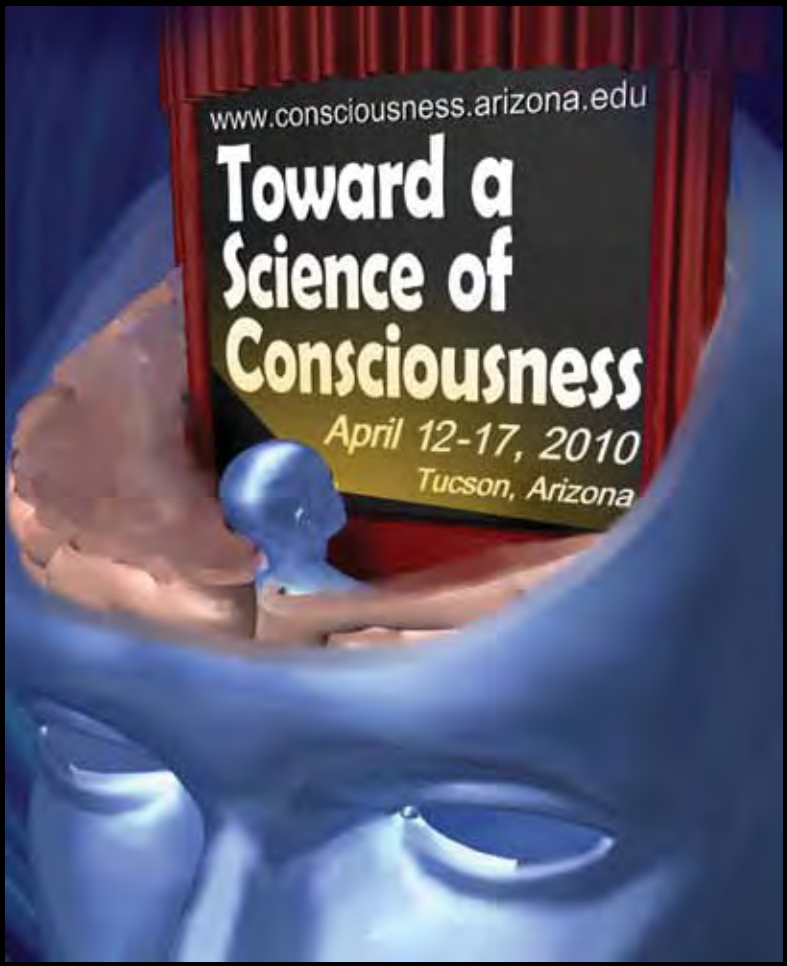

THE UNIVERSITY OF ARIZONA®

Center for CONSCIOUSNESS STUDIES

TOWARD A SCIENCE OF CONSCIOUSNESS

April 12-17, 2010
Tucson Convention Center
Tucson, Arizona

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Sponsored by the
CENTER FOR CONSCIOUSNESS STUDIES
The University of Arizona

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Center for CONSCIOUSNESS STUDIES

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WELCOME

Welcome to the 2010 Tucson conference "Toward a Science of Consciousness," the ninth in a series of biennial gatherings on a broad spectrum of approaches to the fundamental question of how the brain produces conscious experience. As in recent years, we expect over 700 participants from 45 countries on 6 continents. Sponsored and organized by the Center for Consciousness Studies at the University of Arizona, the Tucson conferences have played a major role in shaping an interdisciplinary field composed of neuroscience, philosophy, medicine, physics, biology, psychology, anthropology, contemplative and experiential traditions, arts and humanities and others. Participants will give 400 presentations included in 15 pre-conference workshops, 12 plenary or keynote sessions, 21 concurrent talk sessions, 2 poster sessions, 2 art-tech interactive sessions and special evening Club Consciousness performances.

The conference and Center wish to thank members of the Program Committee, Center for Consciousness Studies/TSC Conference Manager Arlene 'Abi' Behar-Montefiore, Ed Xia, SBS Tech for registration and abstract systems, David Cantrell of AHSC Biomedical Communications for art design, Darla Keneston of AHSC Biomedical Communications for graphic design, and Michael Branch, AHSC Biomedical Communications for web support. We also thank Commotion Studios for A/V, Backcountry Productions for conference recording, U.S. Expo, the Facilities of the Tucson Convention Center (managed by Kate Calhoun), Hotel Arizona (Gayle Venner, Director of Sales) Doug Kramer Tours, Maynards at the Depot, and the Westin La Paloma.

We are grateful to all keynote, plenary, concurrent, poster and art-tech demo session presenters, workshop facilitators, Club Consciousness entertainers and attendees whose registration fees fund the conference. We also thank the University of Arizona Departments of Psychology, Philosophy, the College of Science and the College of Social and Behavioral Studies, the College of Medicine and the Department of Anesthesiology. Thank you to Robert A. Pepperell, Cardiff School of Art and Design and Jim Laukes for chairing the art-tech demo sessions.

Finally, we thank The Fetzer Institute for initial funding of the Center, the YeTaDeL Foundation for ongoing support, the Journal of Consciousness Studies, Keith Sutherland and David Chalmers for the categorization/indexing system.

FINDING YOUR WAY AROUND THE CONFERENCE
A map of the conference sites appears on the inside back cover. Within walking distance (to the northeast of the Tucson Convention Center and Hotel Arizona) are various cafes, galleries, restaurants, bars and other sites, including the Tucson Museum of Art, the 4th Avenue district and the Hotel Congress. The University of Arizona campus is within a healthy 30-minute walk. The Hotel can arrange taxi cabs to The Desert Museum, the University of Arizona campus, or to one of several shopping malls.

SESSIONS
Several types of presentation sessions constitute the conference program

PLENARY SESSIONS
Held in the spacious Leo Rich Theater, 12 plenary and keynote sessions (3 per full day) are presented to the entire conference audience

CONCURRENT TALK SESSIONS
After the Plenary Program Tuesday, Wednesday and Friday 4:30 to 6:35 pm, seven parallel sessions with 5 speakers each (105 speakers total) cover particular focused areas

POSTER SESSIONS
Over 200 poster presentations in two sessions Wednesday and Friday evenings 7:00 pm to 9:45 pm. Presenters stand by their material posted on a large board as audience circulates. Cash bar.

ART & TECHNOLOGY DEMO SESSIONS
More interactive and experiential than concurrent sessions, ART/TECH/DEMO presentations occur in evenings adjacent to the Poster Session, demonstrating art, media and experiential techniques with power point, body and canvas. Cash bar.

INSTALLATIONS: CONSCIOUSNESS UNDER THE SCOPE
The Conference is pleased to host BioScapes®, the international traveling exhibit of outstanding images and videos from the Olympus BioScapes Digital Imaging Competition®, a world-wide contest for the best microscopic images. For the Tucson conference, images and video related to consciousness, awareness, brain, neurons and glia have been selected. Abi Behar Montefiore has also arranged for the BioScapes® installation be shown at the Arizona Health Sceinces Library following the conference. Special thanks to the

Olympus Corporation of America and R. Vincent Parks, Edge Communications. Tucson-based computer artist Lucia Grossberger Morales produced the DVD installation, Consciousness Under the Scope from the BioScapes® art. She will also present her own installation 'Meditations on Computer Patterns.'

LATE NIGHT - CLUB CONSCIOUSNESS
For the first time – Cabaret-style Club Consciousness at the Leo Rich Theatre, 9:45 pm to 11:15 pm Tuesday, Wednesday and 9:45 to Midnight Friday nights. Professional entertainers, singers, comedians and poets with interest in consciousness will perform. Friday night includes the traditional Poetry Slam and Zombie Blues. Cash bar.

CONFERENCE DINNER
Thursday evening at the elegant Westin La Paloma Hotel and Resort in the heart of the beautiful Catalina Foothills, enjoy a wonderful meal, drinks and light entertainment. Ticket required (other conference social events included in registration).

ADDITIONAL SOCIAL EVENTS

- **WELCOME RECEPTION –** Tuesday evening at Hotel Arizona in the Starlight Ballroom and courtyard. Meet and mingle with food and drinks (cash bar)
- **WEBCONSCIOUSNESS ALUMNI –** Special thanks to Bernard J. Baars for his innovative leadership with the successful online Consciousness: The Webcourse and Advanced Seminars, and Jeffrey Martin for his participation and technical assistance. Designated Areas for Alumni at various social events.
- **HOSPITALITY SUITE –** The Conference Hospitality Suite on the 9th floor of Hotel Arizona will welcome our attendees – times TBA, organized by UA Philosophy graduate Czarina Salido. Special thanks to Trader Joe's (North Campbell Ave-Tucson) for their donation of flowers for the registration desk and food items for the hospitality suite. Also thanks to Safeway, Rincon Market and Whole Foods.
- **SIDE TRIPS –** Thursday afternoon - Visits to scenic Mt. Lemmon, Sabino Canyon and a Desert Jeep Ride for the adventurous.

POETRY SLAM AND ZOMBIE BLUES/FRIDAY NIGHT CLUB CONSCIOUSNESS

As in previous conferences, a Poetry Slam/Zombie Blues/Talent Show will take place Friday evening, April 16 from 10 pm to Midnight (cash bar). Attendees are invited to recite an original poem onstage on any topic related to consciousness to a cheering and sometimes jeering audience. Following the poems, attendees offer one or more verses of the Zombie Blues with musical accompaniment. The original soulless lament: *"I act like you act, I do what you do, But I don't know what it's like to be you. What consciousness is - I ain't got a clue….I got the Zombie Blues…"* Start working on your own verses now!

END-OF-CONSCIOUSNESS PARTY

Saturday night (7:30-???) the traditional End-of-Consciousness party will take place at Maynards at the Depot, a 10 minute walk from the conference location. Enjoy food, drinks/cash bar, and music by DJ Jake & Fort Awesome in an indoor/outdoor setting by the tracks of the Southern Pacific Railroad.

The night is also 'Tucson pub crawl', in which a dozen walking-distance bars and clubs feature live music for one five dollar cover-fee. (We have 40 tickets to sell for $5 each.)

PUBLISHER & COMMERCIAL EXHIBITS

- MIT Press
- Oxford University Press
- Walling - Hicks Authors
- Backcountry Productions
- Journal of Consciousness Studies/Imprint Academic
- International Association for Near-Death Studies
- Olympus BioScapes Digital Imaging Competition®
- Center for Consciousness Studies
- Conscious Pictures/The 'Consciousness Chronicles'
- Saybrook University
- John Benjamins Publishing Company
- Gorgeous GoddessWear

TOWARD A SCIENCE OF CONSCIOUSNESS 2011 IN ISRAEL

Getting Emotional

Next year's TSC will take place in Tel Aviv, Israel in the spring. Along with rigorous discussions of philosophy of mind, brain and beyond, this conference will focus on the interplay between self, emotion and consciousness. Hosts of the conference will be leading neuroscientists Prof. Talma Hendler from Tel-Aviv University and Dr. Abraham Zangen from the Weizmann Institute. Further details will follow on the TSC website.

PROGRAM OUTLINE

TOWARD A SCIENCE OF CONSCIOUSNESS

April 13-17, 2010
Tucson Convention Center and Hotel Arizona

TUESDAY April 13

Registration Leo Rich Theatre

1:45 - 4:10 pm **CONFERENCE OPENING/PLENARY 1**
Leo Rich Theatre
William James Centennial
Eugene Taylor, Bernard J. Baars, Bruce Mangan

4:30 - 6:35 pm **CONCURRENT SESSIONS 1-7**
Tucson Convention Center (TCC)
Hotel Arizona (HA)

C1	Consciousness, Representation and Thought	TCC - Coconino
C2	Materialism, Dualism, and Higher-Order Thought	TCC - Gila
C3	Neurobiology and Theories of Consciousness: Brain Networks	TCC - Maricopa
C4	Unconscious Processes	TCC - Graham
C5	AI and Computational Models	TCC - Greenlee
C6	Art, Media and Conscious Perception	HA - Grand Ballroom West
C7	Altered States of Consciousness	HA - Grand Ballroom East

7:00 - 9:30 pm **Welcome Reception**
Hotel Arizona - Courtyard/Starlight Ballroom
Light food and drinks

9:45 - 11:15 pm **Club Consciousness 1**
Leo Rich Theatre

WEDNESDAY April 14

8:30 - 10:40 am **PLENARY 2** Leo Rich Theatre
DOUBLE KEYNOTE
Marcus E. Raichle
Brain Dark Matter and Default Mode Networks
Robert G. Shulman
Brain Energy Supports the State of Consciousness

10:40 - 11:10 am Break

11:10 am - 12:35 pm **PLENARY 3** Leo Rich Theatre
Bodily Awareness
Henrik Ehrsson, Frédérique De Vignemont

12:35 - 2:00 pm Lunch

2:00 - 4:10 pm **PLENARY 4** Leo Rich Theatre
Computational Models of Consciousness
Dharmendra Modha, Ben Goertzel, Marc Ebner

4:30 - 6:35 pm **CONCURRENT SESSIONS C8-C14**
Tucson Convention Center (TCC)
Hotel Arizona (HA)

C8	Introspection	TCC - Maricopa
C9	Panpsychism and Epiphenomenalism	TCC - Mohave
C10	Phenomenology and First-Person Approaches	HA - Cholla
C11	Dreaming	HA - Manzanita
C12	Neural Correlates of Consciousness	HA - Ocotillo
C13	Quantum and Subcellular Approaches	TCC - Leo Rich Theater
C14	Contemplative, Spiritual and Religious Approaches	HA - Grand Ballroom West

7:00 - 9:45 pm **POSTER SESSION 1 (P1-P6)**
TCC - Gila/Coconino/Graham/Greenlee

7:00 - 9:20 pm **ART-TECH DEMO 1**
TCC - Mohave/Maricopa

9:45 - 11:15 pm **Club Consciousness 2**
Leo Rich Theatre

THURSDAY April 15

8:30 - 11:00 am **PLENARY 5** Leo Rich Theatre
Multimodal Experience
Patricia Lynne Duffy, Barry Stein, Casey O'Callaghan, Michael Proulx

11:00 - 11:30 am Break

11:30 am - 12:50 pm **PLENARY 6 KEYNOTE** Leo Rich Theatre
David Chalmers
The Singularity: A Philosophical Analysis

Thursday afternoon: Free

Side Trips/Note: Motor Coaches will leave directly from the Leo Rich Theatre. Trip goers who will be attending the evening dinner will be taken directly to the Dinner Site at the conclusion of their trip. Others will continue back to the Hotel Arizona. Boxed lunches *(ordered in advance)* for the trip goers will be waiting with their designated tour bus.

