable and often life-long effects. The increased focusing skills are not only important for Peak Performance but also to move problems like tinnitus and chronic pain out from the awareness area. In the Mind-Body area the one year mental training normally produces significant positive changes in the self-regulatory area, the biochemistry area and the PNI - Psycho Neuro Immunology area. In one study 6 months of mental training decreased cortisol levels and increased DHEAS-levels corresponding to a 7 year decrease of the 'biological age'. **C13**

5.4 Other altered states of consciousness

259A **Nonlocal consciousness: A concept on the continuity of our consciousness** Pim van Lommel <pimvanlommel@gmail.com> (Velp, Netherlands)

"To study the abnormal is the best way of understanding the normal" -William James. According to our current medical concepts, it is not possible to experience consciousness during a cardiac arrest, when circulation and breathing have ceased. But during the period of unconsciousness due to a life-threatening crisis like cardiac arrest patients may report the paradoxical occurrence of enhanced consciousness experienced in a dimension without our conventional concept of time and space, with cognitive functions, with emotions, with self-identity, with memories from early childhood and sometimes with (non-sensory) perception out and above their lifeless body. In four prospective studies with a total of 562 survivors of

cardiac arrest between 11% and 18% of the patients reported a near-death experience (NDE), and in these studies it could not be shown that physiological, psychological, pharmacological or demographic factors could explain the cause and content of these experiences. Recent publications that increased terminal and coherent activities in the EEG, high levels of end-tidal CO2 , or REM intrusion could explain the cause and content of an NDE will be discussed and then rejected as an acceptable theory. And it is also important to mention that until now it has been impossible to induce a real out-of-body experience with veridical perception from a position out and above the body by any method whatsoever, despite incorrect suggestions about this possibility in the medical literature while just describing bodily illusions. Since the publication of these prospective studies on NDE in survivors of cardiac arrest, with strikingly similar results and conclusions, the phenomenon of the NDE can no longer be scientifically ignored. It is an authentic experience which cannot be simply reduced to imagination, fear of death, hallucination, psychosis, the use of drugs, or oxygen deficiency, and people appear to be permanently changed by an NDE during a cardiac arrest of only some minutes duration. According to these studies, the current materialistic view of the relationship between the brain and consciousness held by most physicians, philosophers and psychologists is too restricted for a proper understanding of this phenomenon. There are good reasons to assume that our consciousness does not always coincide with the functioning of our brain: enhanced consciousness can sometimes be experienced separately from the body. I have come to the inevitable conclusion that most likely the brain must have a facilitating and not a producing function to experience consciousness. By making a scientific case for consciousness as a nonlocal and thus ubiquitous phenomenon we must question a purely materialist paradigm in science. **C8**

259 **Altering consciousness: Setting up the stage** Etzel Cardena <etzel9@yahoo.com> (Lund University, Lund, Sweden)

Although the study of consciousness in general has seen a resurgence in the last few years, the integration to it of a science of alterations of consciousness has lagged behind. This presentation is based on a 2-volume multidisciplinary overview of altered states throughout history, and in the humanities, the arts, and the psychological and biological sciences. I will introduce the topic by discussing how it is important to clarify conceptual issues in this area such as the distinction of induction procedures and phenomenal experience, and the interaction between individual differences and techniques to alter consciousness. I will illustrate these issues with examples from my own and others' research on hypnosis and related areas. I will then discuss how a study of human culture and biology is incoherent unless spontaneous and induced alterations of consciousness are considered, and then provide an overview of the relationship of altered states of consciousness to emotions and psychological health and disturbance. **C21**

260 **The Anatomy of the invisible** Ingrid Fredriksson , Göte Andersson <ingrid-f@telia.com> (Triquetra, Ärjäng, Arjang, Sweden)

My friend Göte Andersson tells the following story: "In 1987 an undersigned author discovered that when a person concentrates mentally on a physical object or person in his surroundings an unknown energy field (psi-track) seems to establish itself to the object or the person. In the beginning the psi-track could only be detected by dowsing. Two years later in 1989 I met a teenage boy, Pontus H. He claimed to have quite an extraordinary visual perception and be able to see the human aura, the psi-track and energy systems (all scientifically unexplainable) around the body. He was able to observe two separate energy fields on each side of the body. On the left hand side of the body he could see a blue-coloured energy field and on the right hand side of the body he could see a red-coloured energy field. I then had the idea to carry out some tests on myself by using a small magnet (4.7 x 1.3 cm) on my own aura and the two above-mentioned red and blue energy fields. I used a coincidence method when I hid the magnet in a small box so Pontus could not possibly know if the north or the south-pole was pointed at my energy system. When the magnet's north-pole pointed

to the left side of my aura, he could see how the energy was attracted. When the south-pole pointed to the same side, he could see how the energy was repelled. When a series of 50 tests were finally completed we could see that the answers he'd given about the way the magnets were attracting or repelling corresponded 100% with the actual position of the poles. More testing was carried out on my left side and again the magnets were not visible to Pontus. After testing a further 50 times we found that, again the answers he gave all corresponded. For further testing with the magnet I contacted the physics professor Erik Karlsson. With his participation 50 tests were done, and this time the answers corresponded 47 times out of the 50. Professor Karlsson is very skeptical to paranormal phenomenon but he could not deny the seriousness of the answers resulting from our investigations. He was also very impressed by Pontus' extraordinary ability. A very interesting and important aspect is that Pontus even seemed to observe how the psi-track was emitted from the above-mentioned energy fields. We do not know the nature of all the above-mentioned energy fields, whether they are paranormal or whether they are some kind of biological magnetic/electromagnetic phenomenon. Göte Andersson". Certain people, along with the teenage boy can see things that not everybody can. They assume that everybody has the same gift but find later that they are special. Is it an electromagnetic phenomenon or is it a non-local gift in our holographic universe? **P5**

261 **Absorption-proneness mediates relations between disorganized attachment and unconventional spiritual experiences** Pehr Granqvist <pehr.granqvist@psychology.su.se> (Psychology, Stockholm University, Dept. of Psychology, Stockholm, Sweden)

In this presentation, I delineate a theoretical model suggesting that a propensity to enter altered states of "absorption" acts as a mediator between trauma-related break-downs in attachment patterning (i.e., disorganized attachment) and certain unconventional forms of spirituality, studied here as New Age spirituality and mystical experiences. Utilizing a prospective longitudinal design (N = 62), empirical tests of the mediational model is also provided. More specifically, I show that unresolved/disorganized (U/d) attachment scores, as identified via the Adult Attachment Interview at the first assessment point, predicts New Age spirituality and mystical experiences three years later, and that these links are mediated by absorption. Although results supported the mediational model, the bivariate relations between U/d attachment and the indices of unconventional spirituality studied were of modest strength. Illustrating discriminant validity of this model, more conventional indices of religion, such as strength of theistic beliefs and degree of general religiousness, were not related to disorganized attachment or absorption. The discussion focuses on the general implications of the mediational model. I argue that these results illustrate a non-pathological, indeed a potentially reparative, sequelae of disorganized attachment and the related propensity to experience altered states of consciousness. I encourage future researchers to address additional non-pathological correlates of disorganized attachment and absorption. **W-AS**

262 **Consciousness magic: Quantum entrainment of the autonomic nervous system** Reginald Humphreys , Kathleen Eagan-Deprez <drrbh@compuserve.com> (American Society of Clinical Hypnosis, Dallas, TX)

Recent developments in research on entrainment of the autonomic nervous system have revealed several powerful new methodologies to manipulate and alter consciousness. The first methodology involves having the research subject (or clinical patient) focus their attention on a specially prepared video composed entirely of fractal images and fractal animations. The frame rate and periodicity incorporated in the video are specially timed to maximize synchronization and resonance between independent circuits within the brain and autonomic nervous system. The addition of music fosters a sense of audio-visual synchronization, which leads in turn to interhemispheric synchronization. A viewer experiences a trance-like phenomenon, referred to previously as the fractal viewing trance (FVT), a state which shares some qualities with other altered states such as meditation and hypnosis, but which may also have unique qualities. The property of the nervous system to exhibit entrainment and reso-

nance is of greatest interest when parasympathetic activity and parasympathetic dominance are being cultivated. In these cases, the underlying physiological foundations of consciousness are being radically 'reprogrammed', leading the individual to experience a ready availability of new states of consciousness and associated phenomena. Parasympathetic dominance is required for most of the states of consciousness of interest within science and spirituality. Using Rudolf Steiner's model of the multidimensionality of human existence provides another basis for conceptualizing and planning consciousness interventions. Using Anthroposophical concepts regarding the seven bodies (or quantum levels of existence) of man, hypnotic suggestions relevant to each of the several bodies may be rendered, resulting in a progressive 'hypnotization' in turn of each of the bodies, physical, etheric, astral, and mental. The resulting trance, spanning multiple quantum levels, constitutes a clear example of quantum entrainment of the autonomic nervous system. Referred to as Anthroposophical hypnosis, this method can be easily demonstrated and learned, and several verbatim hypnosis scripts have been provided for clinical use. Another approach for developing quantum interventions can be derived from Rudolf Steiner's detailed discussions of the various separable phenomena of consciousness. These descriptions, drawn from a multiplicity of his works, can be summarized in a novel schema which identifies eight channels of autonomic activity, residing within five quantum dimensions. Powerful effects occur when one or more of these channels become entrained to a parasympathetic source. Even more pronounced is the effect on consciousness observed when the entrainment occurs across quantum differences. The resultant modifications of mind, body, and consciousness are understood as constituting the essence of quantum entrainment of the autonomic nervous system, and may also be referred to as fostering 'quantum' states of consciousness, or 'quantum trance'. These expanded understandings of altered consciousness and trance illuminate a path for science and consciousness studies to follow. The future of the study of mind, brain, and consciousness may lie along this path, as the concept of quantum states of consciousness, and quantum entrainment of the autonomic nervous system, open the doorway to countless insights and new realms of inquiry regarding consciousness and the nature of human existence. **C21**

263 **Know Thyself. Ayahuasca as a tool for self-knowledge, creativity and the study of consciousness.** Luis Eduardo Luna <leluna47@hotmail.com> (Research Center for the Study of Psychointegrator Plants, Visionary Art and Cons, Helsinki, Finland)

Ayahuasca, the Amazonian brew traditionally used by indigenous and mestizo practitioners and by religious organizations that have it as a sacrament, has also great potentials in rituals of a more secular nature, and as a research tool for studies on consciousness. I will present here data based on fifteen years of research among individuals from over thirty countries and all walks of life. **C21**

264 **Differential Diagnosis Between Spiritual Experiences and Mental Disorders** Alexander Moreira-Almeida <alex.ma@ufjf.edu.br> (School of Medicine, Research C, Faculdade de Medicina da Universidade Federal de Juiz de Fora, Juiz De Fora, MG Brazil)

Objective: Spiritual experiences can be confused with psychotic and dissociative symptoms, being frequently a challenge for the differential diagnosis. We aimed to identify criteria for a differential diagnosis between spiritual experiences and psychotic or dissociative disorders in order to improve the cultural competence and clinical reasoning to make the differential diagnosis between spiritual experiences and mental disorders. Design & Method: 115 randomly selected spiritist mediums active in spiritist centers in the city of Sao Paulo, Brazil, were interviewed based on the Self-Report Psychiatric Screening Questionnaire (SRQ) as well as the Social Adjustment Scale (SAS). Those mediums identified by the SRQ as probably having mental disorders (n = 12) and a control group (12 subjects randomly selected among the remaining 103 mediums) were interviewed using the Dissociative Disorders Interview Schedule (DDIS) and the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). It was also made a wide revision in the literature to identify proposed criteria for a differential diagnosis between spiritual experiences and mental disorders, in which 135 articles identified in the research in PubMed were examined. Results: Mediums reported high level of psychotic and dissociative experiences such as frequent auditory and visual hallucinations, as well as experiences of influence such as insertion of thoughts and feelings. However, these experiences were not correlated to other markers of mental disorders such as scores on social adjustment, other psychiatric symptoms, and history of childhood abuse. The sample had a high socioeducational level, a low prevalence of mental disorders and was socially well adjusted. This group presented a lower prevalence of mental disorders than the general population. It seems that psychotic or dissociative experiences are not necessarily symptoms of mental disorders. Certain features may suggest a non-pathological basis for the experience: lack of suffering or functional impairment, short duration of the experience, critical attitude (to have doubts about the reality of the experience), compatibility with the patient's cultural background, absence of comorbidities, control over the experience, and personal growth over time. Conclusion: Spiritual experiences may be related to psychotic and dissociative experiences, which are not necessarily related to mental disorders. We identified some criteria for differential diagnosis between spiritual experiences and mental disorders, but there is a scarcity of well-controlled studies in this important subject. PL7

265 **New altered states of consciousness (ASC) at childbirth** Kersti Wistrand <kwistrand@gmail.com> (Stockholm, Sweden)

After the publication of the first Swedish book on NDE-OBE, Medvetandet och doden (Consciousness and Death 1982, ed. Wistrand-Pilotti), I interviewed 150 NDE persons about their experiences of ASC. Among them I also found women with such experiences in connection with complicated childbirths. This was a new subject not earlier studied in psychology and psychiatry. In my thesis for the psychology degree 1990 I made an inventory of earlier described states of consciousness during pregnancy, delivery, and postpartum. Then I described the structure of the experiences of thirteen interviewed women with the new kind of ASC, both with complicated and normal deliveries, their reactions and feelings, how their stories were received by hospital staff and relatives, and how they actually wanted them to be received. How they managed to integrate these experiences into ordinary life is described too. Some of the women also experienced such astonishing, and often frightening aftereffects as increased intuition and precognition or felt streaming energy in their bodies and the ability to give healing. These experiences evoked existential questions both in the women and those who listened. Relatives and staff often shook their heads and said it was just a dream and left the subject in a hurry. All women denied any similarity of their experiences with dreams and were convinced that they were real. Then they were compelled to try to understand and sort out their situation by themselves. Some women were suffering from the belief that they had undergone brain damage during childbirth and a couple of others had great concerns before they were ready to bear another child. Those women who already had a philosophy of life, religious or atheistic, found it easier to integrate their experiences. Half of the women described themselves as spiritual seekers due to the experience at childbirth. They gradually were much relieved when NDE/OBE started to be reported in media. For the first time they realized they were not alone with experiences of this kind. I needed to study a bigger sample, and as a research coordinator in the Scandinavian branch of IANDS (International Association of Near Death Studies) I got the possibilities in St Petersburg, Russia, where I came in contact with professor Leonid Spivak, and PhD Dmitri Spivak in Human Brain Institute. Research with several projects was undertaken in 1992-today. In the first project 202 healthy delivering women were interviewed on day 2-4 after normal childbirth. Anaesthesia was not available in Russia in the early nineties. The structure of ASC was studied. E.g. it was found that 10% had a life-panorama and 9 % of the women an out-of-body experience during childbirth. Other projects looked at women with Caesarean section. Another investigated the experiences in relation to complications, anaesthesia, and loss of blood, and found statistical significance only between experiences and big loss of blood. Brain activity of women during childbirth was also measured and the researchers asserted that there could be a predicted state of consciousness bound to the childbirth. **C21**

266 **The concept of cognitive feedback loop: Applying eye tracking and affective visualisation for new states of consciousness** Brigitta Zics <brigitta.zics@ncl.ac.uk> (Newcastle University, Culture Lab, Newport, United Kingdom)

This paper will introduce the philosophical concept of "cognitive feedback loop" which in its application aims to guide its participant toward new states of consciousness. The main objective of this text is the study of human - computer interaction and how such interconnection might be seen as potential application for creative production of novel experiences. In order to exemplify this concept the paper introduces a technology enhanced environment that facilitates affective interaction between the participant's eye gaze and the specially developed audiovisual screen. Challenging approaches that only apply technologies within its scientific realm the paper suggest that philosophical application of new technologies might introduce new modalities of consciousness that uncover new qualities of human condition. This paper's inspiration is one of the radical examples of human condition; a fully locked-in woman who developed a new method of communication by imagining either milk or lemon. Through measuring the pH of her saliva, that showed the change in acidity of her spit, she could externalise her answers by pushing her pH value in one way to say "yes" and to the other to say "no". Such a novel "semantics of imagination" produces novel meaning of embodied experiences that can serve as new modalities of human-computer interaction. Taking up such an approach this paper introduces the concept of cognitive feedback loop; it is a technological feedback loop (when both, the state of the system and the participant's cognition changes) in which "simple" repeated actions between human and computer produce a complexity in the participant's cognitive engagement. This condition might be described as the participant's new state of consciousness. In order to apply this in practice the paper explains the concept of affective interaction that uses affective technologies to effect and evaluate the participant's actions, and to produce a dynamic cognitive profile of him/her. Affective quality here will be understood as a "prepersonal intensity corresponding to the passage from one experiential state of the body to another and implying an augmentation or diminution in that body's capacity to act" (Massumi 1987, p. xvii). Furthermore the paper will explain the concept of affection that here will be understood as interplay between technological effect and affective human response. One of the applications of the cognitive feedback loop is the affective environment of Mind Cupola (2008), where instant affection technologies (affecting the user - audiovisual effect, mechanical effect: hot or cold stream etc.) and solutions of affective computing (monitoring the user - eye and head gaze tracking) are interconnected in order to guide the person toward an optimal state of experience. The paper will show user studies of this environment as participant's behaviour and reactions to the affective visualisation. The "semantics of imagination" of this work is the exploration of human attention, decision making and cognitive capabilities through visual feedback with a result of the participant's immersive state as a cognitive feedback loop. Reference: Massumi, B. Notes on the Translation and Acknowledgements. In: Deleuze and Guattari, A Thousand Plateaus. (Minneapolis: University of Minnesota Press, 1987)p. xvii. **C21**

5.5 Transpersonal and humanistic psychology

267 **Systemic Family Constellations: Perceiving how consciousness transmits the effects of severe trauma across generations without direct sensory input** Dan Booth Cohen <dan@hiddensolution.com> (Saybrook University; Systemic Constellations Conferences and Education, Inc., Needham, MA)

Systemic Family Constellations are an experiential process that work with issues within human systems. The development of the process can be traced through a lineage of philosophers and therapists including Brentano, Husserl, Boszormenyi-Nagy, Satir, and Hellinger. In the past decade, further advancements have been innovated by psychiatrists, psychologists, and an array of mainstream and alternative care providers worldwide. Constellations use standing representatives to create a three dimensional matrix of the ancestral lineage. They transform irreal field dimensions of human experience into real spatial symbolic

representations, thereby allowing them to be worked with directly. The phenomenon known as "representative perception" opens a portal to a domain of consciousness that is well described in First People's traditions, but nearly eradicated within the cosmology of science and technology. Inherited memories and repetitious patterns of loss and trauma can be demonstrated to occur in multiple generations absent direct sensory inputs, e.g. an adopted child's fear of water mirrors the trauma [death by drowning] of a biological grandparent she knows nothing of. [Where the facts are confirmed post-Constellation through direct inquiry to a biological relative.] This contradicts the scientific consensus that humans perceive, transmit and receive information exclusively through direct sensory input. Tens of thousands of Constellations suggest that there is a transpersonal dimension of mind, memory, and behavior that is not derived from personal history and experience. Owing to methodological, economic, and institutional constraints, there is a paucity of published English language peer-reviewed research on the subject of Systemic Family Constellations (Cohen, 2006). With several thousand licensed doctors, psychologists, and therapists using the process and sharing their case histories in on-line forums and print journals, a new understanding of this aspect of human consciousness is emerging. This picture challenges more familiar findings of quantitative, reductionist research in psychology. Boszormenyi-Nagy first described "invisible loyalties" and called them "a hidden and unknown mechanism" (Boszormenyi-Nagy & Spark, 1973). Using the Constellation process, the networks of information transfer can be observed to operate from recognizable patterns. What is seen is that human life is a persistent phenomenon in which transgenerational consciousness sequentially inhabits individuals arrayed in a biological lineage.. The practical relevance is that recurrent or persistent emotional, behavioral, and physical difficulties that resist conventional treatment may be products of archaic traumatic memory embedded in the family system. The Constellation process promotes clarity about the relation of past events and deceased people to living family members. This contributes to these problems becoming much lighter or evaporating completely. Personal consciousness - which is the object of scientific psychology - is the accumulation of sensory input, individual experience, and brain/mind functions. Continuous transpersonal consciousness captures the residue of archaic traumas and expresses them as inexplicable impulses, urges, thoughts, and emotions. Recent research in the fields of epigenetics, morphogenetic fields, and psi phenomenon create a theoretical framework in which to understand how the resonance of the consciousness of parents, grandparents, and great-grandparents literally co-exists in the minds and bodies of living individuals. P5

268 **Religious and spiritual growth following trauma** Rosemary De Castella , Janette Graetz Simmonds <rdecastella@crisissupport.org.au> (Monash University, Melbourne, VICTORIA Australia)

In the research reported here, we examined individuals' experiences of spiritual and religious growth after experiencing major traumas. There has been a growing interest in the study of posttraumatic growth (PTG), where some survivors of trauma report experiencing beneficial changes in self-perception, relationships, and philosophy of life. In particular, survivors often experience positive changes regarding religious, spiritual, or existential matters. In our qualitative research, transcribed data from semi-structured interviews with 10 women who reported experiencing spiritual and religious growth were analysed using Interpretative Phenomenological Analysis (IPA). Several themes were identified that related to the process of spiritual and religious growth experienced by participants. These themes included: inner yearning/ seeking connection, facing challenges to growth, and finding meaning in suffering. Themes that emerged in relation to participants' strengthening of religious and spiritual beliefs included: spiritual/transcendent experiences, understanding religion and spirituality, and personal relationship with God. The third cluster of themes to emerge related to participants' personal and spiritual growth and healing. These themes were identified as: identity/strengths and virtues, purpose in life/changed priorities, and relationships with others. Respondents considered their traumatic experiences and the ensuing distress to be crucial to their subsequent growth, which is consistent with the literature on PTG (Tedeschi & Calhoun, 1996). Most participants identified with some form of Christian background or

beliefs during or pre-trauma, yet all considered that they had lacked depth in their spirituality. Several participants reported that before their trauma, they experienced a yearning for deeper spiritual connection. Trauma and the associated distress prompted a process of questioning and meaning-making for them that facilitated personal and spiritual growth and was related to intrinsic religiosity. **P5 A**

269 **Changes of subjective experiences during voluntary hyperventilation: An experimental study of the holotropic breathing** Csaba Szabo <szabocsaba4032@yahoo.com> (Institute of Psychology, Debrecen University, Debrecen, Hungary)

Subjective experiences during voluntary hyperventilation were studied in an experiment with the participation of 52 subjects. Subjects with their eyes closed hyperventilated for 75 minutes, followed by a 20 minute long normal breathing period. During the experiment, subjects listened to music. To explore the experiences, the Experiential Analysis Technique was used. According to this method, subjects saw the video recording of their experimental sessions and stopped the video when they remembered something important. These interviews were recorded and the content was analyzed with Atlas.ti software. The most frequent emotions were dysphoria, activation, tranquility, joy, and transcendence. For further analysis the experimental session was divided into four periods and the frequency of these emotions was compared. Results show significant characteristic changes of the emotions during the experiment (Friedman-test p<0, 05). Results confirm the observations of the holotropic breathwork literature in general, but raise some further important questions. This research was supported by the National Science Foundation Grant (OTKA) K75258 awarded to Csaba Szabo. **C13**

5.6 Psychoanalysis and psychotherapy

270 **Spirituality and the mind space of the psychotherapist** Janette Simmonds <janette.simmonds@monash.edu> (Psychology Programs, Monash University, Melbourne, VIC Australia)

In research with psychoanalysts and psychoanalytic psychotherapists, the reflections of these clinicians on how their own spirituality interfaced with their psychoanalytic work were explored. Twenty five experienced psychotherapists (11 female and 14 male, with an age range of 35 to 97) were interviewed. Their current spiritual influences included Taoism, Kabbala, Sufism, different types of Buddhism, Gurdjieffian philosophy, Co-freemasonry, Quakerism, and liberal Christianity. Interview transcripts were analysed using compatible qualitative techniques of narrative finding and a phenomenological coding and editing analysis technique. Participants reported that their spiritual practices and experiences influenced their professional work, helping them with specific aspects of their psychoanalytic role. For example, the practice of meditation enabled them to maintain the evenly suspended attention that Freud called for. Participants remarked on the stresses of psychotherapeutic work, and considered that their spiritual practices and perceptions were important in sustaining them in their lives and work. They identified and discussed threats to the desired mind space of remaining genuinely open to what the patient brings, including the wish to feel that one knows, and the obverse of this, a difficulty in bearing not knowing. Many participants considered that extraordinary awarenesses are possible, both within and out of the psychotherapeutic encounter. **C15**

5.7 Lucid dreaming

5.8 Anomalous experiences

271 **Apparent anomalous effects of intention on physical manifestation: Experiments in remote healing using techniques derived from matrix energetics** Imants Barušs <baruss@uwo.ca> (Psychology, King's University College, London, Ontario Canada)

Following upon theoretical speculation using quantum field theory about the possible

effects of conscious intention on physical manifestation (Baruss, 2006; 2008; 2009; 2010) an effort has been made to test such speculation in the context of remote healing using techniques derived from a system of healing and transformation known as Matrix Energetics (Bartlett, 2007; 2009). Subsequent to completing three levels of training in Matrix Energetics, the experimenter conducted healing sessions for volunteers at remote locations and requested feedback regarding their experiences at the time of the sessions or within hours or days afterwards. In an exploratory Experiment 1, a total of 34 remote healing sessions (average length 18 minutes; SD=6 minutes) were held for 15 participants from August 23, 2009 to May 9, 2010. Given that there appeared to be clear correspondences between experimenter intentions and participant experiences, such as increased energy, improved sense of well-being, and, in some cases, apparent alleviation of physical symptoms, an experiment was initiated in which a control condition and five numerical scales were introduced so as to be able to gather statistical data. In Experiment 2 a total of 62 sessions (27 control, 35 experimental (average length 19 minutes; SD=5 minutes)) were conducted by the experimenter for 16 volunteer participants from May 26, 2010 to December 9, 2010. There were no statistically significant differences between the control and experimental conditions for any of the three participant measures although there was some statistical support for participants reporting being more energized during experimental sessions (M=2.83) compared to control sessions (M=2.35; z=1.15; p=.125, one-tailed). However, as in Experiment 1, there were some striking correspondences between the intentions of the experimenter and the experiences of the participants. For example, the experimenter wrote during Session 1 with Participant 11 that there was "insufficient energy flowing to the periphery of [her] body" and imagined ways in which such energy could be increased in her hands. Apparently before even having received the e-mail alerting her that the experimenter was going to begin a session for her, and not knowing, in any case, what he had done or even whether it were a control or experimental session, the participant wrote that at the time of the session she had "become aware of a pulsating feeling in the fingers of [her] left hand" that was sufficient to cause her some concern. The often apparently accurate remote viewing of participants, the metaphorical nature of imagery used by the experimenter, the significance of entering a non-dual state of consciousness on the part of the experimenter, the types and manner of apparent effects on participants, and the possible beneficial effects of the control condition will be discussed. Although these data are inconclusive with regard to the existence of remote healing, they are sufficiently encouraging to continue this line of investigation and sufficiently rich in details to provide clues to the possible parameters that could be modulating the apparent anomalous effects of conscious intention on physical manifestation. **C31**

272 **Reading synesthesia between the lines** Maureen Seaberg <maureenseaberg@gmail.com> (author, Staten Island, NY)

How is it that several times in my experience as a synesthete, I've been able to identify other synesthetes who had not yet admitted the brain gift publicly? As part of a workshop seeking to expand the definition of synesthesia, I would like to offer this profound experience as something not included in current definitions. I believe this is possible through a strong general intuitive quality among synesthetes as well as an ability to spot metaphors in people's spoken, written and lyrical expressions that arc just a few degrees beyond the ordinary. Some of the prominent people I've uncovered may surprise you. To wit: I'm browsing in a book store. Fiction this time, I think. As I scan the spines along the shelves, one leaps out to me like a handsome stranger planting a stolen kiss. My Name is Red. I haven't had a visceral reaction to a book this way since Dr. Richard Cytowic's The Man Who Tasted Shapes caught my eye about a decade earlier; its multicolored letters signaling the contents straight to my heart. I reach for Red. The author is named Orhan Pamuk, who will win the Nobel in literature in this very hall. I already know he's a synesthete before the book about a murder in the Sultan's court of miniaturist painters rolls out like the finest of these paintings in my hands because he's named a character for a color, after all. Soon, on vacation by a seaside in his homeland, I read his rich metaphors and am certain of it. Will Mr. Pamuk confirm this for me? I meet him one night at a Mailer Colony benefit in Manhattan...He says... **C4**

5.9 Parapsychology

273 Presentiment Dick Bierman <d.j.bierman@uniamsterdam.nl> (Psychology, University of Amsterdam, Amsterdam, Netherlands)

Presentiment, the controversial phenomenon where physiological baselines appear to be correlated to future stimuli, can be interpreted as an instance of retro-causality. It will be argued that these phenomena can be understood in terms of time-symmetry. In most physical formalisms time-symmetry is theoretically predicted but in practical physical situations time-symmetry is not observed. Rather than assuming the formalisms to be inadequate, this discrepancy between theory and empirical observations can be attributed to specific physical boundary conditions. The brain is an extremely complex system and when this brain is sustaining consciousness it is also an extremely coherent system. Introducing consciousness in a physical system creates boundary conditions that are assumed to restore time-symmetry. It is essential to realize that this approach allows understanding anomalous phenomena without introducing any new element in physics. As an example new experimental results will be presented where the actual switching time of the percept of a Necker cube is dependent on future feedback conditions. **PL8**

274 **Death and the Loosening of Consciousness** Peter Fenwick <peter_fenwick@compuserve.com> (Institute of Psychiatry, Kings College, Southampton Univ., London, United Kingdom)

There is a growing awareness of the importance of end of life experiences. These comprise transcendental and spiritual features which support the dying through the last days of life, and paranormal phenomena around the time of death which are comforting for the bereaved. Our data base consists of retrospective and prospective studies of a population of carers in hospices and a nursing home in the UK, and a retrospective study of carers in Holland. Added to this are over 1500 accounts from a largely English sample of the general public in response to media discussions. The dying process as described by these people will be discussed. The dying process may start one to two years before death with a premonition about one's own death. In the weeks before death there may be 'visits' by apparitions of dead relatives who indicate that they will soon return to accompany the dying person on their journey through death. As the process continues, some indication may be given by these visitors of the likely time they will return. Next, some people report that they transit between this reality and another reality consisting of love, light and compassion. At the time of death, light surrounding the body and shapes leaving the body are reported. Deathbed coincidences occur, when some kind of contact is made between the dying person and someone at a distance to whom they are emotionally close. This 'connectedness' seems to extend both to animals, which become distressed, and even to mechanisms such as clocks which are often reported to stop at the time of death. One hypothesis is that the process of death seems to be related to the stages of loosening of consciousness. **PL14**

275 **Using retrocausal practice effects to predict random binary events in an applied setting** Michael Franklin , Jonathan Schooler <franklin@psych.ucsb.edu> (Psychology, UCSB, Santa Barbara, CA)

Modern physics suggest that time may be symmetric, thus allowing for backward in time effects, also referred to as retrocausality. Likewise, there is experimental work consistent with the notion that information about a future event, unknowable through inference alone, could be obtained before the event actually occurs. Despite this body of work, there has yet to be an experimental paradigm that has convinced the scientific community at large that retrocausality can influence human behavior. The particular paradigm we will be presenting stands apart from other work on this topic through its potential to demonstrate tangible, real-world applications based on the effect (e.g., successful prediction of the spin of a roulette wheel (black vs. red) or the up/down fluctuations of the market). In this experiment subjects see four different shapes (Shape A, B, C, and D) that randomly appear one at a time in the center of the computer screen. In phase 1, all subjects are simply told to press a button if they see Shape A or Shape B, otherwise they should not respond. Therefore, in phase 1, all subjects respond to both Shape A and Shape B. In phase 2, subjects are randomly divided into two groups. One group only responds to Shape A, while another group only responds to Shape B. In phase 2, therefore, subjects are getting practice with either Shape A or Shape B. Here we can test whether performance in phase 1, where all subjects are doing the exact same task, responding to both Shape A and B, is influenced by future practice with just one of the two shapes. The data from nearly 800 subjects collected at the University of Michigan and UCSB shows that there are reliable effects found in the paradigm, where future practice with a given shape (i.e., in phase 2) significantly affects prior performance (i.e., in phase 1; $p = 0.0002$). Ultimately, we realized that the most convincing demonstration of this phenomenon would be to show tangible effects applied in real-world settings. Importantly, this particular paradigm offers a way to test for retrocausal effects in an applied manner because what these results actually show is that performance in phase 1 gives a better than chance prediction of an unknown random binary event (i.e., whether the subject will be assigned Shape A or Shape B in phase 2). Therefore, this same logic can be used to predict other random binary events (e.g., a coin flip) at greater than chance levels. We will present work done thus far in which we have been succesful at predicting the outcome of a roulette spin (black vs. red) better than chance ($n=204$, hit rate 57%, $p<.05$). **C3**

5.10 Miscellaneous

276 **SETI by telepathy** George Hathaway , Michael Ibison, Institute for Advanced Studies at Austin <ghathaway@ieee.org> (Hathaway Consulting Services, King City, Ontario Canada)

This is an attempt to catalog the assumptions that must be made of telepathy in order that it be a means of communication with alien intelligences. We try to identify the scientific principles that do minimum violence to consensus physics. And we try to determine the content required of a supposed telepathic exchange in order that it simultaneously prove the existence of aliens and its own existence as a mode of communication. We do so whilst taking into consideration presumed limitations in the knowledge of both aliens and humans. Given the considerable uncertainties involved, the primary purpose of this effort is simply to broach the topic for discussion. A longer term goal however is the emergence of a protocol to maximize likelihood of detecting and interpreting a signal under the presumption that such a modality exists and is in use by aliens. **C35**

277 **Online networking as a way to catalyze and coordinate a transdisciplinary community of scientists studying altered states of consciousness** Eugene Pustoshkin , Dimitry Spivak, Andrey Khlopushin <eapustoshkin@gmail.com> (N. P. Bechtereva Human Brain Institute of Russian Academy of Sciences, Saint Petersburg, Russian Federation)

The world today becomes increasingly complex; the same processes are reflected in science. In the 20th century there has been a trend of specialization, but the 21st century brings the need of transdisciplinary collaboration and action. The emerging science of consciousness is essentially a transdisciplinary field. Our argument is that in today's informational society it is important to co-create and develop online platforms that support international academic transdisciplinarity. The case is made on the example of a non-profit, non-governmental international academic web project altstates.net devoted to studying altered states of consciousness (ASC). The platform is designed to support the growth of practical transdisciplinary links and cooperation among specialists of psychology, neuroscience, medicine, anthropology, cultural sciences, and other fields who explore the phenomenon of ASC and its cultural and psychophysiological correlates. This helps to further establish the notion of ASC as a legitimate topic of research in the mainstream academia worldwide. **C31**

6. Culture and Humanities

6.1 Literature and hermeneutics

278 **New Lamps for academic courses in Saudi Arabia: Realism and consciousness of implementing culture-core materials** Basim Alahmadi <bassiem@yahoo.com> (Electronic Learning, Madinah College of Technology, Medina, Saudi Arabia)