6:30 - 10:30 pm Conference Dinner
La Paloma Hotel & Resort
Selections on Violin, Martha Curtis
(casual dress)

FRIDAY April 16

8:30 - 10:40 am **PLENARY 7** Leo Rich Theatre
Transformation of Consciousness
Cassandra Vieten, Jeffery Martin, Za Choeje Rinpoche

10:40 - 11:10 am Break

11:10 am - 12:35 pm **PLENARY 8 KEYNOTE** Leo Rich Theatre
Antonio Damasio
The Neural Self

12:35 - 2:00 pm Lunch

2:00 - 4:10 pm **PLENARY 9** Leo Rich Theatre
Theories of Consciousness
Sid Kouider, Robert Van Gulick, Galen Strawson

4:30 - 6:35 pm **CONCURRENT SESSIONS 15-21**

C15	Consciousness and the Self	TCC - Maricopa
C16	Ontology of Perception	TCC - Mohave
C17	Neurobiology and Theories of Consciousness: Foundations	TCC - Leo Rich Theatre
C18	Psychotherapy and Transformation	HA - Cholla
C19	Mind-Wandering	HA - Ocotillo
C20	Evolution of Consciousness	HA - Grand Ballroom West
C21	Nonlocal and Anomalous Phenomena	HA - Grand Ballroom East

7:00 - 9:20 pm **ART-TECH DEMO 2**
TCC - Maricopa/Mohave

7:00 - 9:45 pm **POSTER SESSION 2 (P7-P12)**
TCC - Gila/Coconino/Graham/Greenlee

9:45 - Midnight **Club Consciousness 3** Leo Rich Theatre
Poetry Slam /Zombie Blues

SATURDAY April 17

8:30-10:40 am **PLENARY 10** Leo Rich Theatre
New Directions in NCC Research
Michal Gruberger, Moran Cerf, Adrienne Prettyman/Stephen Biggs, Anirban Bandyopadhyay

10:40 - 11:10 am Break

11:10 am - 12:35 pm **PLENARY 11 KEYNOTE** Leo Rich Theatre
Robert J. Sawyer
Science Fiction and Consciousness

12:35 - 2:00 pm Lunch

2:00 - 4:10 pm **PLENARY 12** Leo Rich Theatre
Mindwandering and Consciousness
Jonathan Schooler, Malia Mason, Jonathan Smallwood

Evening
7:30 pm till ??? **End-of-Consciousness Party**
Maynards at the Depot-across from Congress Hotel

ART & INSTALLATIONS

BioScapes® - National Tour Exhibit

Now in its seventh year, the Olympus BioScapes® has sponsored a dynamic international photo competition that honors extraordinary microscope images of life science specimens captured through light microscopes, using any magnification, any illumination technique and any brand of equipment. Many of this year's winning images reflect the latest advances in neuroscience, cell biology, botany, zoology, and other sciences.

Consciousness Under the Scope

(Lucia Grossberger Morales, Abi Behar-Montefiore)

In addition to displaying images of the 2009 BioScapes® winners' tour, the Center for Consciousness Studies has prepared a looped video presentation to show at the Art & Technology Exhibit during the conference week. The video presentation will focus on images related to the TSC Conference themes (consciousness, awareness, brain, neuron, glia).

Following the Tucson TSC 2010 Conference, the Tucson display tour and video presentation will be hosted by the Arizona Health Sciences Library at the University of Arizona Health Sciences Center for a two-month display.

Meditations on Computer Patterns

(Lucia Grossberger Morales)

[Abstract 323]

ART & TECHNOLOGY DEMOS

SESSION 1

WEDNESDAY, APRIL 14
7:00 - 9:20 pm, TCC - Mohave
Chaired by Robert Pepperell, Cardiff School of Art & Design

7:00 - 7:20 pm **Yesterday Was a Lie**
James Kerwin

7:20 - 7:40 pm **The Human Hologram**
Robin Kelly

7:40 - 8:00 pm **The Nonlocal Quantum Hologram**
Hasmukh Taylor

8:00 - 8:20 pm **Human/Computer Artistic Collaboration**
Lucia Grossberger Morales

8:20 - 8:40 pm **The Virtual SEER**
Tonietta Walters

8:40 - 9:00 pm **Aperspectival Geometric Art of Adi Da Samraj**
Gary Coates

9:00 - 9:20 pm **Vision Space: A New Form of Illusionary Space**
John Jupe

SESSION 2

FRIDAY, April 16
7:00 - 9:20 pm, TCC - Mohave
Chaired by Jim Laukes

7:00 - 7:20 pm **Higher States of Consciousness in Sport**
Damian Vaughn

7:20 - 7:40 pm **Music as a Transformative Tool**
Katherine Creath

7:40 - 8:00 pm **Sonification in Consciousness**
Kala Perkins

8:00 - 8:20 pm **Music as Counterpoint to Epilepsy**
Martha Curtis

8:20 - 8:40 pm **Sensory Awareness and Unsymbolized Thinking**
Russell Hurlburt

8:40 - 9:00 pm **Bioelectromagnetism as integrative art form**
Luis Miguel Girao

9:00 - 9:20 pm **Exploring the Relationship between Consciousness and Virtual Reality**
Brian Betz

EXPERIENTIAL SESSIONS

Conference ID *(no charge)*
Hotel Arizona (HA)

Guided Meditation / PRANAHUTI

Tuesday, April 13	8:30 - 9:15 pm	HA - Ocotillo Room
Wednesday, April 14	7:30 - 8:30 am	HA - Ocotillo Room
Thursday, April 15	7:30 - 8:30 am	HA - Ocotillo Room

Yoga Asanas

Thursday, April 15	7:30 - 8:30 am	HA - Starlight Ballroom
Thursday, April 15	4:15 - 5:15 pm	HA - Starlight Ballroom
Friday, April 16	7:30 - 8:30 am	HA - Starlight Ballroom
Saturday, April 17	7:30 - 8:30 am	HA - Starlight Ballroom
Saturday, April 17	4:15 - 5:15 pm	HA - Starlight Ballroom

CLUB CONSCIOUSNESS

2010 - TSC - LATE NIGHT - CLUB CONSCIOUSNESS
Leo Rich Theatre

CLUB 1 **Tuesday, April 13**
9:45 pm Robin Kelly, The Human Antenna
10:00 pm Jeff Warren, Wheel of Consciousness

CLUB 2 **Wednesday, April 14**
9:45 pm Vanda Mikoloski, Enlighten Up!
10:15 pm Chase Masterson, Song Stylings from Star Trek

CLUB 3 **Friday, April 16**
9:45 pm Máighréad Medbh, Twelve Beds for the Dreamer
10:00 pm Poetry Slam/Zombie Blues/Club Band: Fort Awesome

TSC 2010 PRE-CONFERENCE WORKSHOPS

Registration: TCC Lobby

MONDAY, April 12 • 9:00 am - 6:00 pm
TCC Meeting Rooms
Pre-Conference Workshops
Session 1, Session 2

TUESDAY, April 13 • 9:00 am - 1:00 pm
TCC Meeting Rooms
Pre-Conference Workshops
Session 3

SESSION 1 – WORKSHOPS

Monday, April 12 (9:00 am - 1:00 pm)
Tucson Convention Center (TCC) and Hotel Arizona (HA)

1	**Selective Attention** *Christof Koch, Jeroen van Boxtel*	TCC - Maricopa
2	**Lucid Dreaming** Stephen LaBerge	TCC - Mohave
3	**Biofeedback and Mindfulness** *Keya Maitra, Connie Schrader*	TCC - Coconino
4a	**Transforming Consciousness** *Stanley Krippner, Frank Echenhofer et al, Part 1*	TCC - Graham
5a	**Psychedelics in the Mainstream** *Thomas B. Roberts, James Fadiman, Part 1*	TCC - Greenlee

SESSION 2 – WORKSHOPS

Monday, April 12 (2:00 pm - 6:00 pm)
Tucson Convention Center (TCC) and Hotel Arizona (HA)

7	**Neuroimaging of Meditation** *David Hubbard, Alarik Arenander*	TCC - Maricopa
8	**Neural Basis of Repression and Dissociation** *Heather Berlin, Michael Anderson*	TCC - Coconino
9	**Yoga Asanas** *Siegried Bleher*	HA - Starlight Ballroom

10a	**Update on Microtubules and Quantum Biology** *Stuart Hameroff, Jack Tuszynski et al, Part 1*	TCC - Mohave
4b	**Transforming Consciousness** *Stanley Krippner, Frank Echenhofer et al, Part 2*	TCC - Graham
5b	**Psychedelics in the Mainstream** *Thomas B. Roberts, James Fadiman, Part 2*	TCC - Greenlee
11a	**A Victorian's Guide to Consciousness** *Pim van Lommel, Gary E. Schwartz et al, Part 1*	HA - Grand Ballroom West

SESSION 3 – WORKSHOPS

Tuesday, April 13 (9:00 am - 1:00 pm)

Tucson Convention Center (TCC) and Hotel Arizona (HA)

12	**Global Broadcasting in the Brain** *Bernard J. Baars, Katharine A. McGovern*	TCC - Maricopa
13	**Why Synesthesia Matters** *Sean Day, Patricia Lynne Duffy et al*	TCC - Gila
14	**Experimenting with Endogenic Experience** *Talma Hendler, Abraham Zangen et al*	TCC - Coconino
10b	**Update on Microtubules and Quantum Biology** *Stuart Hameroff, Jack Tuszynski et al, Part 2*	TCC - Mohave
15	**Philosophical Theories of Consciousness** *Joshua Weisberg, Uriah Kriegel*	TCC - Greenlee
16	**Imperience: Self-transformation Pranahuti Meditation** *K. Madhava, K. Mannur et al*	HA - Starlight Ballroom
11b	**A Victorian's Guide to Consciousness** *Pim van Lommel, Gary E. Schwartz et al, Part 2*	HA - Grand Ballroom West

USING THE PROGRAM BOOK

Individual papers will be found in the abstracts section (p. 38) under the most relevant classification heading and also cross referenced under additional headings. The bold codes at the end of each abstract – e.g. C2 – refer to the program itself (indicating that this paper will appear in Concurrent Session 2. The Poster Sessions are categorized first by Section / Session…. P1-P6 belong to Poster Session A on Wednesday evening; P7-12 belong to Poster Session B on Friday evening. Presenting authors are listed in the Program; all contributing authors are listed in the Abstracts. There is an author index on p. 226.

POSTER SESSION A = P1 - P6

P1 Philosophy
P2 Neuroscience
P3 Cognitive Science and Psychology
P4 Physical and Biological Sciences
P5 Experiential Approaches
P6 Culture and Humanities

POSTER SESSION B = P7 - P12

P7 Philosophy
P8 Neuroscience
P9 Cognitive Science and Psychology
P10 Physical and Biological Sciences
P11 Experiential Approaches
P12 Culture and Humanities

CONFERENCE PROGRAM

Tuesday, April 13, 2010

CONFERENCE OPENING
1:45 - 2:00 pm, Leo Rich Theatre

PLENARY 1
2:00 - 4:10 pm, Leo Rich Theatre

PL1 William James Centennial

Eugene Taylor, Could Radical Empiricism Guide Neurophenomenology as the Future of Neuroscience? **[59]**
Bernard J. Baars, How William James Accidentally Created Behaviorism **[1]**
Bruce Mangan, James in the 21st Century **[173]**

CONCURRENT SESSIONS C1-C7
4:30 - 6:30 pm, Tucson Convention Center (TCC) / Hotel Arizona (HA)

C1 Consciousness, Representation, and Thought

TCC - Coconino

John Spackman, Conceptualism and the Richness of Perceptual Content **[91]**
Bernard W. Kobes, The Reflexive Nature of Consciousness and Anti-Individualism **[87]**
David Pitt, The Paraphenomenal Hypothesis **[89]**
Philip Goff, Does Mary Know I Mean Plus Rather Than Quus? **[85]**
Berit Brogaard, What is an Unconscious Mental State? **[81]**

C2 Materialism, Dualism, and Higher-Order Thought

TCC - Gila

Josh Weisberg, The Zombie's Cogito: Meditations on Type-Q Materialism **[25]**
Bernard Molyneux, Dualism Without the Usual Problems: An Introduction to Soft-Interactionism **[22]**
Brian Fiala, Taking the Edge Off Type-A Materialism **[19]**
Rocco Gennaro, Conceptualism and HOT Theory **[50]**
Alex Kiefer, The Epistemic Status of the Transitivity Principle in Higher-Order Theories of Consciousness **[51]**

C3 Neurobiology and Theories of Consciousness: Brain Networks

TCC - Maricopa

Zoran Josipovic, Influence of Nondual Awareness on

Anti-Correlated Networks in the Brain **[111]**

Giedrius Buracas, Consciousness as Validation of Prediction by Attention **[103]**

Erhard Bieberich, The Hypersite Model of Electrofractal Consciousness and the Search for "Bright Matter" **[133**

Eduard Alto, Inversion of the Retinal Layers as Necessary Condition for Spatial Constancy **[119]**

Kevin Brown, A Systems Model for Selectivity Between Default and Task Modes **[146]**

C4 Unconscious Processes

TCC - Graham

Jerome Daltrozzo, The N400 and LPC Effects Reflect Controlled but not Automatic Mechanisms of Sentence Processing: An ERP Study to Auditory Sentences with Varying Levels of Acoustic Degradation **[107]**

Anastasia Gorbunova, Unconscious Processes in Visual Word Recognition: Evaluating Visual Masking **[170]**

Myoung Ju Shin, A Dissociation Between Non-Conscious Orienting and Conscious Perception of Peripheral Visual Objects **[178]**