Beside sex-segregation, Saudi community is largely religious and conservative where Islam plays a dominant role in defining values, norms, practices of society and attitudes. This uniqueness reflects on academic situations which resulted in rigid hierarchical systems where syllabi are made exclusively for Saudi learners and accordingly there is no space for negotiation. Behind these facts lies a multiplicity of reasons why learners, parents, and stakeholders tend to resist any modifying in their academic materials and the reality for many of them is that they claim this could distort their entity and cultural sensitivity. The most compelling argument against this claim is the fact that the existing academic course books fail to meet the need of future market demands and aspiration of students. This paper sheds lights on a living example of Medina College of Technology (Saudi Arabia) where the author spent 12 years teaching experience. It will be exploring the potential of evaluating the existing results of old materials and further refine appropriate materials while maintaining cultural sensitivity factors. This can be achieved by applying Needs Analysis NA strategy. Academics have subscribed to the belief that NA is by far the most significant component of implementing one's course book. Although it seems interesting to deploy NA on Saudi academic courses from cultural perspective, truly it is an audible task. Based on this contextualised mode, materials can be amended in order to allow for better course delivery and flourishing future market at Saudi academic situations. **C35**

6.2 Art and aesthetics

279 **Consciousness - A Multi-scaled Flux of Communication** Kathrine Elizabeth Anker <kathrineanker@gmail.com> (Faculty of Arts, Planetary Collegium, Plymouth University, UK, Nærum, Denmark)

Consciousness is often addressed as if it was one, single property - either of the human mind, or of nature (panpsychism). In this talk, I suggest a formulation where consciousness is understood as a range of communicational processes in and between organisms and nature. I will be using central terms from Cybersemiotics (2006), a theory by Danish Professor of Semiotics, Soren Brier, who presents a new approach to studies of cognition, communication and consciousness. Briers terms form terminological tools that allow me to both differentiate and connect communicational processes from the biological level to such that are usually understood as mental and social. I will keep a particular emphasis on processes of "internal semiosis", which can be understood as the sensuous, emotional and intellectual processes that are mainly seen as intrinsic (however, naturally effected by extrinsic information input). From this standpoint, and with an emphasis on quantum levels of communication, I will search for a conceptualization of what could be characterized as inner knowledge (apriori philosophy), understood as a real phenomenon, where the former philosophical idea of transcendence is transformed into the idea of quantum information flux, dominated by endosemiotic (inner biological) processes of exchange between cellular and sub-cellular levels of communication. This can be achieved by widening the framework with newer, biophysical theories that focus upon biological, quantum information (Mae Wan Ho, James Oschmann, Marko Bischof). As part of the talk, I will present a case study of Char Davies' technoetic (tech + noeticus = the study of the effects of new technologies on human consciousness) artworks, Osmose (1995) and Ephemere (1998), and question the symbolic value of her original Virtual Reality interfaces, that physically stage and question ideas of the relation between consciousness and endogenous information, image flux as part of imagination, and the value of inwards attention. **C37**

280 **Verse, Universe** Donivan Bessinger <donibess@earthlink.net> ((retired physician), Greenville, SC)

It is from within consciousness that we seek a science of consciousness; states of mind inevitably set the context of theory-making; there seems to be no practical distinction between (subjective) consciousness and meaning (for at the moment of awaking I begin to interpret). Further, nonlocality, the infinities involved in quantum theory, and the quantum connection to consciousness all seem to suggest that the answer to Reality (Ultimate Nature) lurks beyond the reach of literal physical description (and certainly beyond literal religious formulation). Verse-writing, in the symbolic language of psyche, can evoke multiple layers of meaning. It can help break down resistances to nonlinear (and often highly speculative) approaches, and help promote understanding by the general public of new findings. The presentation will include verse samples from the author's "Verse, Universe" (2011) to stimulate discussion of these claims. **C30**

281 **Multimedia synesthetic art: Creativity as research** Carrie Firman <carrie.c.firman@gmail.com> (Buffalo, NY)

My creative process and goals involve the authentic description of the very real, beautiful nature of synesthesia. I strive to build interdisciplinary ties to my work so that it may accurately represent and support research, as well as inviting synesthetes to interact and share their own experiences. My new work includes an electronic installation, which senses the viewer's location and responds by projecting a sound and visual animation from my synesthetic experience. "Synexperience" speaks of the involuntary, consistent nature of our phenomenon and the simple, abstract aesthetic of our triggered photisms. (http://carriecfirman.com/newwork/synexperience.html) "That Which Cannot Be Said With Words" is a photography series that demonstrates the vibrant diversity of synesthetic photisms. The pictures that evoke the strongest reaction from synesthetes resemble Heinrich Kluver's form constants, derived from his research on photisms of people in altered states of consciousness in the early 20th Century. Hinting at the possibilities of commonalities among these manifestations of mental imagery, images from this series are being used to investigate this by collecting responses online. (http://carriecfirman.com/synesthesia/nowords.html) (http://carriecfirman.com/synesthesia/survey/) My "Synesthetic Keyboard" is developing as an outlet for the grapheme-color synesthete. Part abstract electronic art, part scientific testing instrument, this program displays colored blocks instead of letters and numbers. Options for alphanumeric display and custom color settings will be available so that each synesthete may have a tool that displays text as they see it. This program also has potential as a test for consistency and correlation strength in grapheme-color synesthesia. (Beta version, http://carriecfirman.com/synesthesia/applet/) **C38**

282 **Rheomode and aesthetics: Towards an ecological cybernetics of mind** Jon Goodbun <jon@wag-architecture.co.uk> (Architecture, University of Westminster, London, United Kingdom)

The quantum physicist David Bohm suggested that many of the contradictions and paradoxes that arise when we try to formulate accurate descriptions of both matter and mind, arise from the structures of everyday western language, and the ideology of modern reductive scientific method. For Bohm, western languages privilege nouns, and construct for us a perceived world of discrete subjects and objects. Our language obscures the fundamentally dynamic and interconnected process based nature of reality. Bohm imagined a new verb-based form of language, which he called the rheomode (from the Greek flow). He hoped this might make it easier for us to see and conceive of a dynamic unfolding wholeness. In this thinking, Bohm was influenced by two philosophical schools: Whiteheadian process thought, and Hegelian-Marxist dialectics. Bohm suggested that if it were possible to reformulate quantum theory in rheomodic terms, it might move beyond the paradoxes that characterised the standard interpretation: indeterminacy, non-locality, wave-particle duality, the role of the conscious observer etc. Describing the internal relations of an unfolding

dynamic system does not just re-imagine matter. Bohm insisted that rheomodic thought necessarily redefines the other half of that old dualism: mind, or consciousness. He described his holistic account as “more quantum organism than quantum mechanics”, and in his process based concepts such as “active information”, “implicate ordering” and “holomovement”, mind and matter are radically and mutually enfolded; this thinking resonates with panpsychic, hylozoic and radical externalist approaches. Bohm’s joint work with David Peat developed new conceptions of order and creativity that had as much to do with aesthetics as they did with science. In this paper I will extend this line of thinking, and suggest that new rheomodic approaches can be found within some art and design based research, specifically a series of experimental projects associated with the work of neocybernetician Gregory Bateson, Stafford Beer and Gordon Pask. In his recent The Cybernetic Brain, Andrew Pickering argues that in their work “cybernetics drew back the veil the modern sciences cast over the performative aspects of the world, including our own being” and through “hylozoic wonder” and “nomadic science” staged a “a vision of a world....in which reality is always ‘in the making’.” Although most contemporary neurological research tries to reduce correlates of consciousness to ever smaller elements, as Alva Noe has noted, “the phenomenon of consciousness, like that of life itself, is a world-involving dynamic process,” which must have “external correlates” too. As Bateson argued, cognition is a radically ecological “system whose boundaries do not at all coincide with the boundaries either of the body or of what is popularly called the ‘self’ or ‘consciousness’.” At Toward a Science of Consciousness, Tucson 2010, several speakers proposed to explore new unification models, to bring together insights from recent neurological, psychological and philosophical research. I suggest that without a renewed appreciation of Bohm’s rheomode, and the development of a language of dynamic ecological aesthetics, such a task is impossible. **C17**

283 **Ethical implications of theatre practice from a consciousness studies perspective** Daniel Meyer-Dinkgrafe <dmeyerdinkgrafe@lincoln.ac.uk> (Lincoln School of Performing A, University of Lincoln, Lincoln, United Kingdom)

Theatre practice raises a number of important ethical issues, such as: Are those who object to some expressions of theatre simply narrow-minded, or conservative to the extent of rejecting innovation? Is it all just a matter of taste, and therefore relative, subjective, personal, and therefore ultimately not relevant for or interesting to public / critical / academic debates? Are there, should there be limits beyond which theatre should not go - regarding the extent to which the dramatist or director may demand behaviour from the actors that in many other contexts other than theatre would be considered highly problematic, morally suspect, possibly with legal implications? Could there be any circumstance in which such activity, both gross and subtle is acceptable? Is its unacceptability subject to debate? What are the criteria a serious critical discussion needs to establish and then adhere to? To what extent can the canon of ethical writing provide the context? In the paper I discuss these and other issues related to the ethical implications of theatre practice from the perspective of consciousness studies. **C36**

284 **Meta-Kreator: Bending the meta-physical universe; A surrealist media conference happening and painting exhibition about imagination and consciousness** Werner Pans <werner.pans@skynet.be> (Mesnil-Eglise, Belgium)

Imagination sources by pure consciousness our personal holographic cinema inside our mind. We imagine and create under full psychic mind-power the world inside us, reflecting this same world outside us. It’s happening because we are frequencies. In fact, we are consciousness holograms generated by Supra-Consciousness. Imagine now, to go a bit deeper into the void of ourselves where we project to create ... a new world. We may do it. We all have all the quantum tools and knowledge, each one of us. We will do this by bending, influencing and creating frequencied thoughtwaves (information). When we want we frequence, we move energy and things happen to change. It’s Magic. Where will we time/

space-impact with the most effective way when we intention new worlds ? We influence and create inside the collective mind which resides the meta-physical universe. We operate under auto-hypnosis from inside our deep delta personal lab. What do we bend ? Thoughtwaves. Frequencies. Uncoded/Decoded information. We tune in vibratory frequencies of our imagination and start to mind-influence the duality frequencies of mass stagnation. We tune out Unity, consciousness decoded information ready to be captured by earth’s Ley-line grid and the crystalline mankind. We bend the vortex of duality (with his wars, greed, hate, division, ego, ...) and shall replace it with the new consciousness vortex of Unity. Nothing more. Remember, as magicians we move any mountains. How do we bend the meta-physical universe ? From our quantum lab we flux pure consciousness thoughtwaves of imagination. Reverbing lightning photons of information and creation in any direction : sun, quantum resonance field, meta-physical universe(s), black holes .... Lightspeeding and space tuned, this undecoded information undulates into the meta-physical universe. And here we bend ....by frequencing the collective mind as we decode ... How do Quantum Magicians create a new reality ? After the bending process we action the holographic reality movie. A movie needs images as seeing is believing. Materialising (publishing) our imagination thru focus of mind and burn it hologram-wise on mankind’s memory, space/time dvd. We create. The best way for global result is to establish consciousness connection on a 7% world population scale. To achieve this goal each neighbourhood, city ... should have a spearpoint of Meta-Kreators influencing and shaping with pure consciousness a new illusionary reality. We create unity, love, and worlds to play with. Meta-Kreators colour new landscapes for the mind. Meta-Kreators paint visionary frequencies in-sight the ceiling of the collective mind Meta-Kreators bend the illusionary dual-reality into a new holographic world based upon the (new) vortex of unity as frequenced by pure consciousness. **Art-Tech**

285 **Art and externalism: How artists understand the relationship between themselves and the world** Robert Pepperell <pepperell@ntlworld.com> (Fine Art, Cardiff School of Art & Design, University of Wales, Cardiff, United Kingdom)

How have artists understood the relationship between themselves and the world? This paper will present statements and works by important artists that reveal a strong tendency to regard the mind as being continuous with the world rather than distinct from it. I will discuss the reasons for this tendency and how the resulting insights can contribute to consciousness studies. In particular, artists’ ideas will be considered in the context of the ongoing debate between internalist and externalist views of the mind. Artists’ ideas can help press the case for externalism and counter some recent objections to theories of the extended mind. For example, opponents have charged that externalist theories violate common sense (Adams and Aizawa 2010) and yield little of empirical value (Rupert 2004). I will show how works of art can offer a case of materially extended cognition that does not flout common sense, and point to a significant empirical benefit for artists who adopt an externalist outlook: it allows them to make better art. The model of mind favoured by certain key artists, which gives primacy to experience over the dualism between mind and world, has a number of advantages over standard internalist models, which insist on a separation between the internal subject located in the brain and external reality in the world. First, unlike internalism it does not require the object perceived in the world to be distinct from the object as represented in perception. Second, it positions experience within the interdependent relationship between the perceiver and the perceived rather than in either alone. Understanding the mind in this broader way can help guide those in neuroscience and philosophy seeking to locate consciousness in physical processes. I will close with the claim that works of art and the statements made by artists offer a rich source of empirical data and philosophical insight about phenomenal experience. Integrating this with ideas coming from science and philosophy will enhance our understanding of the conscious mind. References: Adams, F. and Aizawa, K. (2010) The Bounds of Cognition, Oxford: Wiley & Blackwell. Rupert, R. (2004) Challenges to the Hypothesis of Extended Cognition, Journal of Philosophy, 101 (8), pp. 389-428. **C16**

286 **Gazing into infinity: An eight-year observational and photographic study of wave patterns, light transmission, fractals, and evolving consciousness** Jack Sneh <jacksneh@yahoo.com> (Calabasas, CA)

As a self taught visual artist working in various photographic mediums since 1971, I have been involved in a continuously unfolding journey into the exploration of static and transient forms in light and color. I have pursued a lifelong fascination with revealed enigmatic patterns. Recent works have incorporated light transmitted through multiple screens as well as reflections in irregular surfaces and use of water as a reflective and simultaneously transparent medium. The interplay between observation and photographic investigation has provided a basis for another interplay, that of the extraordinarily fascinating details of such phenomena and the developing capacity of my consciousness to access them. As a subset of this progression I have for the last eight years been involved with the exploration of infinitely unique and transient geometric and fractal events formed both by circular wave patterns and at the intersection of multiple wave patterns. These images records various simultaneous events occurring in both reflected and transmitted light forms. The juxtaposition of transient wave phenomenon with static structures (creek bed, floating flora, rocks etc.) is a common element which reveals a high lighting phenomenon at the boundaries of fluid bodies. The complexity of the imagery has continued to increase as my awareness of the various elements has become more acute. The interactions seen in these photographs are not manipulated and are in fact photographic records of entirely unique transitory events. Various repeated forms and interactions involving similar geometries are seen but no two are the same and the variations appear to be infinite. I neither instigate nor manipulate the wave patterns, rather I have relied entirely on water as a reflective and transparent matrix for wave forms created by normal dynamic flow and most remarkably through an improbable artistic symbiosis of sorts with insects of the Family Gerridae. Commonly known as water striders or water bugs. They display a seemingly effortless ability to float and move on the waters surface. It has also become clear to me that these creatures use wave patterns as a form of communication. These particular patterns are not the result of locomotion and are highly intricate. I have been able to incorporate the repetitive structures of these communication patterns in the course of my work. **C38**

6.3 Music

287 **Synesthesia and singing: a challenge** Alexandra Kirschner <alexandra-kirschner@t-online.de> (70191 Stuttgart, Baden-Württemberg Germany)

How can awareness of one's synesthesia affect the quality of voice and learning? In this presentation, I will share my experiences as a voice trainer in a German boys choir in which there are several young synesthetes. I feel that awareness of one's synesthesia should figure into voice training. Not only does it support the singer's sense of self, but it is a useful tool for developing the quality of the voice. I also feel it helps to have a synesthetic teacher, such as myself, in bringing out the best in these students. For example, one 10-year-old boy synesthete sang a note too flat for me. I told him it looked like fog and told him to try his scale again. He repeated it, on key this time, and I saw the same note, this time as the color yellow. He knew he'd sung it flat because it was black to him the previous time, and added color. This time it was perfect. It doesn't seem to matter that our images are different (no two synesthetes perceive everything the same. But through our metaphor-filled conversation (synesthetes also have a propensity for metaphor) we are able to connect and change the tone of the notes sung. It is really difficult for synesthetes to convey what they are experiencing to non-synesthetes. And imagine if you are a child, besides? **C4**

6.4 Religion

288 **Altering consciousness in religion** Antoon Geels <antoon.geels@teol.lu.se> (Centre for Theology and Religi, Lund University, Lund, Sweden)

Mysticism can be regarded as an integral element of religion. It includes both a way of life and a direct consciousness of the presence of God. Broadly defined as such, one can encounter mystical dimensions within all religions of the world. Taoism, Zen and other types of Buddhism, as well as Hindu traditions like Kashmir Shaivism, Vaishnavism, and Advaita Vedanta, are basically mystical in the sense that they all strive for transcendence from this world of multiplicity. In order to alter consciousness, mystics in different traditions use a variety of techniques - different types of meditation, visualization, repetitive prayer, dark room retreats, etc. These techniques lead to a variety of altered states of consciousness, including visions and experiences of what has been called 'the pure consciousness' event. What we need is a model of personality enabling us to understand different types of mystical experience, including visions and voices. Such a model should combine cognitive psychology with depth psychology. The heuristic value of such an approach, counting as it does with dynamic, associative ways of handling emotionally charged information, should enable us to understand new or unexpected features in reports of religious experience, whether it be Old Testament prophets combining, in their visions, contemporary iconographic elements with verbal data, or Christian mystics like John of the Cross, using sensuous, erotic imagery in his poetry while simultaneously stating that the mystical adept has to reach beyond the senses. In this presentation, at least one such model will be offered C15

289 **Religion As Conscious Behavior** Lluis Oviedo <loviedo@antonianum.eu> (Theology, Antonianum University, Roma, Italy)

Cognitive and behavioral research on religion has focused most in the last years on aspects which could be deemed 'unconscious': inner mechanisms, innate patterns, or hidden structures broadly shared by humans. Very often the ongoing research programs resort to computational models of mind in which the conscious side of that experience is mainly ignored or not taken into account. There are obviously many problems when the conscious aspects of religion are assumed as an important variable, since such a move appears as a methodological transfer to less scientific and more hermeneutic or phenomenological fields. However, religion cannot be rightly studied and known without taking into account its conscious aspects; indeed, religion and consciousness appear as often deeply related categories, once some religious ways point to higher forms of awareness. In this keynote, a research program is described to what could mean a scientific study of the conscious aspects of religious behavior. To start with, the study should establish what difference makes at the cognitive and behavioral levels the assumption of the role played by conscious elaboration, or - in other words - what distinguishes a religious conscious mind from a 'religious zombie'. A second step needs to deal with the relationship between conscious thought and unconscious processing, as both dimensions are clearly involved, and each one in different measure; at this end, cognitive and emotional aspects as well need to be considered. The third step would describe experimental methods which could render the study of the religious conscious mind a more 'scientific enterprise', in a way able to recover that often neglected dimension in current research. **C15**

290 **The expression of the spiritual dimension of nursing care in a Brazilian intensive care unit: A communicational study** Ramon Penha , Silva, Maria Julia Paes <rvamus@usp.br> (Nursing School, University of São Paulo, Brazil, São Paulo, Brazil)

The dimensions of care are so broad as the dimensions of the human being. In this sense, recognition of needs, fundamental work in nursing, occurs through mechanisms of communication, whether personal or collective, verbal or non-verbal. This work investigated the expression of spiritual dimension of nursing care in the Intensive Care Unit. Aims: to determine the means by which the team identifies the spiritual dimension of care, explore whether there is relationship, the perception of professional nursing, and the expression of interpersonal communication and identifying patient's spiritual needs. Methodology: This was an exploratory-descriptive study and data collection made from semi-structured interviews with thirty-four professionals from the nursing staff of a large public hospital

in Sao Paulo city, Brazil. The content analysis and observation of non-verbal signals was the methodology reference used for the treatment of data. As theoretical framework, was adopted in this study the transpersonal caring theory, developed by Jean Watson and the concepts of human communication proposed by Silva. Results: The analysis of discourse of research subjects, emerged a first category of analysis including: forms of perception of spiritual needs and religious needs of patients, divided into subcategories: the verbal and the non-verbal, and the family history of Nursing. A second category could be identified in order to express the relationship between interpersonal communication and the identification of spiritual needs, which are subcategories belonging: the mechanistic relationship; verbal and non-verbal relationship. Discussion and Considerations for Clinical Practice: The study showed that professionals make use of verbal and non-verbal communication resources, especially for access to the religious, and in some cases, spiritual dimensions. However, the mechanism and the daily verbal relations negatively influence the identification of patients spiritual needs since they are factors limiting the proximity of human relations, especially when it comes to severe patients. The family historical of nursing and were presented as elements for supplying data on the religious beliefs of patients. The study concluded that, communication, verbal and non-verbal, is the main vehicle for expression of spirituality, however, the communicative process has been established from specific systems of beliefs influence the quality of the care and spiritual attention. The study concluded that access to patients spiritual dimension requires an understanding that this dimension is expressed by communicative phenomena perceived more efficiently when higher levels of consciousness, where the senses, the touch, sounds, words, colors and shapes are captured in dynamized frequencies by the desire to understand the other in their individuality. **P6**

6.5 Mythology

291 **Altered states of consciousness and mystery cults in Ancient Greece** Yulia Ustinova <yulia@bgu.ac.il> (Ben Gurion University, Beer-Sheva, Israel)

Greek mystery cults were complex secret ceremonies that were intended to bestow happiness in this world and a better life in the hereafter on their adherents. They emerged to a large extent as an alternative to the prevailing belief in a grim post-existence of the soul beneath the earth as a shadow deprived of consciousness and will. Aristotle states that "the purpose of initiations into mysteries is not to learn anything, but rather to experience and to be inclined, that is to say, to become fit for the purpose." Many ancient authors, most notably Plato, indicate that during initiations participants experienced god-produced madness. Thus, the major objective of the Greek initiations was to make the participants live through a certain experience, and in order to attain it, they had to be inducted to a particular state of mind. In life and in death, it was vital that the initiates (or their souls) remembered these experiences. Aristotle's phrase poses several questions for the modern reader. What was the nature of the experience? Was it the initiatory madness? What methods were used to make the initiated "fit for the purpose"? I will argue that mystery initiations were essentially a fake death, a rehearsal of the real one. Modeled as it seems on near-death experiences, they comprised alterations of the participants? state of consciousness and could be induced by various techniques. Even if his or her state of consciousness was altered slightly, every detail of the initiate's surroundings took on incredible beauty and acquired supreme significance. The experience itself, undergone in an altered state of consciousness, with normal language abilities inhibited, could not be communicated in words. Its transcendental contents therefore were bound to remain ineffable, which is one of the important reasons why mystic revelations were shrouded in secrecy. The feeling of rejuvenation or rebirth reported by some modern experiencers of altered states of consciousness is strongly evident in the ideology of mystery cults, as well as in the subjective sensations of initiates. Finally, individual predisposition and environment defined the profundity of one's experience, and many initiates attended the ceremonies 'for the record', others caught a glimpse of a revelation, while a few could attain the supreme bliss of feeling at one with the deity they worshiped. An approach

based on juxtaposition of historical evidence with the results of neuropsychological research allows us to come closer to understanding of the impact of mystery rites: for trivial events to be remembered by the participants as revelations, they had to be brought to a state of heightened sensitivity and perhaps also suggestibility: this is what Aristotle meant by "becoming fit". The knowledge of life and death thus acquired was a holistic and ineffable sensation, rather than a learnt doctrine: in Aristotle's words, the initiates were "not to learn anything, but rather to experience and to be inclined". **C23**

6.6 Sociology

292 **Artificial "Consciousness Wells" - An approach of autopoietic exegesis on fabricating and sustaining prescribed "Weltanschauungen" in closed groupings** Amalia Tsakiri , Michael Vinos, Hellenic Open University, Informatics ; Christos Milios, Group Analyst - Psychotherapist <atsakiri@phs.uoa.gr> (Cognitive Science, National and Kapodistrian University of Athens (Greece) - Department of Philosop, Athens, Greece)

A central role in the realm of the operational aspects of the human Self is carried out by its interpreting relation with the environment/reality/cosmos which both places it in respect with the later as it also determines it -participates in the Self's realization. Thus, the Weltanschauung (Worldview) is simultaneously a function of, and a supplier to, Consciousness -it constitutes an autopoietic unit in its network of interrelations. Regarding social autopoietic systems (Luhmann, 1989), a Worldview can be examined both as an emergent cultural product of a system's functions and as an intellectual outcome of the components (the individuals) which comprise the system's structure. These two worldviews influence one another when operate within dynamically evolving ambiences. That is certainly not the case with the special type(s) of social systems which we'll denominate as "closed groupings". In these systems, intense effort is being spent to centrally control the premeditated/prescribed Worldview which is being suggested to the individuals as also to maintain it unaltered. The practiced methodologies to achieve such task, lead into that which can be called "Thought Reform" (Lifton, 1961). The term "closed" relates to the groups' attempts to remain secured against evolutionary challenges, dynamic or complex drifts, or fuzzy and obscure entities. H.R.Maturana & F.J.Varela (1987) consider "those human communities which, because they embody enforced mechanisms of stabilization in all the behavioral dimensions of their members, constitute impaired human social systems". Analyzing through systemic approaches such "closed groupings", one finally concludes that the same patterns of psychological and mind manipulation and the same forms of distinctive functions are found almost in any case, regardless the kind of the grouping, either of political or religious orientation. We propose that these processes are essentially, distortions of natural ones, which are intentionally selected or/and emerge as a unique compound in "closed groupings" in the same time that other ones are being repressed or fiercely disputed and scorned. The whole complicated procedure is in its essence a mimesis of "natural" autopoietic systems and its study can aid to a deeper understanding of the broader subject of social autopoiesis, serving as a "magnifying glass". Sampling, some of such characteristic functions, are: 1) the gradual incorporation of new components into the structure (members actually) in manners that are psychologically binding (e.g. through Properly twisted models of "family" relations). 2) Manipulative systems of rewards and penalties. 3) The anxiety of shame and disgrace greatly accommodates the recurrent "training" to embed the constitutional "myths" of the group which are also parts of its Worldview. 4) The extensive use of "dichotomous attributes" (Luhmann, 1989) for the fabrication and preservation of the group's identity. 5) Control through strict hierarchical structuration. 6) Elaborate control over the "linguistic domain" and the function of "languaging" through meaning replacement, oversimplifications, laborious repetitions, etc. With such means do closed groupings artificially enlarge enormously the group's over the individual's significance. The person step-by-step sheds the status of "an End in Itself"(in the Kantian notion) and its self-identity is deformed, sometimes, irrevocably. **C23**

6.7 Anthropology

293 **The fabric of the relativistic cosmos=new interdisciplinary perspectives on relative space-time and the texture of Einstein's Relativistic Cosmology** Nildson Alvares Muniz <alvaresmuniz@bol.com.br> (Uniceub - Centro Universitário de Brasilia, Brasilia, Distrito Federal Brazil)

Albert Einstein's grounding of Relative Spacetime and Relativistic Cosmology is a still long-standing enigma in our sciences after almost a century. On May 29th, 2019 it will be completing a century since Einstein introduced an innovative Cosmology and a method of sunlight measurement and confirmation of Relativistic Cosmology in Modern Physics. The main question,we tackle in this work is,namely, Relativistic Spacetime an einsteinian and human abstraction or is it a real physical entity in Einstein's Relativistic Cosmos. So,the main objective of our paper is to present new interdisciplinary perspectives on the fabric of Relativistic Cosmos in Einstein's Mechanics.This aim has a double effort.First,it discusses the fabric of the Relativistic Cosmos in Einstein's Mechanics intending to present new interdisciplinary perspectives.Second,it discusses Einstein's innovative method as a scientific innovation related to linguistic and anthropologic texture of Einstein's Relativistic Mechanics.In order to accomplish this double effort,first, I discuss symmetry,reality,structure,imag ination,and texture of Relativistic spacetime in Einstein's Mechanics.And,second,I present new interdisciplinary perspectives on conceptualization,figurativisation,and metaphorisation of Relative Spacetime discussing Structural Realism,Imagery Anthropology,Phenom enology,Generative Semantics,and Greimasian Semiotics.Diverse are the interpretations of Albert Einstein's Theory of General Relativity in the different sciences since Einstein presented a completely new scientific method in the conception of his Relativistic Cosmology.An innovative contribution that helped to advance scientific understanding and also presented new consequences to scientific knowledge of Cosmology and on and for the human gender.Einstein introduced a new method of measurement and confirmation of Relative Spacetime,on May,29th,1919,in Sobral,Brazil.This new method introduced the measurement of a total solar eclipse in order to confirm einsteinian relativity,sunlight deflection and his enigmatic equation E=m.c2,i.e,a scientific enigma so far not unveiled.In order to discuss Einstein's fabric of the Relativistic Cosmos as a realistic structure,i.e.an anthropological and tropological structure,an interdisciplinary account must be taken into account in our study on Einstein's conceptualization,figurativisation and metaphorisation of relativistic spacetime. A scientific breakthrough considered a still enigmatic and important contribution in our Modern Physics.I emphasize that the fabric of Relativistic Cosmos in Einstein's Relativistic Mechanics can only be comprehended as a tropological relation since what is involved in the conversion of the unfamilar to the familiar is a creation of Relativity as a concept,figure and a metaphor in language and in thought,therefore as a figurative act.The conclusion herein reached therefore is that Einstein's Relativity is a metaphor in thought and language.This work is based on an interdisciplinary perspective whose main thesis states that Einstein's Relativity is a metaphor in language and in thought.It discusses conceptualization,figurativ isation and metaphorisation of Relativity in Einstein's Mechanics according to an interdisciplinary account among the following fields, namely, Structural Anthropology,Greimasian Semiotics,Imagery Anthropology,Generative Semantics,Hermeneutics,and Cognitive Semantics.With this interdisciplinary perspective,I discuss that the reasoning and confirmations established in Einstein's Relativistic Mechanics,arguing that if Einstein's Relativistic Mechanics does not completely unveil a new way of conceptualization,figurativisation,and metaphorisation,it does at least inform new beacons,in this much complex but fascinating field of man-language-myth-natural world relations. **C37**

294 **Mirroring, Need and Symbolism : A Two Timing Nature or a Whole Concept** Marvin Kirsh <kirsh2152000@yahoo.com> (Anthropology, California State University Los Angeles, Los Angeles, CA)

Method and theory in science are related to a philosophy in which the centric position

of first person perception and cognition are made the exclusive focus for interpretation involving mirroring, symbolism, and need; criteria from which first scientific works in anthropology originated. A new orientation for explanation is found for some notions in physics and cosmology. Theory involving an ether, the interferometer and red shift, theory and experiment in biology, as well as aspects of Ancient Philosophies, and a modern age of extended means of communication are discussed and compared in critique with respect to a mathematically created visual model of an egg, and are used to demonstrate proposed physical and conceptual form. A two-timing complex associated with social and behavioral aspects of human life is conjectured to be caused by an external invasion of spaces by unknown phenomenon dating back to the time of Eve, and reflected from a philosophical incompleteness in the understanding of a universe structured with a like two-timed weave of conceptual and material form. Blind scientific exploration and many cultural phenomena may result from failed awareness and/or lingual representation of possible causative factors influencing behavior. **P6 A**

295 **Ayahuasca, spontaneous mental imagery, and the treatment of drug addiction and alcoholism in Brazil and Peru** Marcelo Mercante <marcelo_mercante@yahoo.com> (Department of Anthropology, University of São Paulo, São Paulo, SP Brazil)

The objective of this presentation is to contribute to investigation of the subjective experiences of participants in drug and alcohol addiction programs which use ritualistically the psychoactive drink ayahuasca as part of their treatment model. This application of ayahuasca seems to promote novel subjective experience, perception, and perspective in substance abusers, thus creating a foundation for changing their life habits. The spontaneous mental imagery associated to that experience seems to be at the core of that process. They are 'revelatory moments', putting in evidence internal and external dimensions of being. The physical, social, and spiritual transformation of the participants would appear in the form of spontaneous mental imagery present in the participant's consciousness which were related to past, present, and future. This presentation puts together data from fieldwork conducted in four different treatment centers: Takiwasi in Peru, Caminho de Luz (Rio Branco, Brazil), Ceu Sagrado (Sorocaba, Brazil) and Ceu da Nova Vida (Curitiba, Brazil). **C31**

6.8 Information technology

6.9 Ethics and legal studies

296 **A model of the evolution of morality, on the basis of neo-classical models figuring trustworthiness toward unknown others, in which open cooperation in learning is the basis for increased fitness** Sara Vollmer <vollmer@uab.edu> (Philosophy, University of Alabama at Birmingham, Birmingham, AL)

Some think morality is passed down through lineages as a consequence of learning and is therefore a cultural phenomenon; others believe it to be essentially genetic. Whether morality is cultural or genetic (or some combination of the two), the concept of being moral - as an ideal state for which one might strive - can be called into question. Among those who argue that morality is essentially cultural, some take it to be a force external to distinct selves, and being moral in a conventional sense renders people causal epiphenomena or 'robotic products of team dynamics.' (Ross 2006) Among those who view morality as largely genetic some cast it as 'a collective illusion foisted upon us by our genes.' (Ruse, 1986, 253) According to those who hold these views, if morality is genetic, we cannot take credit for being moral; and if morality is cultural, we cannot take credit for being moral. This paper will not address the extremely complex question of whether we can take credit for being moral. Instead, it will make a distinction between more, and less, robustly moral states, and then take up the question of how the more robustly moral states, those that motivate action that depletes the actors' resources without expectation of compensating gain, might have evolved. The current consensus is that moral states would have been selected for only under

conditions that were rarely experienced, such as those that obtained during the Pleistocene. Using evidence from neo-classical evolutionary models, this paper argues, to the contrary, that robustly moral states are more generally advantageous than those who argue on the basis of these models, in which economic self-interest is the primary if not sole motivating force, suppose it to be (but see Guala, this volume, for the countervailing supposition). By showing what morality is from an evolutionary perspective when what are at issue are motivating states that are non-self-interested (or as close as humans ever get) this paper helps to build the case that it should be no surprise when 'good guys don't finish last.' **C34**

6.10 Education

297 **Rehearsing Chekhov: Rehearsal techniques informed by wider reading of neuroscience; cognitive exercises** Martin Curtis <martin@citruscreative.co.uk> (Lincoln School of Performing A, Lincoln University, United Kingdom, North Somerset, BS40 7AN United Kingdom)