Peter Walling, Dynamical Correlates of Consciousness During Evolution, and Emergence from General Anesthesia: An Explanation of the "Conscious Moment" **[245]**

Vince Polito, Hypnotic Alterations of the Sense of Agency **[207]**

C5 AI and Computational Models

TCC - Greenlee

Alexei Samsonovich, A Metacognitive Architecture That Supports Human-Like Learning **[199]**

Peter Ford Dominey, When is a Robot Conscious? **[186]**

David Pearce, Quantum Computing: The First 540 Million Years **[224]**

Oded Maimon, The Alien Pure Consciousness (APC) problem **[37]**

Thomas Benda, Minds, Machines, and Lucas-Penrose **[30]**

C6 Art, Media and Conscious Perception

HA - Grand Ballroom West

Robert Pepperell, Art, Indeterminacy and Consciousness **[327]**

James Kerwin, The Intersection of Art and Science in Cinema: "Yesterday Was A Lie" **[326]**

Kristopher Patten, The Harmonics of Hades **[160]**

Carol Steen, Do You See What I See: Commonalities in Synesthetic Art **[328]**

Hein Van Schie, Controlling Your Body from an Out-of-Body Perspective Impairs Movements of Contralateral Body-Parts and Reduces Sensation and Proprioception **[125]**

C7 Altered States of Consciousness

HA - Grand Ballroom East

Matthew Baggott, Effects of the Psychedelic 3,4-Methylenedioxyamphetamine (MDA) in Humans **[138]**

Keith Turausky, Visions of Quantum Superposition in William James' "Subjective Effects of Nitrous Oxide" **[293]**

Christina Lavallee, QEEG, Mood and Personality Profiles of Novice and Experienced Meditators in Conditions of Meditation Only, Meditation with Facilitative Binaural Beats and Meditation with Hindering Binaural Beats **[282]**

Thomas Roberts, You Teach What! Where? A University Course on Psychedelics **[212]**

Elaine Perry, From 'Plants of the Gods' to Shamanic Consciousness **[292]**

WELCOME RECEPTION
7:00 - 9:30 pm, Hotel Arizona - Courtyard/Starlight Ballroom
Light food and drinks

CLUB CONSCIOUSNESS 1
9:45 - 11:15 pm, Leo Rich Theatre

Wednesday 14, 2010

ART & MEDIA INSTALLATIONS
BioScapes® - National Tour Exhibit and Consciousness Under the Scope
Available Wednesday - Saturday
TCC - Apache/Cochise

PLENARY 2
8:30 - 10:40 am, Leo Rich Theatre

PL2 Keynote

Marcus E. Raichle, Brain Dark Energy and Default Mode Networks **[113]**

Robert G. Shulman, Baseline Brain Energy Supports the State of Consciousness **[114]**

PLENARY 3
11:10 am - 12:35 pm, Leo Rich Theatre

PL3 Bodily Awareness

H. Henrik Ehrsson, Two Legs, Two Arms, One Head. Who am I? **[145]**

Frédérique De Vignemont, A Mosquito Bite Against the Enactive View of Bodily Experiences **[96]**

PLENARY 4
2:00 - 4:10 pm, Leo Rich Theatre

PL4 Computational Models of Consciousness

Dharmendra S. Modha, Network Architecture of the White Matter Pathways in the Macaque Brain **[149]**

Ben Goertzel, Moving Bubbles of Attention: A Mechanism Enabling the Emergence of Self and Focused Consciousness in Embodied Artificial General Intelligences **[187]**

Marc Ebner, A Computational Model for a Mobile Zone of Synchrony Mediating Consciousness **[109]**

CONCURRENT SESSIONS C8-C14
4:30 - 6:35 pm, Tucson Convention Center (TCC) / Hotel Arizona (HA)

C8 Introspection

TCC - Maricopa

Terry Horgan, Introspection about Phenomenal Consciousness: Running the Gamut from Infallability to Impotence **[97]**

Eric Schwitzgebel, Introspection, What? **[57]**

Charles Siewert, Attention, Introspection and Inner Sense **[100]**

William Adams, Avoiding The Perceptual Model of Introspection **[53]**

Maja Spener, Introspective Methodologies in the Science of Consciousness **[58]**

C9 Panpsychism and Epiphenomenalism

TCC - Mohave

Godehard Bruentrup, Intrinsic Properties and Panpsychism **[7]**

Alexander J. Buck, Does Panexperientialistic Holism Solve the Combination Problem? **[8]**

William Seager, Rescuing Panpsychism from the Emergence Argument **[13]**

William S. Robinson, Phenomenal Realist Physicalism Implies Coherency of Epiphenomenalist Meaning **[23]**

Bill Faw, How EPI are Phenomena: Velmans, Robinson, Dennett and Others **[41]**

C10 Phenomenology and First-Person Approaches

HA - Cholla

Chris Heavey, Some Characteristics of Feelings **[165]**

Christian Coseru, The View from Everywhere: Consciousness, Intentionality, and Naturalized Phenomenology **[83]**

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Michael Mrazek, Staying on Track: Mindful Breathing Reduces Mind-Wandering **[157]**

William Gomes, Self-Consciousness and Kinaesthetic Perceptual Ambiguity: A Phenomenological Analysis of the Alien-Hand Experiment **[266]**

C11 Dreaming

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David Kahn, REM Network and Dream Consciousness **[183]**

Armando D'Agostino, The Dreaming Brain/Mind, Dissociation and the Psychoses: Connecting States of Consciousness **[182]**

Antonio Zadra, Disturbed Dreaming: How Everyday Dreams Turn into Nightmares **[185]**

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C12 Neural Correlates of Consciousness

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Julia Mossbridge, Disparate Heart Rate Changes Precede Correct vs. Incorrect Guesses **[230]**

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C14 Contemplative, Spiritual and Religious Approaches

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Maureen Seaberg, Why Synthesia Matters: Spirituality **[336]**
Sastry Bhamidipati, Experiences of Non-Ordinary States of Consciousness in Pranahuti Aided Meditation and Psycho-Spiritual-Behavioral Transformation: A Phenomenological Study **[273]**

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Hasmukh Taylor, The Living Nonlocal Quantum Hologram: The Recording and the Viewing of Nonlocal QH Explained, and Focuses on the Relationships and Dynamic Exchanges Between Consciousness and Awareness **[242]**
Lucia Grossberger Morales, A Human/Computer Artistic Collaboration Using Patterns to Generate Abstract, Spiritual "Paintings" **[323]**
Tonietta Walters, The Virtual SEER [Self Extension and Experience Realization] in Phenomenological Self Exploration within the Creative Process **[329]**
Gary Coates, Transcendental Realism: An Introduction to the Nondual, Aperspectival Geometric Art of Adi Da Samraj **[320]**
John Jupe, Vision-Space: A New Form of Illusionary Space **[325]**

ART & MEDIA INSTALLATIONS
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Under the Scope/BioScapes®/Meditations on Computer Patterns

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Jacob Berger, Fodor and the Structure of Iconic Representations **[80]**

Rudy Bernard, Consciousness and the Making of Reality **[5]**

Peng Chien, An Argument Against the Ability Hypothesis **[26]**

Allan Combs, It's All in Peirce! Modern Theories of Consciousness Were Prefigured in Peirce's Tripartite Logic **[82]**

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Paul Evans, Consciousness And The Technological Demiurge **[33]**

Brandon Fenton, Epiphenomenalism Meets Qualia in Practical Deliberation and Action: Seeing Isn't Believing? **[27]**

Jason Ford, Defending "Consciousness, Self and Attention" **[49]**

Mathew Gendle, Beauregard and the "New" Dualism: An Emergentist Response **[20]**

Jorge Gonçalves, The Early Stages of Life and the Problem of the Self **[65]**

Amir Horowitz, Phenomenal Externalism and Self-Knowledge **[86]**

Weisiang Huang, Can Freely Voluntary Acts Appear Without Micro-Determinism? **[76]**

William H Kautz, Is a Science of Consciousness Possible? Limitations, Doubts and Opportunities **[55]**

Kuo Ling-Fang, Still Being Some One **[67]**

Jenyu Liu, The Human Mind May be a Turing-Machine-Like System Even If the Lucas-Penrose Argument is Right **[42]**

Gaylen Moore, From Chaos to Qualia: An Analysis of

Phenomenal Character in Light of Process Philosophy and Self-Organizing Systems **[29]**

Colin Morrison, Identifying the Most Likely Explanation of Consciousness (Part 1): IBM and The SCALP Method **[46]**

Joel Parthemore, The Hard Problem of Concepts IS the Problem of Experience **[47]**

Matthew Piper, Complexity Theories of Consciousness **[11]**

Robert Pusakulich, Avoiding the Ontologic Explanatory Gap **[48]**

David Scharf, A Critique of Jaegwon Kim's Physicalism: An Implicit Argument for a Non-Cartesian Interactionism **[24]**

George Seli, Felt Agency and the Consistency Criterion **[78]**

Robert M. Wallace, Greater Reality Achieved Through Consciousness: An Unrecognized Option (Plato/Hegel) in the Philosophy of Mind **[15]**

Robert Ware, A Set-Theoretic Model of Consciousness: The Structure of Self-conscioiusness as a Natural Solution for the Logical Antinomies **[71]**

Rex Welshon, Heautoscopy, Out-of-Body Experience and the Subjective Perspectivity of Conscious Experience **[72]**

P2 Neuroscience

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Bruce Carruthers, The Primacy of Proprioception- A Thesis Derived from Evolutionary, Neurological, Neuropathological, Clinical, Robotic Design and Philosophical Considerations **[122]**

Michael Cerullo, Tononi's Integrated Information Theory is Inconsistent with Chalmers' Principle of Organizational Invariance **[105]**

Gabriel Mograbi, Neural Basis of Decision-Making and Assessment: Self-Control, Will and Willian James **[123]**

Anatoly Nichvoloda, Information Theoretic Model of Action Awareness **[124]**

James Clement Van Pelt, Beyond the Binding Problem: Toward an Experiential Model of Nested Binding Levels to Integrate the Components of Experience **[141]**

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Richard Blum, The Architecture of the Mind - Toward a Cognitive Model. Or, the Mind is Not the Brain, the Mind is Software Operating the Brain **[195]**

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Alain Morin, Inner Speech: A Neglected Phenomenon **[166]**

John Selden, The Role of Consciousness, Automaticity, and Stimulus-Independent Thought in Deductive Reasoning **[177]**

Richard Sieb, Consciousness and the Production of Voluntary Action **[179]**

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Siegfried Bleher, Mechanism for Transcendence in Consciousness **[234]**

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Jeannine Davies, PhD, Topology of the Mereological Infinite: Modeling Human Resonance as Social Networks **[235]**

Ross Grumet, The Effect of Psychiatric Medication on Consciousness: A Survey of 100 Patients Who Have Started, Stopped and Restarted Medication **[261]**

Alex Hankey, Self Observing Quantum System Models of Body, Mind and Soul **[219]**

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Christophe Menant, Evolutionary Advantages of Intersubjectivity and Self-Consciousness Through Improvements of Action Programs **[257]**

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Marta Sananes, On Luminal and Superluminal Conscious Entities: An Imagination **[239]**

Thomas Schumann, Quantum Calculation of Probability from Complex Probability Amplitudes Using the Metabrain Model **[226]**

Richard Shank, A Theory of Consciousness Based on the Standard Model of Particle Physics and Neuroscience Concepts, and Embodies Interactionism, Dualism and Physicalism **[240]**

John Yates, The A Series, Time and Free Will **[231]**

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John Astin, The Discovery of Awareness - A Qualitative Study **[263]**

Samuel Breidenbach, Shamanic States of Consciousness Compliment Transpersonal Psychology On Spiritual Emergency and Avoid Hospitalization **[289]**

Estelle Campenni, Cultivating Mindfulness Through Contemplative Creativity **[275]**

Vibhas Chandra, The Consciousness Conglomerate: Eastern Insights and Scientific Revalidation **[276]**

Ingrid Fredriksson, Consciousness - Forever **[311]**

P David Glanzer, The Consciousness of Bodily Felt Sense in Focusing (Gendlin): An Adaptive Resonance Theory (Grossberg) Account with Application to Experiential Psychotherapy **[299]**

Ivan M. Havel, Uniqueness of Episodic Experience **[267]**

Reginald Humphreys, Sympathetic Nervous System

Augmentations of Consciousness Using "Third-Eye" Hypnosis **[290]**

Brock Kilbourne, Posttraumatic Stress Disorder Onset and Altered State of Consciousness Symptoms **[291]**

Joel Krueger, (We-)Space is the Place: Extended Cognition and Social Interaction **[269]**

Laurel McCormick, Ground-Breaking Qualitative Research Method: Intuitive Inquiry Embedded With Grounded Theory **[295]**

Rebecca Merz, Transformations of Bereavement in a Psychomanteum Process: Qualities of Meaning and Paths of Change **[296]**

Lesley Roy, When Realities Collide: A Methodology for the Systematic Study of Synchronistic Phenomena **[308]**

Madhu Sameer, Dissociation as a consciousness oriented phenomenon: A blessing or a curse? **[302]**

Joana Serrado, Anxious Consciousness: Anxiousness the Mystical Portuguese Writings of Joanna de Jesus (1620-1680) **[286]**

Jonathan Shear, Meditation as First-Person Methodology? Serious Promise, Serious Problems **[287]**

Karen Studd, The Consciousness of Movement **[315]**

Wandan (Wendy) Zeng, Purification of Consciousness through the Exercise of Will Power in Pranahuti Aided Meditation: A Phenomenological Study of its Effectiveness **[288]**

P6 Culture & Humanities

Nildson Alvares Muniz, Consciousness, Language and Symbolic Thought in Albert Einstein's Relative Space-Time: New Inter-Disciplinary Perspectives in Einstein's Mechanics of Relativity **[338]**

Johnathan Bown, Mindfulness and Video Game Play: A Preliminary Inquiry **[340]**

Lurleen Brinkman, Consciousness and Human Rights: Preservation and Protection of Consciousness-Based Technologies of Indigenous Peoples **[341]**