A primary goal for student's studying Drama at university is to attempt rehearsing and performing scenes from plays. Issues of consciousness, feeling, and action/behaviour are central to both acting and cognitive neuroscience.(Blair 2006 : 169) Cognitive neuroscience's linkage of 'perception, attention, memory, and thinking to underlying mechanisms in the brain' (LeDoux 2003: 23) has allowed me to think about working with students in the rehearsal room in a very different way. In this paper I show how the use of cognitive exercises in the rehearsal/creative process of a group of year 1 Drama students who rehearsed and performed a shortened version of Chekhov's The Three Sisters can enhance and sustain the creative process. The obvious conventional choice of approach to acting with regard to Chekhov's The Three Sisters is the writings and practices of Stanislavsky. He has almost single-handedly driven twentieth-century acting theory. However, in this paper I argue strongly that whilst Stanislavsky is important in understanding 'living the part' and 'reaching the subconscious by conscious means' he is also the problem and it is the route to the subconscious by way of the conscious that I examine. This paper is part of a wider PhD research on 'The Rehearsal Process'. The research involves a heuristic approach to my own work as a drama teacher over a period of time. It would follow that observations I make about teaching drama relate essentially to my own practice, failings and successes as a teacher. I expect that some of my findings will resonate with other teachers. In my wider research I aim to progress my understanding of the creative process in the rehearsal context; in this paper I will consider my understanding of heuristic research and how I perceive my involvement with heuristic research and its subsequent impact on my own development as a drama teacher. **C36**

298 **Educating medical doctors about evolution of consciousness** Haymo Kurz <haymo.kurz@pmu.ac.at> (Anatomy - Tissue Dynamics Lab, Tissue Dynamics Lab, Paracelsus Private Medical University Salzburg, Salzburg, Austria)

Nothing in biology - and therefore nothing in medicine - makes sense, except "in the light of evolution". Hence, teaching anatomy and cell biology, embryology and teratology to medical students needs to make reference to the evolutionary past and presence of H. sapiens and other species. This includes the emergence of brain-dependent suffering and cognition, at least in warm-blooded vertebrates, and in relation to - all too often aberrant - embryological development. However, representative surveys lead to the disconcerting result that, even in some developed countries (USA, Turkey), a rising majority of the general population denies the overwhelming evidence of evolution, while in Japan and most European countries a majority accepts historical reality. Even though no reliable surveys seem to exist about the involvement of medical doctors and other health care professionals in anti-evolutionary thinking or activities, personal experience suggests that a considerable fraction of students enter medical universities with a hardly informed or even hostile attitude towards evolution. Here, proposals will be made how the continuing enigma of consciousness may be used by academic teachers as an entry point to help students think critically about their possible prejudice against evolution, thus preparing them for science-based, humane medical practice. In this attempt, major roles are assigned to demonstrating how minute alterations of DNA may lead to dramatic changes of neocortical growth, how the human X-chromosome may have achieved a high density of genes relevant for cognition (and what that implies specifically for male brains, or most gender studies), and how cognition-dependent medical interventions may feed back into further evolutionary changes of humans and other species. **P6**

6.11 Miscellaneous

299 **Activating mastery by demonstrating the resonance of consciousness science to life. Building global community to synthesize past, present & developing science in consciousness studies** Natalie Geld , Bernard Baars, PhD, NSI; James Catterall, PhD, UCLA Grad School Education & Information Studies; Nathan Allen Munn, MD, University of Montana-Helena <bighandsproductions@msn.com> (Why Consciousness Organization (WhyCon), Los Angeles, CA)

Why Consciousness Organization (WhyCon) is building international community for scientists, educators, students and citizens to communicate, collaborate and synthesize past, present and developing science in the field of consciousness studies. We are passionate about unifying the scientific study of consciousness to amplify its outreach and efficacy. Your experience is important, so we unified to create the Why Consciousness Organization (WhyCon) during the 2010 Towards a Science of Consciousness Conference in Tucson, Arizona. Our vision is to encourage thoughtful dialogue, foster an interactive, global science collaborative and develop effective applications to harness, and deliver, the powerful resources of new media, Internet Technology and the human mind. The study of consciousness offers exciting new perspectives on the human experience. People look at great minds as being anomalies, when actually they use their minds differently - consciousness is key. We humans are walking chemistry Labs - Petri dishes for our own neuroscience experiments - quantum possibilities awaiting our observation. Many in general are science phobic, thinking science is something for what's 'out there.' It's high time we galvanize our energy and efforts to generate outreach. In the conventional college curriculum there is a gaping crater where a truly humanizing and personalizing teaching and learning enterprise used to be. Many scientists and educators continue to work in isolation and struggle to reach an ever elusive audience. Collectively, we can work toward rediscovering the conscious self as something to culture and enrich in the process of education. The human mind and brain are mysterious and fascinating and the perfect 'tools' for illuminating the resonance of science in our lives. Consciousness is humanizing, and WhyCon aims to advance empirically based consciousness (EBC) studies, inspire and support EBC studies in universities, high schools and middle schools and create worldwide web & multimedia outreach for EBC. Our vision is to become a global portal for teaching and learning about consciousness. WhyCon is in process of becoming a 501(c) 3 not-for-profit education and research corporation based in California to communicate the scientific study of consciousness; and encourage lifelong learning - anytime, anywhere - through programs that promote intelligence, curiosity, creativity, collaboration, and the richness of human capacity. In association with The Center for Consciousness Studies, our evolving membership includes innovators in cognitive neuroscience, physics, computer science, quantum mechanics, neurobiology, psychology, education and media, mathematics, arts and the humanities, ethics, and other disciplines. **C38**

6.12 Anthony Freeman/JCS

300 **Naked Emperor** Jon Cape <mail@joncape.com> (Stirling, United Kingdom)

Despite the huge popularity of reality shows, the nature of reality is hardly a popular subject. Well it sort of is - put God in the title of a book and - for or against Him - you can draw an audience. And yet much of the classical 'God versus the atheists' debate generates

more heat than light. It does so because so many of the assumptions behind both sides of that debate remain unexamined, at least outside a fairly narrow and specialist philosophical circle. I thoroughly disagree with Socrates. The unexamined life can certainly be worth living. But unexamined assumptions can at least be fun to explore. When it comes to the nature of reality, what is the dominant outlook? For many, the answer is so obvious it doesn't merit a name. Still less does it merit examination. Within the worlds of science and philosophy, the prevalent outlook, if named at all, is physicalism - sometimes dressed as scientific naturalism. Physicalism in western philosophical tradition is a version of monism. Monism took battle with dualism and monism won. Monism thought the world was composed of one kind of stuff. Dualism opted for two. Monism had two types. These two types were called idealism and physicalism. In today's language, to show idealism is to aim for perfection, whether this is realistic or not. Supporters of idealism may or may not have been idealistic in this popular sense. For them, reality was basically one thing and that thing was mental or spiritual in nature. Physical reality flowed from this. Physicalists took the opposite view and won the day. Science would hardly make sense otherwise, would it? Physicalism became, and by and large it remains, the only show in town, the emperor whose writ is law in most of modern intellectual life. In many parts of the physical, biological and social sciences, to appear to question this holy writ is to seriously damage your wealth, professional prospects and credibility amongst your peers. Thus we find arguments which might run the risk of giving this appearance being carefully prefaced by a denial of any such intention. But the empire is much larger. For many of us in all walks of life, we might not give a second's thought to the emperor. But he quietly informs what we can think about the world and our place in it. Physicalism is often presented as if it is simply science, or what science tells us about reality. But this is not so. Physicalism is one view of reality. It is a dominant view, indeed an emperor in today's world. The emperor's clothes are high fashion. But is he really naked? In this paper, the conventional wisdom of today, physicalism, will be given a philosophical grilling much in the way that Anthony Freeman ('God In Us', 1993) has done so ably with regard to conventional wisdoms of yesterday. **C15**

301 **A 1962 encounter with Thomas Kuhn, Revolution, and a 1968 "Aha" Experience: Are the descriptional categories of physics sufficient for an understanding of consciousness?** Jerry Josties <jjosties@starpower.net> (Silver Spring, MD)

I was privileged to be in attendance at Thomas Kuhn's first major address, in 1962, on "The Structure of Scientific Revolutions", and I felt that my inclinations toward scientific revolution were then fully sanctioned. In 1968 I had an AHA experience which led me to conclude that physics had to be reconceptualized in connection with consciousness, and I presently still believe that to be true. My ideas are closely related to the question of interpreting consciousness in terms of electromagnetic fields, a topic of discussion elsewhere at this meeting. Contemporary physics and neuroscience are beset with severe interpretational problems, a rather clear indication of impending paradigm change. The correct general direction of that change, as indicated by my Aha experience as well as several other general considerations, is toward panpsychism. This paper will elaborate on my Aha, and will enumerate the many advantages of panpsychism. The so-called "combination problem" is no longer a problem. **P6**

PLENARY BIOS

Atmanspacher, Harald

Harald Atmanspacher, studied physics in Goettingen, Zurich, and Munich and received a PhD in physics 1985 at the University of Munich. From 1986 to 1988 Reimar Luest fellow, then research scientist in the theory division at the Max-Planck-Institut for extraterrestrial Physics at Garching. Habilitation in theoretical physics (nonlinear dynamics and complex systems) at the University of Potsdam in 1995. Since 1998 head of the department for theory and data analysis at the Institute for Frontier Areas of Psychology and Mental Health at Freiburg. From 2002 to 2005 associate member of the Max-Planck Centre for Interdisciplinary Plasma Science, Garching. Since 2004 faculty member of the C.G. Jung-Institute Zurich, since 2005 faculty member of the Parmenides Foundation, Capoliveri, Italy. Since 2007 associate fellow of Collegium Helveticum, Zurich, Switzerland. Lecture courses and seminars at the Universities of Heidelberg, Munich, Freiburg, Zurich and at the University of Texas at Austin (USA). Research visits at the Santa Fe Institute, Santa Fe, New Mexico (USA) and at the study center of the Rockefeller Foundation in Bellagio (Italy). Member of scientific organizations and committees. Review activities for journals and publishers. Numerous presentations and over hundred publications in journals, proceedings volumes, and collections of essays. Editor-in-Chief of the journal ``Mind and Matter".

Bandyopadhyay, Anirban

Anirban Bandyopadhyay completed his doctorate in supramolecular electronics at IACS, Kolkata, in 2005. He is a permanent scientist in NIMS, Tsukuba Japan. In 2008, he and his colleagues invented nano brain an artificial molecular device that mimics a fundamental hardware feature of our brain. Apart from holding executive positions in various scientific organizations and editorial board of information related journals, he is involved in setting up a global platform of creating super-intelligent machine "Bramha"

Beauregard, Mario

Mario Beauregard is currently Associate Research Professor at the Université de Montréal (Departments of Psychology and Radiology, Neuroscience Research Center). He is the author of more than 100 publications in neuroscience, psychology and psychiatry. Because of his research into the neuroscience of consciousness, he was selected by the World Media Net to be among the "One Hundred Pioneers of the 21st Century." Dr. Beauregard is the co-author and editor of Consciousness, Emotional Self-Regulation and the Brain. His groundbreaking work on the neurobiology of emotion and transcendent experiences at the University of Montreal has received international media coverage. In 2006, he received the Joel F. Lubar award for his contribution to the field of neurofeedback. The National Film Board of Canada has produced a documentary film about his work titled The Mystical Brain (2007). Recently, Dr. Beauregard has published a book titled The Spiritual Brain (2007). On

September 11 2008, he was invited to participate in a symposium (Beyond the Mind-Body Problem: New Paradigms in the Science of Consciousness) held at the United Nations. In 2010, Dr. Beauregard received the Spectrum Award from the World Organization for Human Potential.

Bernroider, Gustav
Gustav Bernroider is Associate Professor for Neurobiology, University of Salzburg, Austria. He is leading a research unit for Neurosignaling and Neurodynamics studies that focuses on neural correlates of higher level brain functions. Bernroider considers the phenomenon of consciousness as a perceptive property. He argues that the physical relation to the phenomenon is basically provided by the transition dynamics from quantum to classical properties of various cellular components in the brain. In particular this involves ion conduction and ion hosting in membrane channel proteins. He has published his concepts in a series of papers since the mid 90s.

Bierman, Dick
Dick Bierman started his university studies in experimental physics at the age of 16. Too young to realize that perhaps theoretical physics would have been better for his later interests. His Masters Thesis was on the extremely boring topic of Auger electron emission at metal surfaces. This research set the stage for his PhD work comparing behavior of metal surface- and gaseous targets under ion bombardment. After his PhD he headed the Instrumentation dept of the faculty of Psychology of the University of Amsterdam for a few years. In that period he was also teaching the course 'Computer-Art' for Crea, the Universities student society for Arts. The computer used was a PDP-11 (from DEC) and had to be booted (too often) using manual toggling in some machine code. He started also a local educational television show and produced simulations for a TV program on Statistics using the old PDP 11. Under his supervision a large scale project of 60 hours Courseware to teach Statistics was finished. After over 15 years this courseware is still in use, thus reducing the actual costs per student contact hour to less than 10 eurocents. As a consequence he became involved in AI-research in the field of so called Intelligent Tutoring Systems. From that (rather disappointing) experience he concluded that in the teaching process lots of non verbal and often non conscious processes are crucial. His interest therefore shifted towards consciousness studies in general and the relation between conscious and non conscious processes in particular. He was visiting researcher at Interval, Paul Allen's thinktank in California, where he was involved in studying the role of the operator of Quantum Computers. He was also visiting researcher at StarLab in Brussels where he headed the Emotics group. Currently he is involved in research on intuitive decision making and research on the relation between consciousness and Quantum Physics. The latter research was triggered by his long standing interest in highly controversial but less boring so-called paranormal phenomena. In his view these phenomena, if real, should be incorporated in physics in an attempt to unify physics and psychology.

Cerf, Moran
Moran Cerf completed his PhD at Caltech, working with Drs. Christof Koch and Itzhak Fried. He is currently a postdoctoral fellow at UCLA with Dr. Fried and at Caltech with Prof. Christof Koch. His graduate work was in Philosophy of Science (M.A.) and Physics (B. Sc). Prior, Dr. Cerf worked for several years in the Israeli high-tech industry as a hacker. Dr. Cerf is interested in attention, emotions regulations, and dreams. His set of studies include examining the conscious control of single neurons in humans, the ability to affect altered states of consciousness as dreams or sleep, and the ability of humans to regulate high-level emotions.

Chawla, Lakhmir S.
Lakhmir S. Chawla currently serves as an Associate Professor of Medicine; he has dual appointments in the Department of Anesthesiology and Critical Care Medicine and in the Division of Renal Diseases and Hypertension at the George Washington University Medical Center. He has been with George Washington University Medical Center since 1995. Dr. Chawla is board certified in Critical Care Medicine and Nephrology. He is an active investigator in the field of Acute Kidney Injury, particularly in the area of inflammation and AKI, AKI biomarkers, AKI risk prediction, and AKI therapeutics. In addition, Dr. Chawla has an interest in EEG activity in critically ill patients.

Chopra, Deepak
Deepak Chopra, MD is the Founder and Chairman of the Chopra Foundation, and Founder and co-Chairman of the Chopra Center for Wellbeing and Gallup Senior Scientist. Chopra is known as a prolific author of over fifty-five books with eighteen New York Times best sellers on mind-body health, quantum mechanics, spirituality, and peace. He is a columnist for the San Francisco Chronicle and Washington Post On Faith and contributes regularly to Oprah.com, Intent.com, and Huffington Post. Chopra's Wellness Radio airs weekly on Sirius/XM Stars, Channels 102 and 55, which focuses on the areas – success, love, sexuality and relationships, well-being, and spirituality. -- Time Magazine heralds Deepak Chopra as one of the top 100 heroes and icons of the century, and credits him as "the poet-prophet of alternative medicine." – Time Magazine, June 1999

Ehrsson, Henrik
Henrik Ehrsson, Associate Professor of Cognitive Neuroscience Brain, Body & Self Laboratory Department of Neuroscience Karolinska Institutet is a cognitive neuroscientist interested in the problem of how we come to sense that we own our body. He thinks the key to solving this problem is to identify the multisensory mechanisms whereby the central nervous system distinguishes between sensory signals from one's body and from the environment. By clarifying how the normal brain produces a sense of ownership of one's body, we can learn to project ownership onto artificial bodies and simulated virtual ones; and even make two people have the experience of swapping bodies with one another.

This could have important applications in the fields of virtual reality and neuro-prosthetics. Dr. Ehrsson is a Senior Lecturer, Department of Neuroscience, Karolinska Institutet.

Fenwick, Peter
Peter Fenwick is Consultant Neuropsychiatrist emeritus to the Epilepsy Unit at the Maudsley Hospital, which he ran for twenty years. He is presently appointed as a Honorary Senior Lecturer at the Institute of Psychiatry and Southampton University, and Honorary Consultant Clinical Neurophysiologist at Broadmoor Hospital. Over the last ten years he has spent several months a year working in the field of magnetoencephalography in a neuroscience research laboratory in Japan. Dr Fenwick has a long standing interest in brain function and the problem of consciousness and has published a large number of research papers related to altered states of consciousness, and abnormalities of consciousness and behaviour. He has researched into meditation and continues to be interested in the relationship between meditative states. One of his main interests for some years has been near death experiences and the dying process, and he is at present carrying out a research project in hospices in the UK, Holland and Japan into the experiences reported by the dying and their carers around the time of death. He has co-authored several books with his wife, most recently The Art of Dying. Other titles are a study of near death experiences, “The Truth in the Light”, and of dreams “The Hidden Door.”

Franks, Nicholas
Nicholas Franks is Professor of Biophysics and Anaesthetics at Imperial College London where he is the Head of the Division of Cell and Molecular Biology and Head of Biophysics. After a PhD with Maurice Wilkins at King’s College London on X-ray and neutron diffraction and a period at Brandeis University with Don Caspar, Nick Franks moved to Imperial College as one of the founding members of the Biophysics Section, which he now heads. Throughout his career, Nick Franks has been interested in how general anaesthetics act and he has demonstrated that the traditional view that general anaesthetics acted on lipid bilayers was incorrect. With his long-term collaborator, the late Bill Lieb, he has shown that, despite their chemical diversity, anaesthetics act by directly and selectively binding to a small number of protein targets in the central nervous system, a paradigm that is now widely accepted. As well as helping to establish the GABAA receptor as a critical target, in 1988 he discovered a potassium channel in molluscs which could be selectively activated by inhalational anaesthetics. The mammalian homologues, the two-pore domain superfamily, have since been shown to be important targets for volatile anaesthetics in mammals. Most recently he has identified the NMDA receptor as a likely target for xenon, and in collaboration with Mervyn Maze, also shown that anaesthetics and sleep may share common neuronal mechanisms. His current focus is on identifying the neuronal pathways responsible for anaesthetic-induced loss of consciousness. He was the Olof Norlander Lecturer (Stockholm, 1992), the

Merel Harmel Lecturer (Duke University, 1995), the Charles F. Stevens Lecturer (St Louis, 2001), the Crawford Long Lecturer (Atlanta, 2008) and the Stuart Cullen Lecturer (UCSF). He was awarded the Ebert prize by the American Pharmaceutical Association in 1992, the Gold Medal of the Royal College of Anaesthetists in 2003, the Excellence in Research Award of the American Society of Anesthesiologists, 2006 and was elected a Fellow of the Academy of Medical Sciences in 2004 and a Fellow of the Royal College of Anaesthetists in 2007.

Gonzalez Andino, Sara L.
Sara L. Gonzalez Andino was born in Havana, Cuba and received the M.Sc. degree in Physics (with honors) from the University of Havana in 1985 and the PhD degree in Sciences from the University of Geneva in 2001. She was Associated Researcher at the Cuban National Center for Scientific Research from 1985 to 1995. From 1989 to 1990 she was working as a visitor researcher at the Institute of Experimental Audiology, University of Muenster, Germany. From 1996 to 2004 she worked at the Brain Mapping Lab, University Hospital of Geneva, Switzerland. In 2004 she became Assistant Professor and leads since then the Electrical Neuroimaging Group attached to the Medical Faculty of the University of Geneva. Her research interests include biophysical modeling, inverse and direct problem solution in biomedicine, Brain Computer Interfaces and studies on large scale coding mechanisms in humans and animals. She has published over 50 papers and acts as editor for several journals.

Hameroff, Stuart
Stuart Hameroff is a clinical anesthesiologist, Professor of Anesthesiology and Psychology, and Director of the Center for Consciousness Studies at the University of Arizona in Tucson. Beginning in the early 1970s, Hameroff has studied biomolecular mechanisms underlying consciousness, actions of anesthetic gases and information processing in cytoskeletal microtubules inside living cells. In 1994 Hameroff teamed with British physicist Sir Roger Penrose in the controversial Orch OR theory of consciousness, based on quantum computations in microtubules inside neurons.

Hesslow, Germund
Germund Hesslow is a professor of neuroscience and associate professor of philosophy at Lund University in Sweden. He has worked in the philosophy of science, mainly the concept of causality. His main work presently concerns the physiological mechanisms underlying associative learning. Research is focused on the physiology of the cerebellum which contains the neural substrate for classical (Pavlovian) conditioning. He also has an interest in the mechanisms underlying consciousness and cognition, including robot simulations of cognition.

Hudetz, Anthony
Anthony Hudetz graduated from the Eötvös Loránd University, Budapest, Hungary in 1974 with a M.S. degree in physics. He received Doctor of Biologiae Medicinalis (D.B.M.) degree from the Semmelweis University of Medicine, Budapest, Hungary in 1979, and PhD degree from the Hungarian Academy of Qualifications in 1985. Dr. Hudetz held faculty appointments in the 2nd Department of Physiology, Semmelweis University of Medicine, in the Department of Biomedical Engineering, Louisiana Tech University and currently, in the Department of Anesthesiology at the Medical College of Wisconsin with secondary appointments in the Departments of Physiology and Biophysics. He is also Adjunct Professor in the Department of Biomedical Engineering, Marquette University. Dr. Hudetz's current research interest is in discovering the mechanisms by which anesthetics produce loss of consciousness. Does consciousness really disappear when the patient is not responding? What happens to the thinking brain when it is anesthetized? Dr. Hudetz's research team investigates the electrophysiological changes that occur in the brain that has been subjected to varying depths of anesthesia with various anesthetic drugs. They also perform functional magnetic resonance imaging (fMRI) of the brain to determine the critical neurofunctional systems that anesthetic agents primarily target. One of the important findings is that the anesthetized brain retains much of its reactive capability to sensory stimuli. However, the cortical neuronal responses evoked by these stimuli do not reach consciousness due to a disruption of information integration in large-scale neuronal networks. The significance of this research is that it should lead to a better understanding of the mechanism of anesthesia of the neural correlates of consciousness.

Kafatos, Menas
Menas Kafatos joined Chapman University in 2008 as the Vice Chancellor for Special Projects and is also Founding Dean of the Schmid College of Science, Director of the Center for Excellence in Applied, Computational, and Fundamental Science, and is a Fletcher Jones Endowed Professor of Computational Physics. He received his B.A. in Physics from Cornell University in 1967 and his PhD in Physics from the Massachusetts Institute of Technology in 1972. After postdoctoral work at NASA Goddard Space Flight Center, he joined George Mason University and was University Professor of Interdisciplinary Sciences there from 1984-2008. He also served as Dean of the School of Computational Sciences and was Director of the Center for Earth Observing and Space Research. He has 34 years experience in undergraduate and graduate Earth systems science, hazards, remote sensing and data information systems, physics, computational and theoretical astrophysics, astronomy, and foundations in quantum theory. He has published numerous books including The Conscious Universe, the Non-local Universe (with Robert Nadeau, Springer-Verlag), Principles of Integrative Science (with Mihai Draganescu, Romanian Academy of Sciences Press), and more than 250 articles on computational science, astrophysics, Earth systems science, hazards and global change, general

relativity, cosmology, foundations of quantum theory, and consciousness. He has helped foster several Memorandums of Understanding with several international institutions such as Peking University, Seoul National University, Korea University Ewha Womans University and recently made a research agreement for remote sensing/GIS with Korea University and climate change with Ewha Womans University. Dr. Kafatos has wide interests in several fields of science and information science: Earth System Science/Earth Observing/ Remote Sensing: Interdisciplinary Earth system science; natural hazards and climate change; aerosols and pollution; vegetation and climate change coupling; tropical cyclones; Earth Observing System observations. Data Information Systems: Federated, distributed data information system architecture; content-based Earth science data browsing; user interfaces; distributed data systems and associated technologies. Astrophysics and Space Sciences: Black holes, active galaxies and quasars; accretion hydrodynamics in curved metrics; General Relativity; high-energy emission from cosmic sources; ultraviolet astronomy, symbiotic stars; atomic physics; cosmological redshifts. Foundations of Quantum Theory, Cosmology and Consciousness: Cosmological observations and their limitations; Universal Diagrams; foundations of quantum theory; quantum theory and brain dynamics; consciousness as the unifying field in the cosmos.

Kallio-Tamminen, Tarja
Tarja Kallio-Tamminen is a natural philosopher who focuses on the ultimate questions of reality, in particular the place of human being in the overall scheme of existence. Kallio-Tamminen has completed her degrees in high energy physics (M.Sc.) and theoretical philosophy (PhD) at the University of Helsinki focusing on the foundations, implications and interpretations of quantum mechanics. She has been actively working as a researcher, lecturer and science writer in Finland and in Sweden. Recently, she spent half a year in Vienna at the Institute for Quantum Optics and Information when intrigued by the experiments showing quantum waves and entangled states in the macroscopic world.

Malach, Rafael
Rafael Malach, Department of Neurobiology – Brain Sciences Program. Weizmann Institute of Science. Born in Israel, Prof. Malach earned a B.Sc. in biology (1974) and a M.Sc. in neurobiology (1977), both with distinction, from the Hebrew University of Jerusalem. He received his PhD in physiological optics (1982) from the University of California at Berkeley. He then spent several years as a postdoctoral fellow studying neuroanatomy at the Massachusetts Institute of Technology (MIT). In 1985, he returned to Israel and joined the staff of the Weizmann Institute as a Scientist. He was appointed Senior Scientist in 1988 and full Professor in 2002. He has since served as a visiting scientist at MIT, Massachusetts General Hospital, and NYU. Previous honors include the Dean's Prize for B.Sc. Studies, a Bantrell postdoctoral fellowship, and the Kimmel Prize for innovative research; he is Head of the Department of Neurobiology

and the incumbent of the Barbara and Morris Levinson Professorial Chair in Brain Research. Prof. Malach has contributed to the scientific understanding of the ways in which the human brain processes sensory information. His goal is to understand, at the neural level, how the brain's cortex underlies the emergence of sensory perceptual images in the human mind. Prof. Malach has demonstrated that a hierarchical sequence of anatomically connected cortical areas is involved in this process. This hierarchical flow culminates in a set of highly specialized cortical regions, among which an important component is a cortical region, dedicated to the analysis of visual objects which Prof. Malach identified and termed the Lateral Occipital Complex. More recently, Prof. Malach's group has focused on the neuronal conditions associated with crossing the perceptual threshold, using both functional MRI in healthy volunteers and electrophysiological signals obtained intracranially for diagnostic purposes in patients.

McCormick, David A.
David A. McCormick is a professor of Neurobiology at Yale University School of Medicine. His laboratory investigates the cellular and network mechanisms of cortical and thalamocortical function and modulation. The basic principles by which the forebrain generates rhythmic activity during sleep and waking, how this is modulated by neurotransmitters that determine the waking/sleeping state, and how these different patterns of activity modulate cortical communication are under active investigation. Recent investigations have also focused on the role of endogenous electric fields in guiding and synchronizing cortical network activity.

McFadden, Johnjoe
Johnjoe McFadden is a molecular biologist/microbiologist. Nearly a decade ago he became interested in the possibility of quantum mechanics playing a non-trivial role in life, particularly in the process of mutation. Whilst researching this topic for a popular science book, 'Quantum Evolution', he encountered the quantum theories of consciousness. His reading convinced him that consciousness must indeed be some kind of physical field but he was not persuaded that macroscopic quantum states were feasible in a warm wet brain. Instead he stumbled upon the idea that the brain's own electromagnetic field was a far more realistic substrate for consciousness and went on to propose the conscious electromagnetic information field (cemi field) theory. The cemi field theory was first described in McFadden's popular science book 'Quantum Evolution' in 2000 and then described in more detail in two JCS papers published in 2002. Since then McFadden has continued his mainstream work in molecular genetics but maintains a keen interest in attempts to provide the study of consciousness with a solid scientific foundation.

Mlodinow, Leonard
Leonard Mlodinow holds a PhD in theoretical physics from the University of California at Berkeley, has been an Alexander von Humboldt fellow at the Max-Planck-Institut fuer Physik und Astrophysik in Munich, and on the physics faculty of California Institute of Technology. He has authored numerous publications in academic physics journals as well as in the popular press, and has written 5 popular science books, which now appear in 25 languages -- Euclid's Window: The story of geometry from parallel lines to hyperspace (2001); Feynman's Rainbow: a search for beauty in physics and in life (2003); A Briefer History of Time (2005, co-authored with Stephen Hawking); the New York Times best-seller, editor's choice, and notable book of the year, The Drunkard's Walk: the story of randomness and its role in our lives (2008), short listed for the Royal Society book award; and the #1 best seller The Grand Design (2010, co-authored with Stephen Hawking). With Matt Costello, he co-authored the children's book series The Kids of Einstein Elementary. Dr. Mlodinow also wrote for network television for many years, including the series MacGyver, and Star Trek, Next Generation, and the comedy Night Court, has appeared in front of the camera on numerous television talk shows including Larry King Live on CNN. His writing awards include the Committee for Skeptical Inquiry's Robert P. Balles Prize in Critical Thinking and the Liber Press Award from the Spanish publisher. He was also a pioneer in computer games, as producer, executive producer and designer of several award-winning games. Between 1997 and 2003 he was Vice President for software development for the New York publisher Scholastic Inc., the U.S. publisher of the Harry Potter series, where he created a children's games division and built it into one of the top five in the United States.

Montagnier, Luc
Luc Montagnier, world renowned virologist and 2008 Nobel Prize recipient, is credited with the 1983 discovery of the human immunodeficiency virus (HIV), identified as the cause of acquired immunodeficiency syndrome (AIDS). Since 1993, Montagnier has been president of the foundation he helped found, the World Foundation for AIDS Research and Prevention and co-directs the Program for International Viral Collaboration. In the 20 years prior to the onset of the AIDS epidemic, Dr. Montagnier had also made many significant discoveries concerning the nature of viruses, as well as major contributions to the understanding of how viruses can alter the genetic information of host organisms. Additionally, as founder and director for the Institute Pasteur's viral oncology unit, his work significantly advanced cancer research. Montagnier's ongoing research focuses on the search for an AIDS vaccine or cure. Dr. Montagnier is also president of the Houston-based World Foundation for Medical Research and Prevention and has received more than 20 major awards, including the Légion d'Honneur, the Lasker Award, and the King Faisal Foundation International Prize (known as the Arab Nobel Prize). In 2008, he was awarded the Nobel Prize in Physiology or Medicine, joint recipient with Françoise Barré-Sinoussi and Harald zur Hausen for the discovery of HIV.

Moreira-Almeida, Alexander
Alexander Moreira-Almeida, MD, PhD trained in psychiatry and cognitive-behavioral therapy at Institute of Psychiatry of the University of São Paulo, Brazil, where he also obtained his PhD in Health Sciences investigating the mental health of Spiritist mediums. Formerly a postdoctoral fellow in religion and health at Duke University (US), he is now Professor of Psychiatry at the Federal University of Juiz de Fora School of Medicine and Founder and Director of the Research Center in Spirituality and Health, Brazil (www.ufjf.br/nupes-eng). His main research interest involves empirical studies of spiritual experiences as well as the methodology and epistemology of this research field. His publications are available at www.hoje.org.br/elsh.

Penrose, Roger
Sir Roger Penrose, OM, FRS is Emeritus Rouse Ball Professor at the Mathematical Institute at Oxford, and Emeritus Fellow at Wadham College. He is an historic and world-wide authority on the nature of reality, and renowned for pioneering work in black holes, twistors, spacetime geometry, cosmic censorship, Penrose tilings, quantum gravity and other areas. In 1989 he proposed consciousness as a particular form of quantum state reduction intrinsic to the universe, and later teamed with Stuart Hameroff to formalize the process in brain microtubules. His awards include the 1988 Wolf Prize (shared with Stephen Hawking). He has authored numerous books including The Road to Reality and Shadows of the Mind. His most recent book, Cycles of Time proposes serial universes preceding the Big Bang.

Plenz, Dietmar
Dietmar Plenz, National Institute of Health (NIH). Dietmar Plenz is Chief of the Section on Critical Brain Dynamics in the Intramural Research Program at the NIH. He attended college at the Universities of Mainz and Tuebingen, Germany. Under the supervision of Prof. Valentino Braitenberg and Ad Aertsen, he received his PhD in 1993 at the Max-Planck Institute of Biological Cybernetics/University Tuebingen, where he pioneered the development of in vitro cortex networks to study the emergence of neuronal population dynamics. During his 3 year postdoctoral fellowship with Stephen T. Kitai at the University of Tennessee, Memphis, he developed advanced cortex-forebrain neuronal cultures that allowed him to identify the mechanisms underlying distinct activity patterns that characterize normal and abnormal population dynamics in cortex and basal ganglia. Dr. Plenz joined the NIMH as an Investigator in 1999 and was promoted to Senior Investigator with tenure in 2006. His laboratory combines electrophysiological and imaging techniques and neuronal modeling to study the self-organization of neural networks.

Pockett, Susan
Susan Pockett earned a PhD in neurophysiology from the University of Otago in 1980. After a postdoc with Terje Lømo at the University of Oslo, she returned to

New Zealand to set up a single cell neurophysiology lab in the Department of Physiology at the University of Auckland, where she worked (apart from short sabbaticals at the Universities of New South Wales and Manitoba) until 1995. At that point she made an abrupt professional shift and embarked on the study of consciousness. After a few years doing field work and reading the literature in this new area from a base in the Dept of Psychiatry at the University of Auckland, she published a book outlining an electromagnetic field theory of consciousness in 2000. She then moved to the Dept of Physics at the University of Auckland, where (apart from a brief sojourn at UC Berkeley) she has worked for the last decade. Now, armed with a fresh theoretical perspective and skill set, she is looking for opportunities to return to her roots in neurophysiology.

Pylkkanen, Paavo
Paavo Pylkkanen received his masters degree from the University of Sussex and his doctorate from the University of Helsinki. He was an Academy of Finland researcher 1990-1995 and became associate professor in theoretical philosophy at the University of Skovde, Sweden in 1996, where he initiated a consciousness studies undergraduate program. In 2001 he became an adjunct professor at the Department of Philosophy, University of Helsinki, where he has since 2008 been a temporary university lecturer in theoretical philosophy. He has been a visiting researcher in Stanford University, Oxford University, London University, Charles University, Prague and Gothenburg University. While doing his masters and PhD theses Pylkkanen interacted with the physicist David Bohm (1917-1992) and became interested in whether Bohm's ontological interpretation of quantum theory could throw light on various philosophical problems, especially those in philosophy of mind. Bohm suggested that a new type of "active information" plays a role in quantum processes and in his 1992 PhD thesis Pylkkanen developed further Bohm's idea that mental causation can be understood in a new way in light of this notion. Bohm also proposed a more general "implicate order" framework to capture the essential content of quantum and relativity theory and in his 2007 book Mind, Matter and the Implicate Order Pylkkanen explored how the phenomenon of time consciousness can be understood in terms of the implicate order. Pylkkanen has since 1991 also interacted with Bohm's long time colleague Basil Hiley with whom he has published many articles on the relevance of quantum theory to understanding the mind.