Jack Friedland, How the Myths of God and Mind Emerged from the Evolution of Internal Communication **[334]**

Natalie Geld, Building Better Human Beings from the First Flickering of Consciousness. Activating mastery of art & science of being human - Learning to lift the skirt of consciousness & take advantage of yourself. **[343]**

Jon Goodbun, Empathising with Gregory Bateson: Ecologies of the Extended Mind **[322]**

Alexander Jon Graur, Think a Song! Brain, Mind, Consciousness-the Musician's Way **[332]**
Chao-Huei Laii, Disease Consciousness, Illness Consciousness and The Behavior or Actions Taking Medical Treatment of The Prostitute in Bei-tou **[337]**
Peter Reynolds, Did Mirrors Cause Consciousness? **[344]**
Brandi Whitemyer, Exploring the Relationship between Affective Response, Psychological Presence and the Aesthetic Experience in a Virtual Environment **[330]**

CLUB CONSCIOUSNESS 2
9:45 - 11:15 pm, Leo Rich Theatre

Thursday, April 15, 2010

PLENARY 5
8:30 - 11:00 am, Leo Rich Theatre

PL5 Multimodal Experience

Patricia Lynne Duffy, What is it Like to Experience Synesthesia and What Might it Mean? **[305]**
Barry E. Stein, An Unconscious Neural Strategy Synthesizes Information from Different Senses, Creates a Coherent Picture of External Events, and Executes Adaptive Behaviors **[116**
Casey O'Callaghan, Varieties of Multimodal Experience **[98]**
Michael Proulx, Synthetic and Natural Crossmodal Mappings Explored with Sensory Substitution **[161]**

PLENARY 6
11:30 am - 12:50 pm, Leo Rich Theatre

PL6 Keynote

David Chalmers, The Singularity: A Philosophical Analysis **[31]**

THURSDAY AFTERNOON FREE – SIDE TRIPS

CONFERENCE DINNER
6:30 - 10:30 pm, Westin La Paloma Resort & Hotel
(ticket/reservation required)

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PLENARY 7
8:30 - 10:40 am, Leo Rich Theatre

PL7 Transformation of Consciousness

Cassandra Vieten, Transformations in Consciousness through Spiritual Engagement **[297]**

Jeffrey A. Martin, Empirically Testing Purported Claims of Enlightenment Using Standard Psychological Methods and Instruments **[169]**

Za Choeje Rinpoche, Tibetan Buddhist Perspective on Consciousness, Enlightenment and Reincarnation **[285]**

PLENARY 8
11:10 am - 12:35 pm, Leo Rich Theatre

PL8 Keynote

Antonio Damasio, The Neural Self **[108]**

PLENARY 9
2:00 - 4:10 pm, Leo Rich Theatre

PL9 Theories of Consciousness

Sid Kouider, Neurocognitive Theories of Consciousness: a Critical Overview **[112]**

Robert Van Gulick, "Toward a More Perfect Union" - The Prospects for Integrating Diverse Theories of Consciousness **[101]**

Galen Strawson, A Metaphysics for Panpsychism **[14]**

CONCURRENT SESSIONS C15-C21
4:30 - 6:35 pm, Tucson Convention Center (TCC) / Hotel Arizona (HA)

C15 Consciousness and the Self

TCC - Maricopa

Rita Carter, The Multiple Self: Dissociation in Normal Self-Identity **[63]**

Kenneth Williford, Consciousness and Its Selves: Subjectivity and the Autobiographical Ego **[73]**

Miri Albahari, Can Meditation Non-Pathologically Dismantle the 'Core Self'? **[271]**

Wolfgang Fasching, The Presence of Experience and the Experience of Presence **[64]**

David Woodruff Smith, Is Reflexive Inner Awareness a Form of Representation? **[208]**

C16 Ontology of Perception

TCC - Mohave

Jonathan Bricklin, William James's Veridical Revelation **[6]**

Leopold Stubenberg, Seeing Things Outside the Head **[93]**

Enrico Grube, In Defense of Diachronic Perceptual Atomism **[210]**

Susanna Siegel, When are the Contents of Experience Mulitmodal? **[90]**

Riccardo Manzotti, The Spread Mind: Is Phenomenal Experience Identical with Physical Processes Larger Than Those Taking Place Inside the Nervous System? A Defense of Process Phenomenal Externalism **[10]**

C17 Neurobiology and Theories of Consciousness: Foundations

Leo Rich Theatre

Benjamin D. Young, The Phenomenal Element **[102]**

Benjamin Kozuch, Prefrontal Lesion Studies Cast Doubt on Higher-Order Theories of Consciousness **[52]**

Eric Larock, How are Synchrony and Suppression Related to Conscious Experience? **[139]**

Justin Sytsma, Searching for Evidence of Phenomenal Consciousness in NCC Research **[117]**

Joy CY Hung, The Detectable Consciousness **[3]**

C18 Psychotherapy and Transformation

HA - Cholla

Donald Mender, Post-Classical Phase Transitions and Emergence in Psychiatry: Beyond Engel's Biopsychosocial Model of Psychopathology **[307]**

Michael Johnson, A Randomized Study of a Brief Novel Zen Dialogue Method For Rapid Induction of "Kensho Experience" with Enhancement of Mindfulness and Well Being Parameters **[279]**

Mark Thurston, A Developmental Model of Volition for Personal Transformation **[79]**

Daniel Beal, Placebo Response and Consciousness **[260]**

Madhava Kotagiri, Taming the Disturbed Mind - A Revolutionary New Method **[281]**

C19 Mind-Wandering

TCC - Ocotillo

Xiao-Lan Song, Mind-Wandering in Daily Life: An Experience-Sampling Study **[211]**

Wlodzimierz Klonowski, Mind Wandering - Feelings and Thoughts **[129]**

Michael Franklin, Behavioral Indices of Mind-Wandering While Reading **[155]**

Jules Troyer, Situation and Self: The Case of the Wandering Mind **[158]**

Peter Langland-Hassan, Imagination and the Psychology of Mind-Wandering **[197]**

C20 Evolution of Consciousness

TCC - Grand Ballroom West

James Beran, If Birds Have Conscious Experiences, Do Fish Too? **[249]**

Brian McVeigh, Why Did the Unconsciousness Appear in History When It Did? A Jaynesian Explanation **[174]**

Carole Brooks Platt, Voices from the Other Side: Neuroscience, Attachment Theory and the Creative Self **[132]**

Michael McBeath, A Dynamic, Topographic, Natural-Selection Fitness Representation and the Evolution of Conscious Awareness as a Mechanism for Rapid Plastic Adaptation **[256]**

Laurence J. Victor, Mammalian Origins for Human Consciousness **[259]**

C21 Nonlocal and Anomalous Phenomena

TCC - Grand Ballroom East

Gary Schwartz, Effects of Individual and Group Distant Healing Intentions on Patterns of Cosmic Rays **[312]**

Pim van Lommel, Nonlocal Consciousness: A Concept Based on Scientific Studies on Near-Death Experience **[309]**

Mark Boccuzzi, Old Dog, New Trick: The Effect of Animal Micro-Psychokinesis on Quantum Events **[310]**

Julie Beischel, PhD, A Phenomenological Pathway to an Empirically Driven Distinction Between Survival Psi and Somatic Psi by Research Mediums **[264]**

Arnaud Delorme, Shaktipat-Related Synchronization Between Brains?: Statistical Analysis of Simultaneous High Density EEG Recordings of Shaktipat Sender and Receiver Subjects **[277]**

ART & TECHNOLOGY DEMOS 2

7:00 - 9:20 pm, TCC-Mohave/Maricopa

Exploring Consciousness with Art & Technology

Damian Vaughn, Exploring Higher States of Consciousness in Sport - Sport as a vehicle to understand the potential of human consciousness **[294]**

Katherine Creath, Music as a Transformative Tool **[331]**

Kala Perkins, Sonification in Cosmos and Consciousness ~ the Ontology of Resonant Properties: How sound Gives Rise to Phenomena, Transforms, Evolves and Heals **[198]**
Martha Curtis, Music as Counterpoint to Epilepsy **[154]**
Russell Hurlburt, Sensory Awareness and Unsymbolized Thinking: Videos from Descriptive Experience Sampling **[214]**
Luis Miguel Girao, Bioelectromagnetism as Integrative Art Form. Towards a Non-Representational Art Practice **[321]**
Brian Betz, Exploring the Relationship Between Consciousness and Virtual Reality **[319]**

ART & MEDIA INSTALLATIONS
7:00 - 9:00, TCC - Apache/Cochise
Under the Scope/BioScapes®/Meditations on Computer Patterns

Poster Session B, Sections P7-12
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P7 Philosophy

Brent Allsop, Scientific Consensus: The Importance of Measuring For and Methods For Tracking Such **[95]**
Anna Bortolan, The Role of Affects in the Constitution of Pre-Reflective Self-Consciousness: How Current Approaches to the Study of Self-Awareness Could Be Integrated **[62]**
Noel Boyle, Jackson Has Been Wrong All Along **[18]**
Michael Brill, How the 162 Basic Patterns of the Human Personality Matrix Reflect Free Will and Are the Catalysts for Health Issues **[75]**
Stephen Deiss, The Hard Problem and a Possible Solution **[43]**
Melissa Ebbers, How to be Judgmental: On the Need for a Two-Dimensional Account of Content **[84]**
Horace Fairlamb, Would James Buy Dennett's Conscious Robot? **[34]**
Machiko Fujiwara, A Computer Program that has its Subjective Views **[35]**
Shun-Pin Hsu, Self and Transparency **[66]**
Tam Hunt, Kicking the Psychophysical Laws into Gear: A Single Aspect Theory of Information, Part I **[44]**
Kenzo Iwama, Knowledge Argument on the Basis of Our Computer Program **[36]**
Morey Kitzman, We Will Know What We Are Looking For When We Find It **[56]**
Chia-Hua Lin, From the Self-Awareness to the Other Minds **[88]**
Ying-Tung Lin, Mary, No Pain, No Gain **[28]**
Pete Mandik, Fine-Grained Supervenience **[21]**

Robert Mays, A Theory of Mind-and-Brain that Solves the "Hard Problem" **[45]**
Rajakishore Nath, A Critique on Artificial Intelligence Model of Mind **[38]**
Anthony Peressini, Applying Dynamical Systems Theory to the Problem of Conscious Intentional Action **[77]**
Jonathan S Powell, A Singular Resolution to the Combination Problem **[12]**
Christopher Richards, Color Content, Semantics, and Error Theories **[68]**
T. Bradley Richards, Consciousness, Access and Phenomenal Overflow: A Reply to Block **[69]**
Juan Tomas Rodriguez-Colon, Theory of Consciousness and the Self. What was in the Mind of Marx, Freud and Einstein When They Conceived Their Respective Theories? **[70]**
Sunita Singh Sengupta, The Science of Mind: Vedantic Perspectives **[99]**
Pierre Steiner, What Role for the Brain in Vehicle-Externalist Theories of Perceptual Experience? **[92]**
John Strozier, A Logical Model of the Brain and Consciousness **[39]**
Zoltan Veres, An Auto-Theoretic Model of Consciousness **[94]**
Burton Voorhees, Toward a Scientific Approach to First Person Reports **[60]**
Laura Weed, A Relational Account of Perception **[61]**
Gary Williams, What is it Like to be Unconscious? **[4]**
Jerry Yang, Self-Representation and Kant's Transcendental Self-consciousness **[74]**
Xinyan Zhang, A Neutral Monism's Theory of Mind and Matter **[16]**

P8 Neuroscience

Adam Crane, The NQUIET (Neuronal Quantum Information and Energy Transduction) Hypothesis An International MindFitness Foundation Initiative **[135]**
Stuart Hameroff, Response to recent attack against Penrose-Hameroff Orch OR **[134]**
Leon Hardy, Neurohydrodynamics: a Window for Conscious Cognition **[147]**
Russell Hebert, An EEG Quantum Model of Consciousness **[136]**
Scott Jackson, Abstract and Imaginary Sense Data **[9]**
Pardeep Kumar, Anti-Aging and Neuroprotective Effect of Estradiol in Aging Female Rat Brain **[130]**
Eugene Ledezma, Have You Ever Thought that Memory is Not Inside Your Brain? **[127]**
Nathan Munn, Self Evidence: Cognitive Neuroscience and Consciousness as a Variable **[131]**

James Pagel, The Neurochemical Switch (GABA) That Turns Off Conscious Thought **[144]**
Jordan Peterson, The Frames of Consciousness: The Role of Motivation and Emotion **[150]**
Peter Raulefs, A Computational Model of Emotions: Anxiety and Fear **[142]**
Jesper Ronager, The Biochronos Theory: All Cells Possess a Core of Electrons in an Unobserved Quantum State Residing in the Intraluminal Vacuum of Tubular Proteins of the Cytoskeleton **[137]**
Francis Schwanauer, No Syncrony Below N+1: The Sum of the (Parent and Daughter Particles As) Members of a Self-Inclusive Set **[140]**
Kunjumon Vadakkan, Framework of Consciousness from the Semblance Hypothesis of Memory **[118]**
Anders Wallenbeck, Explicit Description of the Mind-Body Problem by Autonomous Neural Signals **[152]**

P9 Cognitive Science & Psychology

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Amna Alfaki, The Neurons in the Myocardium of the Mammalian Heart Have Perceptive Sensory Functions Locally in the Heart Like Sensory Cortical Neurons of the Brain **[191]**
Amanda DaSilveira, Empirical Investigation of Scales on Self-Consciousness and its Related Constructs in Brazil and in the United States **[202]**
Marcos Estellita Lins, Metacognitive Schemes Applied to Social Problems Structuring **[204]**
Anya Farennikova, Seeing Absence **[213]**
Gustavo Gauer, Autonoetic Consciousness in Episodic Recall and Simulation: An Episodic Processing Hypothesis **[162]**
Francesco Giorlando, Why Consciousness Doesn't Sleep: An Information Theory of Continuity in Consciousness **[209]**
Ida Hallgren Carlson, Why Make It Conscious? The Function of Consciousness in Therapeutic Change **[171]**
Gail D. Kelly, Mental Imagery as Adaptive Healing Mechanisms **[167]**
Henry Kennedy, Tribal Networks and Consciousness **[192]**
Chad Kidd, A Phenomenological Model of the Moderate Richness of Conscious Experience **[168]**
Simone Marini, The Semantics of 'Perception': A Critical Examination of D. Milner and M. Goodale's Proposal **[159]**
Narisa Marrett, Attentional Orienting - Conscious or Unconscious? **[156]**