Roberto, Padrinho Paulo
Padrinho Paulo Roberto is one of the foremost English speaking authorities on the psycho-spiritual work of Amazonian communities. He received a degree in psychology from the University Gama Filho in Rio de Janeiro. His training included psychoanalysis, bioenergetics, gestalt, as well as various psycho-spiritual healing modalities. At the age of twenty-five he worked as a psychologist for the Brazilian government in Amazonia. There he began his lifelong study of the psychological and spiritual effects plants of the rainforest

have on communities of native people. As a psychologist in Rio de Janeiro, he worked at the suicide prevention center of Pinel Hospital, with psychotic patients at the Pedro II Psychiatric Hospital and the Anna Freud Clinic, and with psychopathic children at Santa Thereza Hospital. At the same time he continued to develop his work integrating the science of the mind with theology that spoke to the spirit. In 1982 he became the head of the Céu do Mar church in Rio de Janeiro. Since his first lecture at Harvard University 15 years ago, Padrinho Paulo Roberto has been invited to universities and conferences around the world to share his knowledge of Christian-Spirituality. He recently presented at a Google Tech Talk on the threats to the ecosystem of the Amazon rainforest. He spoke about the use of sacramental plants and spiritual teachings of the Yawanawa tribe and the Santo Daime communities in Ceu do Mapia and Ceu do Mar.

Snyder, Allan
Allan Snyder is recognised for discoveries in biology, communications, optical physics and neuroscience. He received the world's "foremost prize in communication and information technology", the Marconi International Prize, in 2001. He is a Fellow of the Royal Society of London and the recipient of its 2001 Clifford Paterson Prize for "contributions which benefit mankind." He was awarded the International Australia Prize by the Prime Minister of Australia. His discoveries in brain science are hailed in the journal Nature as "breaking a 19th century mindset", while his advances in physics are described in Science magazine as a "giant step forward". His intriguing hypothesis that everyone possesses the extraordinary skills of savants, is declared "startling" by Nature, "a breakthrough that could lead to a revolution in the way we understand… the functioning of the human brain" by the New York Times, "brave and original" in a New Scientist cover story, and is featured in The Times of London, the BBC, CNN, and Barbara Walters ABC 20/20. Allan holds the 150th Anniversary Chair of Science and the Mind at the University of Sydney. Previously he was a Guggenheim Fellow at Yale University's School of Medicine and a Royal Society Research Fellow at the Physiology Laboratories of Cambridge University. He is a graduate of Harvard University, Massachusetts Institute of Technology and University College London. Dr. Snyder is also the creator of the What Makes a Champion? forum, an official Olympic cultural event held at the Sydney 2000, Beijing 2008 and forthcoming London 2012 Olympic Games, where the topic will be the neuroscience of championship. Dr. Snyder is Founder & Director, Centre for the Mind at the University of Sydney.

Summhammer, Johann
Johann Summhammer is Associate Professor for Experimental Physics at the Atom Institute of the Vienna University of Technology, Vienna, Austria. He has carried out numerous experiments and theoretical studies on quantum mechanical phenomena employing beams of neutrons, electrons and ions. He also applied his quantum physical concepts in diverse experimental fields

including research on solar cells. More recently he has developed a focus on quantum effects in biological systems, in particular in fields where these effects can provide explanations to processes building on Darwinian advantage.

Tanzi, Rudolph E.
Rudolph E. Tanzi is the Joseph and Rose Kennedy Professor of Neurology at Harvard University, and Director of the Genetics and Aging Research Unit at Massachusetts General Hospital (MGH). Dr. Tanzi has been investigating the genetics of neurological disease since 1980 when he participated in the study that led the first disease gene to be found by genetic analysis (Huntington's disease). In 1987, Dr. Tanzi isolated the first familial Alzheimer's disease (FAD) gene, known as the amyloid ß-protein (A4) precursor. In 1995, he co-discovered the second two FAD genes: presenilin 1 and 2. Dr. Tanzi is currently carrying out genome wide screens to identify additional AD genes. His research the role of zinc and copper in neurodegeneration has led to successful clinical trials for AD. Dr. Tanzi has received many awards, including the two highest awards for Alzheimer's disease research: The Metropolitan Life Award and Potamkin Prize. In 2007, he was included on the list of the "Harvard 100: Most Influential Alumni". Dr. Tanzi has co-authored over 400 research articles, including three of the top ten most cited AD papers. He also co-authored the popular trade book "Decoding Darkness: The Search for the Genetic Causes of Alzheimer's Disease".

Tuszynski, Jack
Jack Tuszynski received his M.Sc. with distinction in Physics from the University of Poznan (Poland) in 1980. He received his PhD in Condensed Matter Physics from the University of Calgary in 1983. He did a Post-Doctoral Fellowship at the University of Calgary Chemistry Department in 1983. He was an Assistant Professor at the Department of Physics of the Memorial University of Newfoundland from 1983 to 1988, and at the University of Alberta Physics Department from 1988 to 1990. He joined the University of Alberta Physics Department in 1993. He is on the editorial board of the Journal of Biological Physics.

Tyler, William J.
William J. Tyler, Virginia Tech Carilion Research Institute, School of Biomedical Engineering and Sciences. He received his BS and PhD from the University of Alabama at Birmingham before conducting his postdoctoral fellowship at Harvard University. Dr. Tyler utilizes cutting-edge technology to investigate a wide range of problems in modern neuroscience and has made leading contributions to our understanding of synaptic transmission and brain plasticity underlying sensory encoding and cognitive processes, such as learning and memory. Most recently, he developed novel methods for the noninvasive remote stimulation of brain circuits using transcranial pulsed ultrasound. This ultrasonic neuromodulation (UNMOD) technology will have a major impact on emerging

brain stimulation markets including for therapeutic applications to treat brain diseases and for research applications to elucidate brain function. To this end, Dr. Tyler co-founded SynSonix, Inc. and currently serves as its President while spearheading efforts to translate UNMOD from bench-to-bedside. Dr. Tyler's neurotechnology research on the development of UNMOD is funded by the U.S. Army Research, Development and Engineering Command (RDECOM) and a Defense Advanced Research Projects Agency (DARPA) Young Faculty Award. He recently served as an Assistant Professor of Neurobiology and Bioimaging at Arizona State University.

Ullén, Fredrik
Fredrik Ullén acclaimed pianist and active scientist, Dr. Ullen regularly collaborates with the Stockholm Brain Institute for special research concerning the development of musicians' brain. The Stockholm Brain Institute is a consortium for Cognitive and Computational Neuroscience, joining three leading Swedish Universities; Karolinska Institutet, Royal Institute of Technology and Stockholm University, in the endeavour to enhance the understanding of higher brain functions.

Vitiello, Giuseppe
Giuseppe Vitiello is Professor of Theoretical Physics, University of Salerno, Italy. His research is focused on spontaneous breakdown of symmetry in elementary particle physics, in condensed matter and in brain modelling. He studies the quantum field dynamics underlying the living matter phenomenology since the early 80s. In a series of papers and in the book "My Double unveiled" he has formulated the dissipative many-body model of brain where coherence and dissipation play a central role. In its continuous interaction with the environment the brain constructs its own image of the external world as its "Double". Consciousness arises as the permanent dialog with the Double.

Wassermann, Eric
Eric Wassermann is a neurologist specializing in neurobehavioral disorders, with a background in clinical neurophysiology. His education and training includes Swarthmore College, the University of Pennsylvania, New York Medical College, the Boston City Hospital, and the National Institute of Neurological Disorders and Stroke (fellowship in Human Motor Control). He currently heads the NINDS Brain Stimulation Unit and is acting head of the Cognitive Neuroscience Section. After early work on self-stimulation reward in rats and a hiatus for clinical traning, he restarted his research career in the physiology of the human corticospinal system and then migrated rostrally, as his interests took led him to the control and selection of action and frontal lobe disorders. Along the way, he became a leading authority on transcranial stimulation and neuromodulation techniques and was closely involved in the initial trials of TMS in depression. Having come full circle, Dr. Wassermann's current experimental program concentrates on the role of the human reward system modulating activity in the motor cortex and

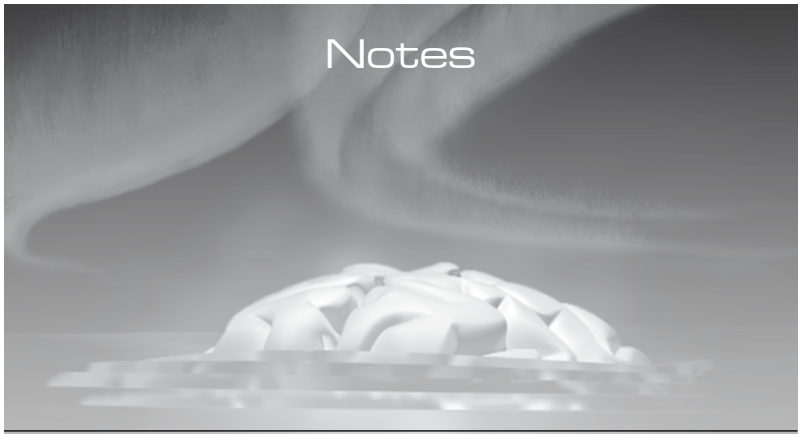
related cortical areas, and the effect of reward pathway lesions on procedural and explicit learning, fatigue and motivation. Other interests include the development of new techniques for accelerating neuroplasticity and learning. His clinical research is mainly in the area of traumatic brain injury with a concentration on military populations. He holds the rank of Captain (O-6) in the U.S. Public Health Service and serves as a government subject matter expert on medical countermeasures for chemical terrorism. He spends about 60 days a year racing and cruising under sail with family and friends.

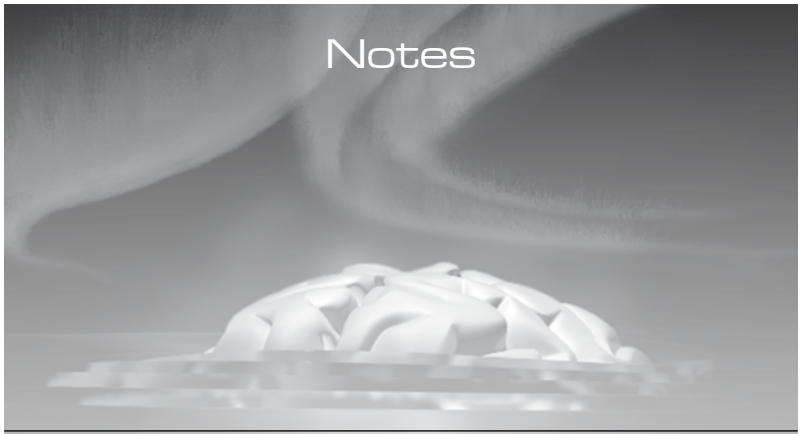
Zizzi, Paola
Paola Zizzi is with the Department of Pure and Applied Mathematics, University of Padova, Italy. She is also guest scientist at the Department of Astronomy, University of Padova and member of the International Quantum Structure Association and the Quantum Consciousness Group at the University of Arizona

Index to Authors

Abdel-Khalek A., 158
Abujudeh A., 244
Abundis M., 3
Adams, III H., 218
Alahmadi B., 278
Alberto K., 47
Ale G., 231
Alfaki A., 97
Allen-Hermanson S., 91
Alvares Muniz N., 293
Anker K., 279
Annabi E., 237
Annamalai M., 219
Araujo S., 48
Argonov V., 55
Arshamian A., 162
Ascoli G., 124
Atmanspacher H., 189
Atomi Y., 214
Avital S., 78
Awret U., 190
Axinciuc M., 4
Bachkirova T., 79
Bachmann M., 146
Baer W., 59
Bair P., 251
Bandyopadhyay A., 191
Barušs I., 271
Basbaum S., 92
Beal D., 227
Beauregard M., 100
Behme C., 159
Bell D., 144
Benazzo P., 208
Beran J., 133
Bergstrom M., 192
Berlin H., 165
Bernal R., 1
Bernroider G., 193
Bessinger D., 280
Bierman D., 273
Bizarro S., 163
Blommestijn G., 194
Blood C., 195
Borsato A., 246
Boyle N., 49
Bradley R., 154
Brazdau O., 149
Breznay P., 215
Brier S., 24
Brogaard B., 126
Brugnoli P., 257
Buck A., 80
Bulanov S., 53
Burton P., 25
Bushell W., 252
Bushell W., 120
Bystrova J., 209
Cape J., 300
Cardena E., 259
Castejón O., 134
Caulley B., 5
Cerf M., 101
Chawla L., 128
Chien E., 6
Chin H., 7
Choifer A., 26
Chopra MD D., 204
Christ H., 183
Clark N., 238
Cohen D., 267
Craddock T., 129
Curtis M., 297
De Castella R., 268
De Weijer H., 8
Dilek C., 9
Droulez T., 60
Duffy P., 155
Egoyan A., 188
Ehrsson H., 121
Ells P., 27
Endo K., 137
Eriksson J., 102
Evans P., 54
Fenwick P., 274
Fingelkurts A., 103
Firman C., 281
Franck G., 28
Franklin M., 275
Franks N., 130
Fredriksson I., 260
Froese T., 156
Gamez D., 104
Ganesh S., 174
Gáliková S., 29
Ge Moll J., 66
Geels A., 288
Geld N., 299
Ghista D., 10
Gonzalez Andino S., 98
Goodbun J., 282
Goradia S., 221
Grandy J., 232
Granqvist P., 261
Graur A., 160
Grumet R., 239
Gundersen S., 61
Guterstam A., 147
Hagen O., 30
Hallgren Carlson I., 81
Hameroff S., 131
Handziy T., 233
Hansen M., 93
Haraldsen R., 31
Hathaway G., 276
Havel I., 157
Hayley S., 127
Hebel W., 228
Hebert J., 138
Hernández R., 247
Hesslow G., 105
Hohenberger W., 67
Holbrook D., 68
Holvenstot C., 50
Houdek M., 32
Hsieh Y., 82
Hudetz A., 132
Humphreys R., 262
Jansen F., 196
Josipovic Z., 106
Josties J., 301
Jupe J., 153
Kafatos M., 210
Kallio Tamminen T., 197
Kanary Nikolov(a) J., 187
Karpukhina A., 56
Katz B., 107
Kautz W., 69
Khrennikov A., 139
Kirschner A., 287
Kirsh M., 294
Koenig R., 70
Komaki S., 223
Kornmeier J., 117
Korotkov K., 57
Kostiner N., 177
Krueger J., 248
Kulchenko P., 11
Kuo L., 83
Kuprijanov S., 211
Kurz H., 298
Kyburg A., 96
Lamanna C., 33
Lee-Woolf M., 118
Leicht E., 89
Levin T., 12

Liljenstrom H., 108
Lipkind M., 109
Liu S., 151
Longinotti D., 52
Loorits K., 34
Lougheed T., 84
Luna L., 263
Majorek M., 35
Maksakova O., 180
Malach R., 110
Manjaly J., 36
Martikainen V., 13
Martinez J., 71
Martinez Saito M., 181
Matías J., 72
Mazer R., 122
McClelland T., 37
McCormick D., 111
McDougal W., 229
McFadden J., 64
Mercante M., 295
Meyer-Dinkgrafe D., 283
Mirnig A., 73
Mlodinow L., 205
Moir J., 94
Montagnier, M.D. L., 135
Moore J., 166
Moreira-Almeida A., 264
Morrison C., 198
Morse M., 240
Mourenza A., 65
Mruthinti S., 112
Musha T., 199
Nassikas A., 222
Neven H., 200
Nevvazhay I., 38
Nizzi M., 85
Nystrom J., 39
O'Connor F., 40
Omid M., 206
Osika W., 253
Oviedo L., 289
Padgett J., 176
Pang H., 86
Pans W., 284
Parker A., 14
Parthemore J., 15
Penha R., 290
Penrose R., 201
Pepperell R., 285
Petkova V., 123
Petrovic B., 234
Pilotti J., 62
Plenz D., 113
Pockett S., 224
Pokorný J., 140
Poochigian D., 74
Pop-Jordanov J., 114
Potashko O., 230
Pregnolato M., 16
Proeckl D., 17
Pustoshkin E., 277
Pylkkanen P., 41
Raeisi M., 207
Rapparini R., 178
Reynolds P., 167
Roberto P., 241
Rodrigues A., 249
Romero L., 254
Ronager J., 141
Roy S., 245
Rubin F., 168
Salari V., 142
Sananes M., 212
Sandra D., 213
Schäfer L., 18
Schlicht T., 19
Seaberg M., 272
Seli G., 58
Semmens-Wheeler R., 169
Sharma S., 75
Sharma V., 148
Shaw J., 87
Shin H., 145
Silverstein D., 152
Simmonds J., 270
Sjöstedt Hughes P., 42
Sneh J., 286
Snyder A., 170
Sollberger M., 95
Sotirova-Kohli M., 171
Spivak D., 179
Staicu L., 2
Stamenov M., 161
Standish L., 242
Steen F., 182
Sugiyama S., 20
Suzuki K., 172
Swiatek K., 76
Szabo C., 269
Tamori Y., 184
Tanzi R., 125
Tassone S., 51
Taylor H., 43
Tereshko S., 44
Theise N., 216
Theise N., 217
Thomas K., 45
Thomson J., 21
Travis F., 99
Trivedi C., 235
Tsakiri A., 292
Tsakiris M., 88
Tunevi A., 175
Tuovinen J., 46
Tuszynski J., 225
Tyler W., 136
Ullén F., 185
Uneståhl L., 258
Ustinova Y., 291
van Lommel, 259A
Veliz C., 63
Veres Z., 22
Verma P., 119
Villanueva L., 173
Vitiello G., 143
Vitiello G., 202
Vollmer S., 296
Waldon S., 186
Wallenbeck A., 243
Wassermann E., 226
Waterworth J., 236
Weber G., 255
Weed L., 77
Westcombe A., 90
Whitehead C., 164
Whitmarsh S., 256
Whitney L., 150
Willis A., 115
Winkler E., 23
Wistrand K., 265
Yordanova J., 116
Zdravkovic S., 220
Zhou F., 250
Zics B., 266
Zizzi P., 203