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Gerard Blommestijn, Quantum-Exit From Materialistic Confinement **[215]**
Michele Caponigro, Quantum Interpretation of Vedic theory of Mind: An Epistemological Path and Objective Reduction of Thoughts **[220]**
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Ralph Frost, Imagine Consciousness and Qualia as a Single Internal Analog Language Made of Ordered Water Forged During Respiration in Concert with Experience **[246]**
Alex Gamma, Evolutionary Psychology, or How Not to Explain the Human Mind **[254]**
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Kenneth Van Gross, Primal Neuroanthropology- The Study of Archetypal Postures, Movements and Behavior in Sports and Related Activity that Connect us to our Evolution, Infancy, Neurodegeneration and Primordial Selves **[256]**
Syamala Hari, Mind Field, Active Information, and Zero-Energy Tachyons **[220]**
Franz Klaus Jansen, Consciousness Functioning with Potentiality Systems Partially Isomorphic to Quantum Mechanics **[221]**
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Andy Kuniyuki, Primordial Influence of Unequal on Evolution of Consciousness **[257]**
Borut Ljubec, Fundamental Principles all of the Solutions of Creative Mental Process in Visual and Aural Energies **[237]**
Sky Nelson, Retroactive Event Determination In Consistent Histories And Relational Quantum Mechanics, Leading To Macroscopic Quantum Effects and Synchronicity **[223]**
Majid Rahnama, Visual Quantum Information, Teleportation

and Consciousness **[228]**

Chitta Ranjan Sarker, An Exploratory Approach to Higgs-Boson Entanglement for Understanding Ultimate Reality **[238]**

Jagdish Srivastava, Consciousness, and the Foundations of Reality **[241]**

M. E. Tson, A Brief Explanation of Consciousness **[258]**

Li-An Yu, Is There a Room for Free Will in Many-Worlds? **[231]**

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CLUB CONSCIOUSNESS 3
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1. Philosophy

1.1 The concept of consciousness

1 **How William James Accidentally Created Behaviorism** Bernard J. Baars <bbaars@comcast.net> (The Neurosciences Institute, Berkeley, CA)

William James' Principles of Psychology (1890) is regarded as the greatest summary of empirical knowledge about consciousness of the 19th century. James covered perception and cognition, language and the fringe, and much more. He defined psychology as 'the science of mental life,' meaning 'conscious mental life.' The 19th century was a Golden Age of Consciousness Science, with discoveries about hypnosis and conversion disorders, the brain and emotions, Broca's and Wernicke's areas, imagery, feelings, multiple personality disorder, the limits of consciousness and immediate memory, and more. James's book was greeted almost immediately as a masterpiece, and three years later, he produced his Briefer Version (1893), which became the most widely used introduction to psychology in American colleges until about 1920. It established James as a founder of empirical psychology. James placed consciousness at the center of psychological science. And yet, paradoxically, he triggered seven decades of scientific rejection of human consciousness. His paper of 1904 called 'Does consciousness exist'? was published in Psychological Review, under the editorship of John B. Watson. James' 1904 paper reflected his ambivalence about a science of mind and free will. James suffered from repeated near-suicidal depression, which often focused on free will. By 1904 James was looking to psychic phenomena and the soul as a solution to his crisis of meaning and spiritual comfort. The 1904 paper sought to eliminate mind-body paradoxes by decomposing 'consciousness as an entity' into a series of conscious moments; but James never denied that mental life consisted of such subjective moments. It was John B. Watson who decided to cut the mind-body knot, proclaiming his radical behavioristic manifesto two years after James died in 1910. To make psychology into a 'respectable' science Watson argued for a complete purge of consciousness, volition and self. Watson's radical behaviorism erased almost the entire psychological vocabulary. He was strongly encouraged by Bertrand Russell in England, and by a parallel purge in Russian physiology, beginning with Sechenov and I.P. Pavlov, in Germany by Helmholtz and positivism, and by a radical reductionistic movement in biology. In a political context Watson, Pavlov (and later Skinner) promised utopian manipulations of the human condition, simply by analyzing and controlling human beings by reflexes and operant training. Reflex-reductionism became the orthodox wisdom in the newly made academic sciences of psychology and physiology, in spite of a total absence of proof. Even today 'reflexes' and 'conditioning' are still viewed as 'atoms' of behavior. But behaviorism gave a consistent physicalistic basis to the new and insecure academic fields of psychology, sociology, political science, and analytic philosophy. The behavioristic purge was pursued for almost a century. The result was a kind of psychic wound in the Western intellectual tradition, a Dark Age comparable to the purge of classical learning by the medieval Church. While literature and Continental philosophy built upon James' work, the new academic sciences rejected some 25 centuries of humanistic scholarship, going back to ancient Greece, and in Asia, to Vedanta, Buddhism and Taoism. **PL1**

2 **Zen's Civil War over the Definability of Consciousness: Medieval Asian Roots of Contemporary Conceptions of Consciousness** Cody Bahir <codybahir@gmail.com> (Asian and Comparative Studies, California Institute of Integral Studies, Burlingame, CA)

Is the notion of consciousness a quantifiable entity or is it merely an arbitrary construct we as humans have formulated in an attempt to grapple with the experience of self awareness? This question lies at the heart of many philosophical discussions concerning the nature of what we call "consciousness". Though the debate between these two positions has reemerged into the limelight of a number of intellectual and scientific disciplines, the friction generated from this conflict was the main source of the great schism that occurred between the two competing schools of Zen in the 8th Century C.E. According to traditional Zen history, the

conflict was primarily over the disagreement between Shen Xiu of the North who taught that enlightenment was a gradual process and Hui Neng of the South who taught that enlightenment was sudden and instantaneous. Certain critical Zen historians have downplayed this issue and argued that the split was due more to politics and personal ambitions. This paper argues that the conflict was based on opposing definitions of both consciousness and enlightenment which were only alluded to by the recorded gradual verses sudden enlightenment debate. The Northern school believed that consciousness was an objective, quantifiable and even malleable entity to be trained and molded. Their definition of enlightenment was the total purification of consciousness that took place over time. The Southern school headed by Hui Neng, believed that consciousness was a subjective, unquantifiable experience. They believed that enlightenment was achieved by the utter dissolution of all preconceptions, which in turn led to an experience of complete, unmitigated self awareness. As many modern discussions over consciousness involve extrapolations from primary and secondary sources concerning Zen Buddhism, this historical debate is very important to contemporary discussions over the nature of consciousness; for this medieval disagreement lies at the root of all subsequent views of consciousness found within the Zen tradition. This paper takes an in depth look at the both primary and secondary sources regarding the portrayal of consciousness during the golden age of Zen, paying special attention to differing descriptions of consciousness, definitions of enlightenment and meditative practices as taught by these two competing schools. The purpose of this paper is to shed light onto the historical backdrop upon which our contemporary discussions over the nature of consciousness are built and to both clarify and stimulate further scholarship on Zen's notion of consciousness. **C14**

3 **The Detectable Consciousness** Joy CY Hung, Allen Houng <jh.philo@gmail.com> (Institute of Philosophy of Mind and Cognition, National Yang Ming University, Taipei, Taiwan)

Ned Block pointed out that consciousness is a mongrel concept which involves a number of very different 'consciousnesses'. Thus he made a distinction, the phenomenal-consciousness and the access-consciousness, among all the concepts connoted and the different phenomena denoted to avoid conflation which leads to bad results. Per his definition, the phenomenal-consciousness is experience; the phenomenally conscious aspect of a state is what it is like to be in that state. The access-consciousness is availability for use in reasoning and rationally guiding speech and action. Block further specified that whatever cognitive processes underlie our ability to report the experiences are to be defined as phenomenal consciousness. This definition might preclude some states that are defined conscious clinically, such as MCS (minimally conscious state). Patients of MCS demonstrate inconsistent but discernible evidence of consciousness by the index of N100, showing patients being able to detect the occurrence of discrete environmental sounds, and by the elicitation of MMN (mismatch negativity), showing patients being able to discriminate between different types of sounds. Recent studies show that the self-referential stimulus (call subject's own name) effectively evokes residual brain activity by eliciting MMN in patients with disorders of consciousness (DOC) (Qin, 2008). These evidences imply their ability to create and utilize neuronal representations of the immediate sensory auditory environment (Näätänen, 1992; Näätänen et al., 2007) and thus are to be considered included within the realm of consciousness further to the phenomenal-consciousness defined by Block. We suggest a distinctive category, the detectable consciousness, to define conscious states that are unreportable, nevertheless can be detected by using 'indirect' techniques and objective measurement. The distinction could make clear the definition of conscious states related to this sort apart from the hard problems that are to be solved or might be unsolvable. This nuanced view will also make clearer the sphere of related researches on comatose state, dream state, memory, and mental imagery etc. **C17**

4 **What is it Like to be Unconscious?** Gary Williams <garystevenwilliams@gmail.com> (Baton Rouge, LA)

In this paper I want to respond to Ned Block's claim that it is simply 'ridiculous' to suppose that consciousness is a cultural construction. In so doing, I will argue that a distinc-

tion can be made between what-it's-like to be a nonhuman animal and the consciousness of average, adult humans. In accordance with this distinction, I will argue that Block is wrong to dismiss social constructivist theories of consciousness on account of it being simply 'ludicrous' that first-person experience is anything but a basic biological feature of our animal heritage, characterized by sensory experience, having slowly evolved over millions of years. By defending social constructivism, I will claim that a distinction can be made between the basic biological experience of nonhuman animals and the consciousness that constitutes the experience of an average human adult. In other words, there is more to consciousness than brute, biological perception of the world. Following Julian Jaynes, I will argue that to be in a conscious mental state means more than just to experience the way things look, smell, or feel. To experience the world consciously means to experience it (and yourself) in terms of certain conceptual filters. It will be the task of this paper to work out what these filters amount to and to argue that it is only in light of these filters that human experience should be considered 'conscious'. In so doing, I will address the plausibility of unconscious human cultures and conclude, contra Block, that such 'cultural zombies' are entirely plausible based on known psychological facts. Essentially, such zombies would have a what-it's-like while nonetheless lacking consciousness proper. Demonstrating this will amount to answering the question, 'What is it like to be unconscious?' By doing so, I will also give a Jaynesian answer to the question, 'What is it like to be conscious?' **P7**

1.2 Ontology of consciousness

5 **Consciousness and the Making of Reality** Rudy Bernard <bernard@msu.edu>
(Physiology, Michigan State University, East Lansing, MI)

Physicalists and identity theorists consider consciousness to be an epiphenomenon because it does not appear to have a causal role. However, such a view stems from treating it as an abstraction, which leads to the mistake of treating consciousness as some kind of free-standing entity, symbolized by the brain in a vat dear to some philosophers. In reality, however, it exists only in the living individual who perceives and acts consciously. The role of consciousness can be objectively demonstrated by observing what happens when an individual loses consciousness, such as in a fainting spell or a coma. The visible effects can be summarized as lack of responsiveness to stimulation and the inability to engage in voluntary movement. Such observations demonstrate that the fundamental role of consciousness is twofold: to provide awareness of self and the outside world and to enable the individual to act upon the environment. The perceptual aspect of consciousness tends to receive the most attention (what it is like to be...), but its role in volition is just as important, for intentional action cannot occur without it.The relationship between consciousness and the brain is contentious, a variant of the mind/body problem. The widespread rejection of substance dualism in contemporary thought cannot obscure the fact that mind and body are experienced very differently from each other. In actuality, however, this phenomenal dualism is resolved in the unity of the living individual. Neuroscience demonstrates that all phenomena occur as a result of an interaction between sensory receptors and signals from the external and internal environments. In contemporary thought the outside world is considered to be objectively real, whereas our inner world is relegated to the hard problem of subjectivity. In fact, however, as phenomena, these two worlds exist only in so far as we experience and know them; they are literally constructs of human perception and action. In the absence of consciousness these phenomenal worlds recede into their underlying reality, which is otherwise formless and intangible. Kant was right: we do not know the thing in itself. This abstract or absolute reality, however, is not a discrete thing, but neither is it nothing. Neuroscience has established that the neural processes underlying perception and volition are different from those for consciousness. This is illustrated by the fact that our fundamental knowledge of sensory and motor neural processes was obtained from anesthetized animals (e.g. Hubel & Weisel, Mountcastle, Woolsey). The brain mechanisms underlying the conscious state, on the other hand, are related to the neuromodulatory processes that regulate sleep and wakefulness and homeostatic well being. It is only when these processes operate together that the individual is able to perceive

and act. Consciousness as it actually exists in the intact individual can now be seen for what it is and does. It enables us to generate a concrete version of an otherwise formless and intangible reality and to develop an inner mental world that makes it possible for us to survive and flourish in this actual world. **P1**

6 **William James's Veridical Revelation** Jonathan Bricklin <bricklin@earthlink.net> (Eirini Press, Staten Island, NY)

"Is consciousness already there waiting to be uncovered and is it a veridical revelation of reality?" William James asked in one of his last published essays, "A Suggestion About Mysticism." The answer, he said, would not be known "by this generation or the next." A century after his death, as if on schedule, physicists are now making the case, both experimentally (Craig Hogan) and theoretically (Julian Barbour), that answers James's question in the affirmative. By separating what James passionately wanted to believe about will, self, and time, from what his "dispassionate" insights and researches led him to believe, I show how James himself laid the groundwork for adopting this eternalistic revelation as veridical. "Consciousness waiting already there to be uncovered" – not "generated de novo in a vast number of places," but existing "behind the scenes, coeval with the world" – is consistent with James's "neutral" monism, and his belief that Newtonian, objective, even-flowing time does not exist. Prime reality was not, for James, an object-world appearing to a subject-self, but a "monism" of "pure experiences," a stream of "sciousness" (consciousness without consciousness of self), "thinking objects...some of which it makes what it calls a 'Me,' and only aware of its 'pure' Self in an abstract, hypothetic or conceptual way." These pure experiences "exist and succeed one another," entering into "infinitely varied relations," "throw[ing] the question of who the knower really is wide open." James also emphasized that the only provable relationship between brain states and consciousness is correlation not generation. That "thought is a function of the brain" does not imply that the brain either stores or produces thought; brain function may be merely transmissive, like a radio. While never fully abandoning commonsense dualism himself, James believed that parapsychological and other transpersonal phenomena had "broken down...the limits of the admitted order of things," and that insofar as science denies such exceptional occurrences, it lies "prostrate in the dust." The "most urgent intellectual need" he felt early in his career was that "science be built up again" in a form in which transpersonal phenomena "have a positive place." In centennial retrospect, his veridical revelation, and his corroboration of it, helped create a positive place for the most radical reconstruction of physics today. **C16**

7 **Intrinsic Properties and Panpsychism** Godehard Bruentrup <gbru@hfph.mwn.de> (Munich School of Philosophy, Munich, Germany)

There are two major arguments for panpsychism: the genetic argument, and the argument from intrinsic natures. The genetic argument is built on the intuition that nothing can give what it does not possess, and thus radical emergence is impossible. The argument from intrinsic nature claims that the physical description provided by the sciences captures only relational and dispositional properties. Thus, an intrinsic and categorical basis that carries those functional structures must be assumed. I will briefly sketch how this line of reasoning was already known in Early Modern Philosophy as a critique of the Cartesian notion of matter: Some, not widely known, arguments by Leibniz, Locke, Hume and surprisingly Kant provided some useful historical background information to set the stage for the contemporary debate. In the recent debate I will focus on only one particular argument: Newman's argument against structural realism and relationalism. In 'The Analysis of Matter' Russell famously claimed: "The only legitimate attitude about the physical world seems to be one of complete agnosticism as regards all but its mathematical properties" (Russell 1927, 270-271). Newman's argument (1928) was directed against Russell's skeptical view. Newman claimed that, unless we take into account the intrinsic features of the relata, there will be too many relations. The existence of a set of relations is trivially true of a set of objects unless the relata have some qualitative intrinsic properties. Panpsychists have used Newman's argument to show that absolutely intrinisic properties are indispensable. Some recent authors have tried to

counter Newman's argument by claiming that structure is indeed all we need to interpret the scientific worldview (French/Ladyman 2003). I will defend and extend Newman's original argument against various criticisms that have been advanced against it in recent years, and place it in the context of Putnam's famous 'model theoretic argument.' It will be shown that modest forms of structural realism will have to assume the existence of some kind of intrinsic properties. Thus the argument from intrinsic natures to panpsychism will still go through since prima facie the best candidates for tout court intrinsic properties are phenomenal properties. Only a radical form of structural realism, a relationalism which assumes only the existence of relations and denies the existence of objects of any kind, might possibly be defended against Newmann's argument. But is this idea ultimately defensible? Going back to Leibniz thesis that all relational properties must be based in intrinsic properties and by referring to some recent arguments (Floridi 2008) against the theory of radical structural realism, it will be claimed that the core argument for panpsychism from intrinsic natures is still standing. It will then be argued that the best candidate we have for intrinsic properties are (proto-)mental properties by analyzing some of the alternatives for absolutely intrinsic properties. Physical properties like "mass" can either be analyzed in functional terms or - after careful analysis - seem to imply a (proto-)mental aspect. **C9**

8 **Does Panexperientialistic Holism Solve the Combination Problem?** Alexander J. Buck, Ludwig J. Jaskolla <mail@alex-buck.de> (Metaphysics, Munich School of Philosophy; KSFH Muenchen, München, Germany)

The combination problem is still one of the sternest problems for panexperientialistic ontology. Prominently, among others, Phil Goff argued in 2009 with two papers that panexperientialists cannot get around the combination problem. Therefore, they need to argue for the at first hand contra-intuitive notion of panexperientialism in combination with a strong interattribute version of emergence bridging the gap between proto-experiential simples and the full-blown consciousness of human persons. At the end of the day, it seems panexperientialism rests on weak systematic grounds. We want to address Goff's challenge from two different angles: (1) We will argue that Goff's attack is only relevant, if parsimoniousness is the only methodological principle for evaluating and comparing ontologies. As soon as other principles, for example questions of adequacy with everyday experience or coherence with the framework human theories of reality, are deployed at the problem, we are forced to admit that panexperientialism is the best option for explaining consciousness in naturalistic terms. (2) Our second approach will sketch a version of panexperientialism for which the combination problem does not arise at all. `Panexperiential Holism', such as supposed by T.L.S. Sprigge in 2006, is the theory that the universe as a whole is one big experiential matter of fact. What we normally believe to be independent centers of conscious subjectivity are merely long-lived structural features of this big experience. We argue that the combination problem does not arise in this context. The 'Lego'-Block orientated, naive thought of simple 'combination' is misleading, misguided and must be abandoned. Nevertheless, there are some interesting (and maybe frightening) consequences entailed by this approach. We will be coping with three of these consequences: (2.1) The big universal experience needs to be self-referential. (2.2) The notion of 'personal identity' is essentially vague and may lead us into something like Derek Parfit's 'Relation R' (1984).Therefore, persons are not merely series of experiences, but (in an anti-realistic fashion) exemplifying the common denominator of these experiences. In this sense, a person is what has experiences, or the subject of experiences. And (2.3) There is no lower-limit to reality. Experience is the ontological cement of the World. Despite of these consequences, quite welcoming some of them (e.g. the resulting personal identity concepts), we argue that panexperientialistic holism is a promising candidate in the framework of naturalistic theories of consciousness. **C9**

9 **Abstract and Imaginary Sense Data** Scott Jackson <scottjaxon@gmail.com> (Prescott College, Tucson, AZ)

Direct realists claim the direct objects of perception are sense data. However, in contrast to direct realist claims, the senses perceive abstract sense data. The adult and early child-

hood conscious mind process these raw stimuli into a perception of three-dimensional objects. These objects are not produced in the mind, rather imaginary sense data, the subjective effect of abstract sense data fed into consciousness, frequently or typically produces a 1:1 perceptual rapport with the empirical world in all of its inherent three-dimensionality. The theory of abstract and imaginary sense data aligns with indirect realist claims that "sense data" are not directly perceived and are an inherent intermediary level involved in the process of perception. The indirect realist claim "that sense data originate from an unknowable source" accords with this theory in that, in part, abstract sense data exist outside our normative sense of time and space. Abstract sense data, as opposed to imaginary sense data, differ from indirect realist conceptions of "sense data" in that abstract sense data are not private, internal and subjective phenomena pertaining only to individual perception. Abstract sense data are empirical and exist external to human cognitive processes. As such, abstract sense data affect the senses and transform into private, individual and subjective imaginary sense data when transmitted to human consciousness. At this point, the Kantian imagination in conjunction with sensorimotor schemata function to synthesize and concretize, if you will, the 1:1 perceptual rapport between abstract and imaginary sense data; which is the relationship between the external world and internal experience that we call consciousness. The disciplined altering of sensorimotor schemata modulates the flow of abstract and imaginary sense data within cognitive processes. Altering the flow of these data in cognitive processes can potentially transform the very nature of their synthesis thereby allowing for the contribution of data to a first-person science of consciousness. **P11**

10 **The Spread Mind: Is Phenomenal Experience Identical with Physical Processes Larger Than Those Taking Place Inside the Nervous System? A Defense of Process Phenomenal Externalism** Riccardo Manzotti <riccardo.manzotti@iulm.it>
(Communication and Behaviour, IULM University, Milan, Italy)

It is often assumed, both in science and in philosophy, that phenomenal properties supervenes on what takes place inside the nervous system: "if you are a physicalist of any stripe, as most of us are, you would likely believe in the local supervenience of qualia" (Kim 1995, p. 159). As a proof of this tenet, it is often reported that the a grown up brain seems capable of producing – autonomously and in isolation from the environment – phenomenal experiences such as dreaming, hallucinations, afterimages and, by and large, most cases of indirect perception (Koch 2004; Tononi 2004; Edelman 2003; etc.). I will run afoul this view trying to defend an alternative framework suggesting a different physical supervenience substratum for phenomenal experience. My argument is divided in three steps. First, I will try to show that the aforementioned internalist view is based on a few questionable hypotheses as to the causal and temporal limits of physical phenomena – namely the roughly instantaneous notion of present. I challenge these hypotheses trying to outline the conditions of isolations for a physical system and then to check whether they are satisfied by the brain in allegedly isolated cases (like dreams, memory or mental imagery). The tentative conclusion is that they are never wholly satisfied as long as the brain is working properly and hence that the brain is never isolated from its surroundings. Second, if the above twist in a fundamental assumption such as to the boundary of physical phenomena is acceptable, a more radical framework can be fleshed out: The neural activity is a subset of the physical bundle of events and processes either responsible or identical with consciousness. I suggest to call the resulting spatio-temporal manifold, which suggests that phenomenal experience is physically spread beyond the limits of the subject's body: the "spread mind". Clearly, it is a variant of externalism. Yet it has not received much support up to now. Even proponents of various forms of externalisms restrained from considering seriously the possibility that the physical substratum of consciousness is literally/physically more extended than the subject's body (Clark, 2008; Chalmers 2007). Similarly, to a certain extent, enactivists (O'Regan, Noe, Hurley) steered for a more epistemic view so as to avoid committing to any problematic ontology. In fact, to hold this stand, the "spread mind" faces a serious threat: not veridical perception and mistaken perception. Which brings us back full circle to where we started. As a third step, thus, I will try to address a few cases of not veridical perception such as dreaming, afterimages and hallucinations trying to show whether

it is possible to give a satisfying account of them exploiting a strong case of phenomenal externalism such that entailed by the "spread mind" hypothesis. **C16**

11 **Complexity Theories of Consciousness** Matthew Piper <mpiper5@slu.edu> (Philosophy, Saint Louis University, St. Louis, MO)

In this paper, I will argue that a correct theory of consciousness will supervene on a particular type of complexity theory (CUV). In Part I, I will introduce and resolve a key tension within complexity theory (CT) concerning antagonist operationalizations of the concept of complexity (i.e., CUV vs. CAI). I will explain the antagonism between CUV and CAI theories within CT and introduce a thought experiment that shows why naturalistic intuitions justify the choice of CUV theories over CAI theories in regards to frameworks appropriate for theories of consciousness (ToCs). I will then unpack some basic features of CUV theories relevant to ToCs. In Part II, I will first show that CUV theories predict the essential features of non-reductive physicalist (NRP) ToCs, which is important because NRP accounts are arguably the received view at present. Secondly, I will show how additional empirical and conceptual considerations, especially theoretical convergence over the last decade, further support the conclusion that CUV theories are the framework in which ToCs, if they are to be successful, must be framed. **P1**

12 **A Singular Resolution to the Combination Problem** Jonathan S Powell <j.s.powell@rdg.ac.uk> (Philosophy, University of Reading, Reading, BERKSHIRE United Kingdom)

In his landmark paper 'Realistic Monism: Why Physicalism entails Panpsychism'1 Galen Strawson presents the rejection of brute emergence as the strongest reason to adopt a Panpsychist Metaphysics if one is a committed Physicalist. In his responses to that paper 'Experiences don't sum'2 and 'Can the panpsychist get around the combination problem?'3 Philip Goff claims that in order to solve the so-called binding or combination problem Strawson's Panpsychism is committed to just such a form of brute emergence and that this constitutes a fatal flaw in the theory. Goff shares William James's intuition that one can '[T]ake a hundred of them [feelings], shuffle them as close together as you can (whatever that may mean); still each remains the same feeling it always was, shut in its own skin, windowless ignorant of what other feelings are and mean.' [Bracketed comment replicated from Goff's quotation.] According to Goff, Panpsychists of Strawson's ilk are committed to the brute emergence of 'macroexperiential phenomena' from 'microexperiential phenomena'. I show briefly why Goff's attacks fail. They do however point to a gap in the Panpsychists' model. How do little experiential somethings add together to form a big experiential something whilst retaining their individuality? The question can be re-phrased in neurological terms; '[H]ow, then, do the neurons' experiences combine to give rise to human mentality?... the real explanatory work still remains to be done'4 The resolution to the problem which grounds James's disquiet and Goff's challenges is to deny that traditional part/whole relations exist in unified experiences. I propose a model for the identity of experiential unities in which the constituent 'parts' no longer retain distinct identity. This proposal in the Metaphysics of Mind draws on rational argumentation and empirical science (specifically Quantum Mechanics). Single experiential unities are defined as CORPUSCLEs. A CORPUSCLE is a Concrete, Ontologically-Real, Physical, Unified, Synchronic, Conformational, Locally-holistic Experience. **P7**

13 **Rescuing Panpsychism from the Emergence Argument** William Seager <seager@utsc.utoronto.ca> (Philosophy, University of Toronto, Toronto, Ontario Canada)