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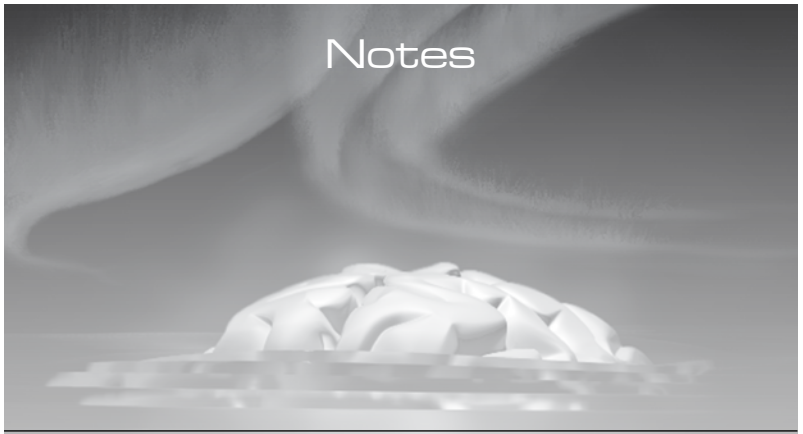

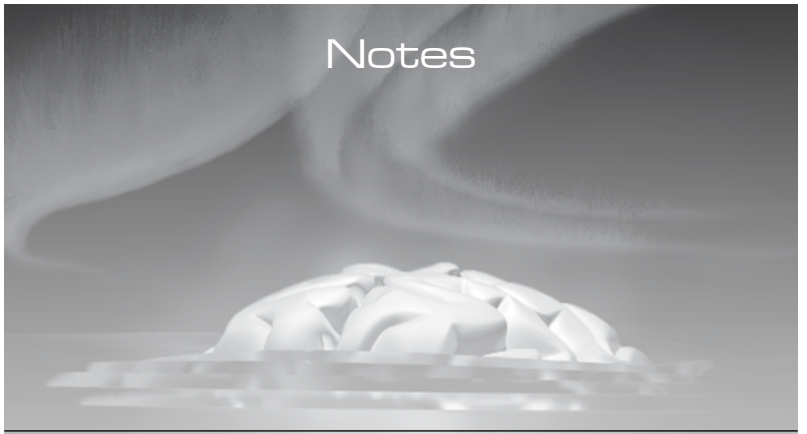

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Notes

The Center for Consciousness Studies
Thanks Christer Perfjell for all your efforts
to make TSC 2011 a reality

Thank you for your vision

It is important to highlight the research and theories of consciousness.
It is a vast and difficult subject and I feel that people in general
do not dare to talk about it. I want to place these questions
in the limelight, both from a spiritual and scientific point of view,
and let people take part in the discussion and search for knowledge
and understanding of this complex subject.

Christer Perfjell
Perfjell Foundation
Evidentum Foundation
Västra Frölunda
Sweden

Perfjell
FOUNDATION

The Center for Consciousness Studies and The Perfjell Foundation Thank Deepak Chopra for Participation at Stockholm TSC CCS 2011

CONSCIOUSNESS:
THE ULTIMATE REALITY

Monday, May 2, 2011
9am to 4pm
Aula Magna Hall
Stockholm, Sweden

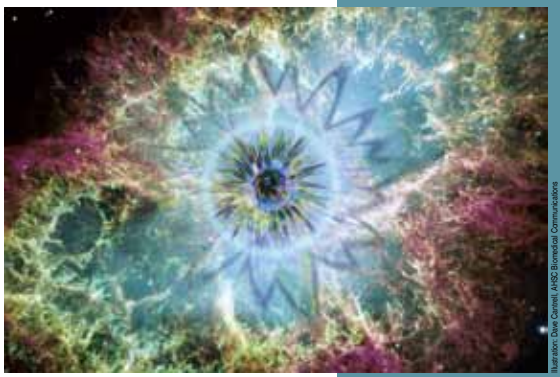


Illustration: Oliver Cantrell, AHSC Biomedical Communications

Deepak Chopra, MD will lead a special workshop as part of the 2011 Conference: Toward a Science of Consciousness ***Brain, Mind and Reality***

New York Times Bestselling Author, Founder, The Chopra Foundation and Gallup Senior Scientist **http://consciousness.arizona.edu/TSC2011deepakworkshop.htm**

Based on a theoretical framework from Vedic traditions that consciousness is the ultimate reality, and in the context of modern medical science, **Dr. Deepak Chopra** will discuss ancient spiritual disciplines. These include various types of meditation such as transcending, contemplative, reflective, and healing practices which can expand consciousness to deeper levels of nonlocal awareness and awaken dormant potentials. Deepak will also address the significance of love, compassion, joy, kindness, and service as transcendence to higher states of consciousness. He will explore a map from Vedic wisdom traditions leading us through stages of spiritual development towards enlightenment. Participants will be shown how to influence their autonomic nervous system to lower heart rate and blood pressure, and change body temperature.

Deepak Chopra, MD is Founder and Chairman of the Chopra Foundation, the Chopra Center for Wellbeing, and Gallup Senior Scientist. He is a prolific author of over fifty-five books with eighteen New York Times best sellers on mind-body health, quantum mechanics, spirituality, and peace. He is a columnist for the San Francisco Chronicle and Washington Post On Faith and contributes regularly to Oprah.com, Intent.com, and Huffington Post. Chopra's Wellness Radio airs weekly on Sirius/XM Stars, Channels 102 and 55, which focuses on the areas – success, love, sexuality and relationships, well-being, and spirituality. – *Time Magazine heralds Deepak Chopra as one of the top 100 heroes and icons of the century, and credits him as "the poet-prophet of alternative medicine." – Time Magazine*

Featured Discussion: "Neuroscience of Enlightenment"

Neuroplasticity and gene regulation show that consciousness can change brain structure and function. Thought, perception, emotion, intention and other mental processes correlate with neural representation in synaptic networks. A new understanding of the mind/brain relationship shows evolution of our consciousness through mental practices such as meditation and mindful awareness. In the workshop, attendees will be transcendence and how to get in touch with pure consciousness, higher states of consciousness and rewiring the brain for enlightenment.

- Is there an ultimate reality? What comprises the universe? How does reality relate to conscious experience?
- Is consciousness an epiphenomenal illusion emerging from complex computation as materialists believe? Or is consciousness primary, conceiving, governing, constructing and becoming the universe, as Vedic traditions describe?
- Is it the universe itself within the brain which becomes self-aware? Does consciousness extend to the fine structure of spacetime geometry?
- Are paths to enlightenment through meditation and spiritual practice taking us to deeper levels of reality in the physical universe? Does reaching deeper levels enhance intuition, creativity, choices, healing, and non-local communication?
- How far can our consciousness evolve? Are we influenced by the future? Can we achieve physical, emotional, spiritual, social, financial and ecological well-being? Can we save the world?

Evening Public Forum at Aula Magna Hall – Monday May 2 5:00-7:00 PM
Dr. Chopra will also speak at the Evening Public Forum at Aula Magna Hall
"Are Science and Spirituality Incompatible?" (speakers TBA)
Workshop participants are invited to keep their seats. Additional Seats for public based on availability

ticnet

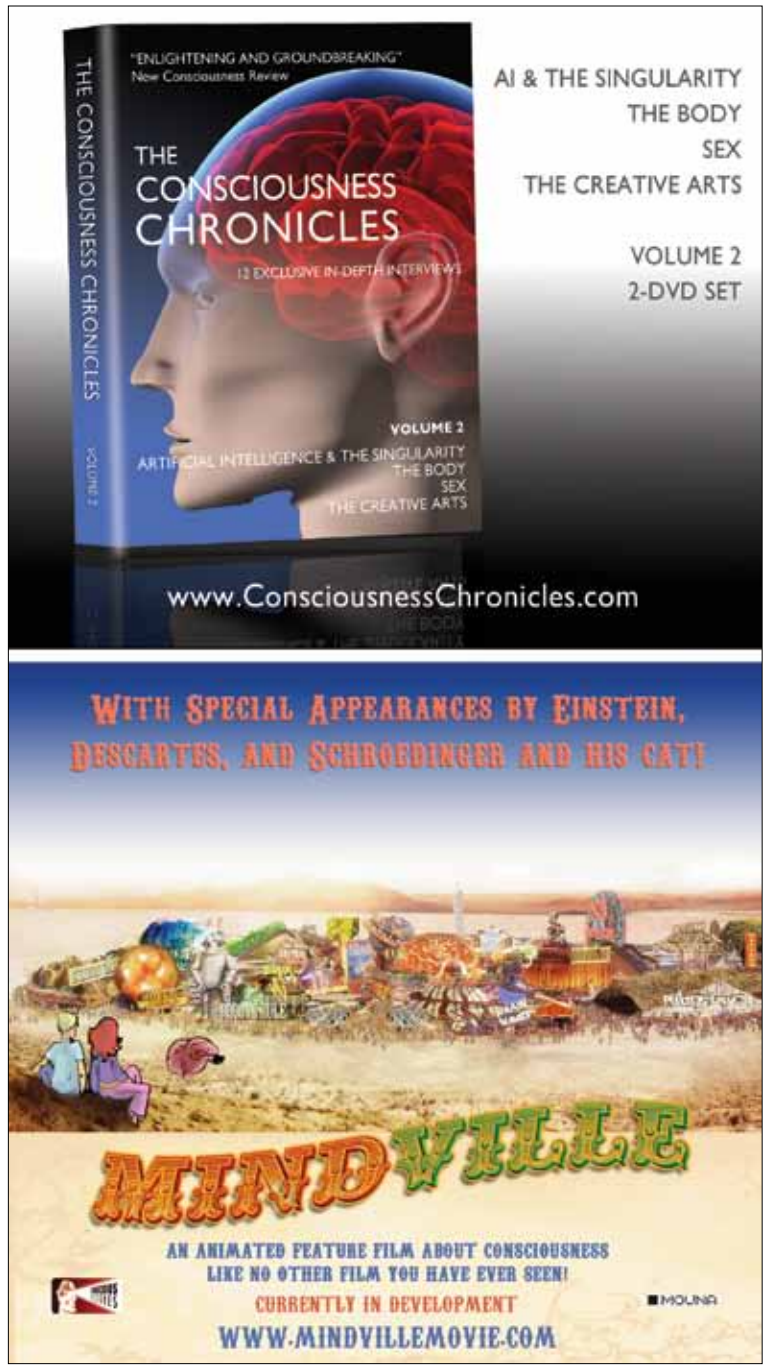
Contact Info/Tickets: center@u.arizona.edu
Contact in USA: center@u.arizona.edu – **Contact in Sweden:** info@mindevent.se

DEEPAK CHOPRA WORKSHOP
Consciousness: The Ultimate Reality
Aula Magna Hall, Stockholm University | Monday, May 2, 2011, 9am-4pm

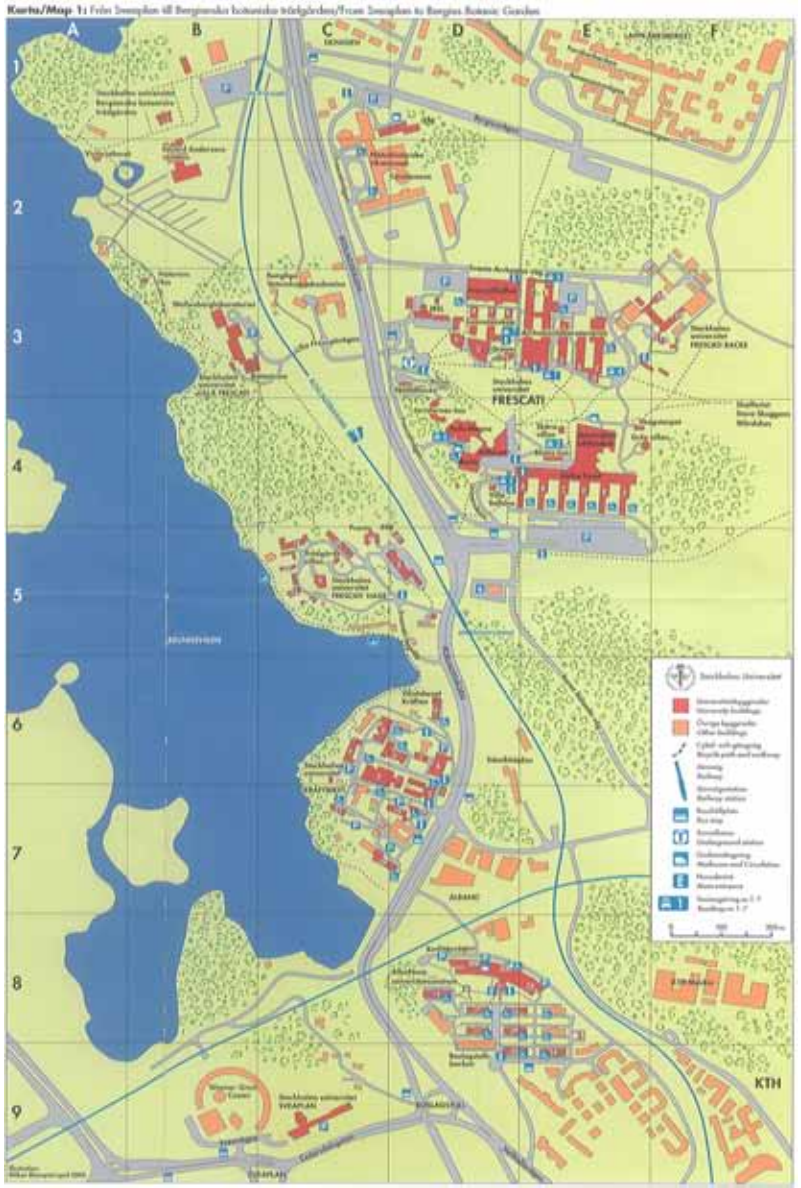
PUBLIC FORUM WITH DEEPAK CHOPRA AND GUESTS
Science, Consciousness and Spirituality
Aula Magna Hall, Stockholm University | Monday, May 2, 2011, 5-7pm

PLENARY 3 WITH DEEPAK CHOPRA
Consciousness and Reality |
Aula Magna Hall, Stockholm University | Tuesday, May 3, 2011, 2-4:10pm

Mindville SA Congratulates CCS and The Perfjell Foundation for Toward a Science of Consciousness 2011 · Stockholm, Sweden



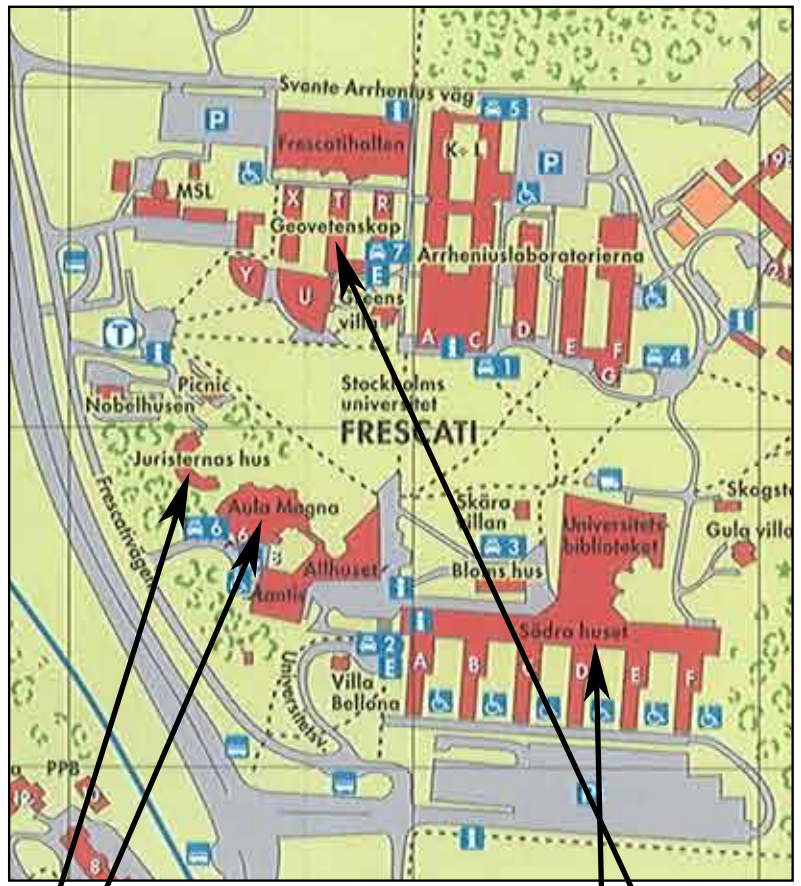
Toward a Science of Consciousness



May 3-7, 2011 | Stockholm, Sweden | Aula Magna Hall

FINDING YOUR WAY AROUND THE CONFERENCE

Toward a Science of Consciousness 2011
Aula Magna Hall, Frescati Campus, Stockholm University



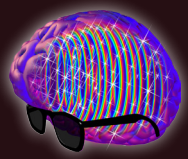
BUILDING AND ROOM LOCATIONS

AM – Aula Magna Hall
SH – Södra Huset (South House)
JH – Juristernas Hus (Law Students House)
GEO – Geovetenskapens Hus (Geo-Science building)

TOWARD A SCIENCE OF CONSCIOUSNESS 2011
STOCKHOLM, SWEDEN – AULA MAGNA HALL

ORGANIZERS AND SPONSORS

Perfjell FOUNDATION



www.MindEvent.se

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