Any number of "external" objections against panpsychism have been raised which turn on its inherent implausibilities or its lack of supporting empirical or theoretical evidence. But perhaps the most challenging objection is one "internal" to the theory. The objection targets one of the principle virtues of panpsychism: the avoidance of the "hard problem" of consciousness. The solution offered by panpsychism is that consciousness does not emerge from a non-mental, purely physical background but is a fundamental feature of reality. Thus the hard problem cannot even arise. The objection in question threatens to reinstate the hard problem. The problem is this. If panpsychism is true then the basic constituents of things each

possess some kind of primitive element of consciousness. However, complex minds are not identical to any primitive element. Presumably, the panpsychist must hold that complex minds are some kind of resultant of the constituent primitive conscious elements and their inter-relations. But as William James pointed out, the panpsychist then faces a problem of emergence closely analogous to that facing the physicalist: how are complex states of consciousness generated by the interactions of units of elementary consciousness? Of course, the problem faced by the panpsychist is not absolutely identical to that facing the physicalist. The panpsychist need not account for the inception of consciousness in a world utterly lacking mentality. On the other hand, the panpsychist's problem is in at least one way worse than the physicalist's. Within the physical world we have discovered a host of mechanisms of emergence by which the structure and capacities of complex systems can be seen to arise from the interactions of the system's constituents. Not only does the panpsychist lack any distinctive model of mental emergence, the standard forms of physical emergence leave the constituents in place as the ontological base which determines the properties of the system as a whole. Such a model of emergence is entirely inappropriate for the emergence of a consciousness which is an active entity in its own right whose efficacy does not devolve onto that of a host of mentalistic constituents which are each independent, if simple, minds. Thus the panpsychist faces a dilemma. Either complex minds emerge by "magic" from their constituents, in which case why not simplify theory by letting minds similarly magically emerge from purely physical constituents, or complex minds emerge via mechanisms of emergence which leave the emergent as "ontologically secondary" and in themselves inefficacious. I want to show that that there is a way to rescue the panpsychist from the emergence dilemma. In essence, the panpsychist can escape by invoking the idea of what I call "large simples", which are ontologically simple entities which have diachronic conditions of emergence. I argue that this conception is coherent and in fact has models in the physical sciences, and provides a way for the panpsychist to escape the dilemma while retaining panpsychism's solution to the hard problem. **C9**

14 **A Metaphysics for Panpsychism** Galen Strawson <gstrawson@mac.com>
(Philosophy, University of Reading; MIT, Reading, Berkshire United Kingdom)

[1a] We know that experiential phenomena (consciousness) exist in the universe [1b] There is provably zero evidence for the existence of non-experiential phenomena in the universe [1c] Physics (including cosmology) is a part of metaphysics [1d] Sense in which physics already provides a metaphysics for panpsychism [1e] But physics indeterminate in many respects: provides only structural information about reality; theories proliferate concerning the fundamental constitution of space-time-matter [2a] Stuff monism is true (only one kind of stuff in the universe) [2b] Thing monism is true (sense in which only one thing in the universe = itself = space-time-matter) [3a] being is becoming (Wesen ist Werden, thing/process distinction is superficial) [3b] matter is force and conversely (Stoff ist Kraft, categorical property/power property distinction is superficial) [3c] existence is qualitativity (Sein ist Sosein, 'object'/'property' distinction is superficial) [3d] the 'in-itself' is the for-itself ('Ansichsein' ist Fürsichsein, panpsychism is true) **PL9**

15 **Greater Reality Achieved Through Consciousness: An Unrecognized Option (Plato/Hegel) in the Philosophy of Mind** Robert M. Wallace <bob@robertmwallace.com>
(independent scholar, Shorewood, WI)

Recent discussions of the history of theories of mind and consciousness in the west identify the leading options as (a) materialism/physicalism/emergentism, (b) dualism, (c) panpsychism, and (d) some kind of "idealism." In this paper I will lay out an additional major option, which I find mainly in Plato, Aristotle, Plotinus and Hegel. These philosophers think of reality, I suggest, not primarily in terms of what it's "composed of"(whether matter, psyche, or some sort of matter-plus-psyche), but as an "achievement," and thus as having "degrees." Beings that exhibit mentality can be more "real," not in the sense of being less illusory but in the sense of being more "themselves," more self-determining, than beings that lack it. Above all, one can be more "oneself" if one seeks, not what one is programmed by the external world to seek, but what is genuinely Good. (Because of this role that the Good plays, Plato refers to

it as "beyond being in rank and power" [Republic 509b].) When one focuses, as the Platonic tradition does, on the greater reality as oneself that's achieved by self-determining beings including those with minds, then other phenomena take on perhaps unfamiliar roles. In particular, consciousness and the first-person point of view then derive their importance from their contribution to one's reality as oneself, through the increased self-determination that they make possible. Thus Platonism confirms our sense (as against materialism) that consciousness isn't merely epiphenomenal. Consciousness enables beings to achieve greater reality as themselves. Unlike dualism, however, Platonism unifies the whole range of reality under a single feature (namely, increasing degrees of reality as oneself). Structure, growth, reproduction, motility, sensation, consciousness, self-consciousness and abstract thought are all phases of this one endeavor. Viewing them as phases on a scale, Platonism (unlike panpsychism) honors the common-sense view that lower entities like rocks and plants don't possess consciousness. The Platonic view also differs from the "idealist" views of Bishop Berkeley, Immanuel Kant, F.H. Bradley, Josiah Royce and others, as well as from A.N. Whitehead's "process" thought and from phenomenology. None of these get into focus the role of the Good and consciousness in achieving reality as oneself, which Plato analyzed in the "Republic" etc., Aristotle in the "De Anima" etc., Plotinus in the "Enneads," and Hegel in his "Science of Logic" and "Encyclopedia of the Philosophical Sciences". (I have identified this theme in Hegel and analyzed his account of it in extensive textual detail in my "Hegel's Philosophy of Reality, Freedom, and God" [Cambridge University Press, 2005].) If this conception reminds you of the "great chain of being" that A.O. Lovejoy traced to Plato and Aristotle, you're right. It's a statement of the original and defensible content of that idea. It conflicts in no way with modern science, and it provides a more satisfying explanation of consciousness's role and status in reality as a whole than current science and philosophy of mind have been able to provide. **P1**

16 **A Neutral Monism's Theory of Mind and Matter** Xinyan Zhang <zxy@live.de> (Shandong Univ., School of Medicine, Duesseldorf, Germany)

The author does not think either reductive physicalism or property dualism a solution for the problem of consciousness, and tries in this paper to show how neutral monism may solve it. By following Anaximander, Hume, Mach, Richard Avenarius, William James, Bertrand Russell, Kenneth Sayre, philosophers of neutral monism are approaching a better understanding: Consciousness is a real existence, realer than either mind or matter. The author has also discussed in details the functional roles that consciousness plays in the whole activities of human mind. **P7**

1.3 Materialism and dualism

17 **Uniting "Hard-To-Classify" Responses to the Conceivability Argument Against Materialism** Dave Beisecker <beiseckd@unlv.nevada.edu> (Philosophy, University of Nevada, Las Vegas, NV)

In "The Two-Dimensional Argument Against Materialism" (expanded version), Chalmers notes that there are several responses to the conceivability argument that resist easy classification according to his earlier taxonomy of responses. Chief among these 'hard to classify' responses are the conditional analysis reply advanced by Hawthorne, Braddon-Mitchell, and Stalnaker, as well as various 'reverse-zombie' arguments promoted by Balog, Frankish, and Brown. One thing that these responses have in common is the adoption of an indirect strategy whereby allegedly parallel thought experiments are deployed in order to defuse or otherwise blunt the compelling force of the original conceivability argument. These thought experiments in turn bid us to consider seriously how matters would stand from the perspective of thoroughly materialistic beings who apply something resembling phenomenal concepts in their wholly material world. Thus we have Hawthorne's Oracle, Balog's Illuminati and Yogis, and Frankish's Anti-zombies, to say nothing of the eponymous question Stalnaker raises in 'What is it Like to be a Zombie?' Despite this commonality, it is remarkable how divided proponents of these responses are in their respective diagnoses of what goes wrong with the original conceivability argument. Some (e.g., Stalnaker, Braddon-Mitchell) take these considerations to

undermine the robust conceivability of zombies ('they only seem to be conceivable'), while others (e.g., Balog, Hawthorne) take them to illustrate why we cannot infer their genuine metaphysical possibility from their admitted conceivability ('though conceivable, they're not really possible'). Given this lack of consensus, it is little wonder why Chalmers finds these responses so hard to classify. In this paper, I suggest how these otherwise disparate opponents of the conceivability argument might present a more unified front. The problem with the original conceivability argument concerns neither the scope of conceivability nor the space of possibility. Rather, the real problem is that it illicitly presupposes a particular manner of talking about phenomenal consciousness that begs the question against materialism from the get-go (witness Stalnaker's pleas for the debate to be conducted in 'topic neutral' terms). However, the very conceivability of the materialistic perspectives these hard-to-classify responses invoke in their thought experiments (and which the original conceivability also countenances as a zombie world) only goes to show that this offending manner of speaking is indeed optional. So the real lesson for materialists is that they should point out this infelicitous feature of the conceivability argument and then refrain from engaging the argument on its own terms. For when they fail to show such restraint (for instance, by pinpointing specific premises where it goes wrong), their foes can use the language of the original argument to trap them into apparent contradictions. Finally, I close by challenging a general response Chalmers raises against these sorts of objections, namely that the materialistic perspectives (considered as actual) that they adopt really aren't as robustly or directly conceivable as these hard-to-classify responses allege. For Chalmers' defense of this contention once again presupposes the very manner of speaking that these responses should be taken to throw into question. **P1**

18 **Jackson Has Been Wrong All Along** Noel Boyle <noel.boyle@belmont.edu>
(Philosophy, Belmont University, Antioch, TN)

In 1998, Frank Jackson changed his position from dualism to physicalism. I argue that the change is generally overstated and, in an important sense, Jackson has been wrong all along. Contrary to Jackson's consistent claims, it is possible to construct a theory of consciousness that honors both Jackson's pre-1998 phenomenal realist intuitions as well as his post-1998 physicalist intuitions. Consistently and accurately, Jackson captures the core commitment of physicalism in regard to consciousness with the following supervenience thesis: any microphysical replica of our world is a world in which all of the properties about consciousness in our world are also replicated (a thesis that he now, but not formerly, believes to be true). Jackson goes astray by claiming that this supervenience thesis is true only if the phenomenal facts about our world are entailed by the microphysical facts. Yet, there are distinct metaphysical and epistemological senses of 'entailment'. One set of facts metaphysically entails a second set of facts if the first set makes true the second set - if there can be no world in which the first, but not second, set of facts hold. One set of facts epistemologically entails a second set when it is possible, at least in principle to know the second set merely by knowing the first set. This sense of entailment is a matter of explanatory reduction, not just ontological necessity. The metaphysical entailment of consciousness by the microphysical follows from the supervenience thesis and is a commitment of physicalism. However, the epistemological sense of entailment makes a stronger claim, does not follow from the supervenience thesis, and is not a commitment of physicalism. Put differently, Jackson overstates the commitments of physicalism by failing to allow for levels of theoretic investigation that follow from, but cannot (even in principle) be explanatorily reduced to microphysical facts. The emerging science of consciousness is, I believe, one such level; biology is another. A complete explanatory reduction of biology to microphysics is neither currently available nor seemingly forthcoming. Yet, no one argues that realism concerning biological properties threatens physicalism. Therefore, prima facie, biology is an example of metaphysical entailment in the absence of epistemological entailment, and one might look to biology as a model for how phenomenal facts relate to microphysical facts. Contrary to this view, Jackson argues that the failure of reductive explanation in biology is a practical, not principled, failure. Given the infancy of the science of consciousness, physicalists can say the same thing about phenomenal properties, in which case biology is still a model for placing phenomenal properties in a physical world. In short,

for Jackson to show that one must choose between physicalism and phenomenal realism, he must show that there is a salient difference between how biological and phenomenological properties relate to microphysics. And this, it seems, cannot be done. **P7**

19 **Taking the Edge Off Type-A Materialism** Brian Fiala <fiala@email.arizona.edu> (Philosophy, University of Arizona, Tucson, AZ)

Type-A materialism is the view that consciousness can be explained exclusively by explaining various functions. According to Chalmers, ''the most interesting arguments for type-A materialism are those that argue that we can give a physical explanation of our beliefs about consciousness, such as the belief that we are conscious, the belief that consciousness is a further explanandum, and the belief that consciousness is nonphysical'' (2002: 253). He also claims that ''at a certain point, the debate between type-A materialists and their opponents usually comes down to intuition: most centrally, the intuition that consciousness (in a nonfunctionally defined sense) exists, or that there is something that needs to be explained (over and above explaining the functions)'' (253). Because anti-materialist intuitions are so powerful, the result is that ''even among materialists, type-A materialists are a distinct minority'' (253). The charge is essentially that type-A materialism presents itself as a radical view because it does not take seriously that which appears to be intuitively undeniable about consciousness. But, I claim, this shortcoming is not a necessary feature of the view. By explaining key anti-materialist beliefs, a type-A materialist can produce positive arguments for the view while simultaneously rendering it significantly less radical. For example, a type-A materialist who offers a robust functional explanation of the intuition that consciousness is a 'further explanandum' takes that intuition quite seriously, even though such a materialist clearly does not take the intuition at face value. Since this sort of materialist has in hand an adequate explanation of one his opponent's key intuitions, it would be unfair to accuse the materialist of simply 'intuition mongering.' I argue that an especially important group of beliefs about consciousness includes those beliefs that are manifested in our intuitive judgments about consciousness, particularly intuitive judgments that are leveraged in philosophical arguments about the nature of consciousness. I suggest that the tools of cognitive science and experimental philosophy provide a promising avenue for explaining these intuitive beliefs. I briefly sketch some ways in which we might use these tools to functionally explain the intuition that consciousness is not physically explicable. **C2**

20 **Beauregard and the "New" Dualism: An Emergentist Response** Mathew Gendle, Jeffrey C. Pugh, Department of Religious Studies, Elon University <mgendle@elon.edu> (Psychology, Elon University, Elon, NC)

In their book "The Spiritual Brain: A Neuroscientist's Case for the Existence of the Soul" (2007), Mario Beauregard and Denyse O'Leary outline arguments supporting non-materialist neuroscience approaches to the understanding of spiritual experiences and consciousness. This work dismisses the physicalist thinking championed by many mainstream scientists and philosophers, and stokes the debate between materialism and dualism. Although the authors present an excellent argument for why materialism cannot fully explain human consciousness and many spiritual experiences, their work fails to make a convincing case that Cartesian dualism possesses explanatory power beyond that provided by physicalism. By focusing on the dichotomy between materialism and dualism, Beauregard and O'Leary have overlooked a viable third alternative: emergence. As discussed by Clayton (2004) and Peterson (2006), radical emergence provides more satisfying explanations for the range of mental and spiritual phenomena studied by Beauregard and colleagues. Radical emergence is compatible with both the claim that mental states arise from physical substrates and the position that mental phenomena are not wholly reducible to embodied biological activity. In this presentation, we will review the principle claims outlined in "The Spiritual Brain", critique the authors' non-materialist position in regards to these claims, and re-examine these points through the lens of radical emergence. **P1**

21 **Fine-Grained Supervenience** Pete Mandik <mandikp@wpunj.edu> (Philosophy, William Paterson University, Wayne, NJ)

The philosophical technical term 'supervenience' is frequently used in the philosophy of mind as a concise way of characterizing the core idea of physicalism in a manner that is neutral with respect to debates between reductive physicalists and nonreductive physicalists. I argue against this alleged neutrality and side with reductive physicalists. I am especially interested here in debates between psychoneural reductionists and nonreductive functionalist physicalists. Central to my arguments will be considerations concerning how best to articulate the spirit of the idea of supervenience. I argue for a novel version of supervenience, 'fine-grained supervenience,' which is the claim that if, at a given time, a single entity instantiates two distinct mental properties, it must do so in virtue of instantiating two distinct physical properties. I argue further that despite initial appearances to the contrary, such a construal of supervenience can be embraced only by reductive physicalists. **P7**

22 **Dualism Without the Usual Problems: An Introduction to Soft-Interactionism** Bernard Molyneux <molyneux@ucdavis.edu> (Philosophy, UC Davis, Woodland, CA)

Dualists have in recent decades presented arguments which, being Cartesian in style, lead to species of dualism with causal interaction problems. As a result, contemporary dualists usually endorse epiphenomenalism, the thesis that the conscious mind is causally inefficacious. In contrast, I present a new dualist position derived from a family of libertarian responses to the problem of free will, in which non-physical agency has its effect by exploiting the indeterminacy in physical state evolutions. The resulting interactionist view allows the dualist to convincingly answer the two principal arguments for physicalism - the causal exclusion argument and the argument from lack of evidence - while retaining any motivation provided by Cartesian dissociation, specifically via reformulated zombie arguments. The view is amenable to a naturalistic development, as it is able to exploit the ontological neutrality of evolutionary and computational theory. Lastly, the view is open to empirical verification. However, such an investigation cannot proceed at the level of physics, but requires cross-level observations taken at the physical and intentional levels. **C2**

23 **Phenomenal Realist Physicalism Implies Coherency of Epiphenomenalist Meaning** William S. Robinson <wsrob@iastate.edu> (Iowa State University, Ames, IA)

Recent criticisms of epiphenomenalism include a self-stultification objection, according to which epiphenomenalism is incoherent, because phenomenal quality words could not mean what epiphenomenalists say they mean, if epiphenomenalism were true. This paper seeks to remove the sting of this objection. As many physicalists will agree, phenomenal quality terms do not simply have the same meaning as neural property terms. If phenomenal realist physicalism is true, there must be some true theory T, statable in terms acceptable to physicalists, that explains how such terms come into use. Let epiphenomenalists construct a new theory, T*, that is exactly like T except that wherever a phenomenal quality is invoked as a cause, the term for that quality is replaced by the neural property term that physicalists say has an identical referent. Since causal contexts are extensional, T* will be true if T is; both will be acceptable to physicalists; and T* will be usable by epiphenomenalists, as it attributes causation only to properties that they agree are physical. So, if phenomenal realist physicalism is true, there is a T* that is true and coherently usable by epiphenomenalists. – This argument bears adversely on an important argument offered by K. Balog. Some arguments she gives to support her view can be re-targeted as arguments against my conclusion. These arguments are reviewed and answered. **C9**

24 **A Critique of Jaegwon Kim's Physicalism: An Implicit Argument for a Non-Cartesian Interactionism** David Scharf <dscharf108@gmail.com> (Physics, Maharishi University of Management, Fairfield, IA)

Kim's argument for a minimal physicalism breaks down in two critical places. First, his functional reduction of cognitive/intentional properties fails to do justice to what we mean

when we refer to belief, desire and the like. And although Kim believes that he is saving what is distinctive about our cognitive/intentional life, by providing for mental causation in the context of functional reduction, it can be shown that mental causation without autonomy is inadequate, and irredeemably so, as Davidson anticipated. Kim saves mental causation in name only. Second, his minimal physicalism depends on a metaphysically fundamental partition between phenomenal consciousness and cognitive/intentional properties. This idea cannot be made coherent, because consciousness itself is intrinsically cognitive. Contemporary research in cognitive neuroscience documents the principle, anticipated by William James, that consciousness is functional and adaptive. Hence, if the consciousness that the explanatory gap says is irreducible (phenomenal consciousness) is the same as the consciousness which cognitive neuroscience tells us is functional (cognitive/intentional) then William James is right, and interactionism is a reasonable point of view. Although there remain compelling reasons to reject a Cartesian model of radically distinct substances, both threads of this critique indicate the need to take seriously a more sophisticated interactionism, where consciousness is metaphysically fundamental and interacts with biophysical processes in the brain. **P1**

25 **The Zombie's Cogito: Meditations on Type-Q Materialism** Josh Weisberg, <jweisberg@uh.edu> (Philosophy, University of Houston, Houston, TX)

Generally, materialist responses to the zombie argument either deny the conceivability of zombies, or accept their conceivability but deny their possibility. David Chalmers labels these two strategies "type-A" and "type-B" materialism, respectively. But those who are dubious of any sharp distinction between the empirical and the conceptual will find this split problematic. If both conceivability and possibility intuitions are theory laden, and if theories are judged by their global, holistic explanatory virtues, then it is not feasible to cordon-off conceptual claims about qualia and zombies. Rather, we assess the supposed problem of zombies by seeing which overall theory, over time, has the best explanatory record. This approach to zombies is labeled by Chalmers "type-Q" materialism, for its obvious Quinean leanings. In this talk, I'll present a way of defending materialism from the threat of phenomenal zombies, one that leans on the idea that global theoretical considerations are the key to defusing the zombie argument. What's more, I'll present the "reflections" of a certain zombie – Rene Descartes' zombie twin – in order to undermine the theoretical position of the anti-materialist. Throughout, I will highlight how type-Q materialism offers powerful tools for defending a materialist theory of mind. There is no privileged epistemic ground from which to analyze concepts and reflect on arcane possibilities. Instead, the best overall theory carries the day, and that theory is materialism. **C2**

1.4 Qualia

26 **An Argument Against the Ability Hypothesis** Peng Chien , Allen Y. Houng (National Yang Ming University) <emmapchien@gmail.com> (Instit.of Philosophy of Mind, National Yang Ming University, Taipei, Taiwan)

I propose an argument against the ability hypothesis (Jackson, 2003; Lewis, 1990; Nemirow, 1980) in this paper. The ability hypothesis is one of the physicalistic responses against the knowledge argument (Jackson, 1982, 1986). It argues that Mary, an imagined scientist who learned complete physical knowledge in a black and white room, does not learn any new knowledge when seeing colors for the first time. Instead, Mary learns only the ability to recognize, imagine, and remember colors from her new experiences. In this paper, I provide an argument against the ability hypothesis, to argue that what Mary learns is not fully explained by the ability. First, it usually needs repeated experiences and practices to acquire an ability to recognize, imagine, and remember a specific experience. Before acquiring the ability, the subject still enjoys the experiences. Thus, it is possible to have the experiences without the ability. On the other hand, the possibility of having color ability without having color experience is supported by the real story of a vision scientist, Knut Nordby (1942-2005), who was color blind (Nordby, 1990, 2006). Since it is possible to have color ability without color experiences, and vice versa, color experiences is something other than color ability.

Thus, the ability hypothesis fails to explain what Mary learns after seeing colors. Furthermore, I propose that what Mary learns are facts about color phenomenology. The main reason why the ability hypothesis fails to explain what Mary learns is that phenomenology is the first-personal phenomenon, which cannot be fully explained by the third-personal ability and physical knowledge. **P1**

27 **Epiphenomenalism Meets Qualia in Practical Deliberation and Action: Seeing Isn't Believing?** Brandon Fenton <fenton1@yorku.ca> (Philosophy, York University, Toronto, Ontario Canada)

Most people, it seems, take it for granted that the reasons that they make use of in episodes of practical deliberation are efficacious when it comes to consciously guiding and controlling their behaviour – that is, when they engage in performing actions. A basic picture of how this process is taken to work is that an individual is said to have a desire for something as well as a belief about how to attain the end desired. The belief and desire together combine to form an intention, and this intention ultimately sets the body in motion. On this picture of human behaviour, it is the adopted reasons qua reasons that are treated not only as what makes sense of the resulting action (i.e. as what makes it intelligible), but also as what are, in large part, responsible for the issuing of the behaviour that is described as an action. But one important point that remains unresolved is how the apparent efficacy of our consciously grasped, mentally deployed practical reasons should fit with our physical understanding of the nature of cause and effect – an understanding that is at the heart of scientific knowledge – without such reasons losing something (if not everything) of the force that we generally tend to accord to them as reasons (i.e. as considerations entertained consciously). For the most part, research on practical deliberation and reasoning leaves this issue under-addressed. Flying in the face of the common sense picture of the deliberatively prescribed intentional action mentioned above is the philosophical theory of mind called epiphenomenalism. In short, epiphenomenalists hold that mental events are the result of physical events in the brain but that these mental events themselves can have no effects upon physical events. This view of mental events as things that merely piggy-back parasitically upon physical events is immediately offensive to our common sense thoughts about practical reason. After all, if one takes one's consciously and deliberately adopted reasons for doing something as efficacious in leading to one's actions, then it seems that one simply could not accept the epiphenomenalist picture of the mind. And this is because, in accepting the epiphenomenalist view of the mind one would also be accepting that any apparent efficacy of one's deliberative and practical reasoning to be utterly illusory. So it appears that we face an impasse in attempting to reconcile our common sense views about practical deliberation and action with a scientific approach to understanding sequences of causally dependent events in the world – at least, that is, insofar as epiphenomenalism captures what is distinctive about the scientific approach to such a form of explanation. In this paper, I take the stance that the epiphenomenalist view of the mind should be rejected. My challenge to the epiphenomenalist picture will be framed by appealing to some considerations (and a novel thought experiment) involving phenomenal qualia applied in conjunction with Graham and Horgan's (2008) argument from inconceivability. **P1**

28 **Mary, No Pain, No Gain** Ying-Tung Lin , Allen Y. Houng (Institution of Philosophy of Mind and Cognition, National Yang Ming University) <jo.yt.lin@gmail.com> (Institution of Philosophy of Mind and Cognition, National Yang Ming University, Taipei, Taiwan)

In the early works of Frank Jackson, he resorted to the intuition that Mary learned new facts to argue that physicalism is false. That is, if Mary learned new facts when she left the black-and-white room, then some facts are not a priori deducible from the physical facts, and if physicalism is true, then all facts about consciousness are a priori deducible from the physical facts; then with the intuition, physicalism failed. However, later, Frank Jackson changed position to argue against this intuition to save physicalism. He tried to regard all facts about the phenomenal character of experience as representational character of these experiences, and Mary can a priori deduce these representational characters of the experience in the room. The difference Mary had when getting out of the room is that she gained new representational

state, a new way to represent the old fact. It seems plausible to explain the intuition away in the case of color experience. Nevertheless, in other cases, such as pain or other bodily sensation, the representational accounts seem to face some obstacles. Thus, we can imagine another situation that Mary is kept avoiding from having any bodily sensation, and at the same time, she learns all physical knowledge about neural mechanism of bodily sensation. When one day she first has the pain stimuli, will she recognize this experience as pain, or itch? **P7**

29 **From Chaos to Qualia: An Analysis of Phenomenal Character in Light of Process Philosophy and Self-Organizing Systems** Gaylen Moore <glmoore1@kent.edu>
(Philosophy, Kent State University, Ravenna, OH)

Recent advances in our understanding of complex dynamical systems may be of interest to philosophers seeking the best metaphysical grounds for understanding the qualitative character of subjective experience (qualia). I propose that qualia are not specifically brain processes, but are instead best thought of as world processes that can be characterized as distributed self-organizing networks of Whiteheadian actual entities. Whiteheadian actual entities have intrinsic natures that ground the subjective/qualitative aspects of phenomena, but they also exhibit extrinsic relations capable of grounding the physical properties studied by science. This suggests that qualia - normally associated with the purely mental - may be better understood as the metaphysical ground of both mental and physical properties. Due to its peculiar blending of internal and external relations, this Whiteheadian model implies that different aspects of a quale that a subject experiences as a specific shade of blue, might be contributed by contemporaneous entities that are also contributing other aspects of other qualia to other subjects widely distributed throughout time and space. Cellular automata and network models may be used to help clarify some aspects of this proposal. **P1**

1.5 Machine consciousness

30 **Minds, Machines, and Lucas-Penrose** Thomas Benda <tbenda@ym.edu.tw>
(Instit.of Philosophy of Mind, National Yang Ming University, Taipei, Taiwan)

The famous Lucas-Penrose argument is directed against mechanism, the thesis that the mind can be modeled by a computer. Its newest version (Penrose 1994) derives a contradiction from the assumption that human (arithmetic) knowledge is constituted by a set of propositions which is which is the output of a computing machine. It contains a step S in which it is established that the set of theorems derivable from that assumption is consistent. For S to work, however, a truth or knowability predicate K is required whose application to some Goedelian fixed point reveals that the set of knowable propositions is not definable, preventing S from going through (Chalmers 1995; Shapiro 2003). No mechanical way has been found to restrict K to prevent its problematic application. Hence it seems that the Lucas-Penrose argument uses tools beyond mechanistic powers to show that human knowledge exceeds what a machine can derive. Similar reasoning, however, can be used to weaken the case of the mechanist. To model propositional human belief, take a fairly weakly designed doxastic logic, which is a conservative extension of Zermelo's set theory, with expression variables x,. a binary predicate constant B and a quotation symbol ' '. The elementary formula B'x'k is read as "'x' is believed with background k". The second place k plays the role of a belief context. Axioms are, besides statements about form and minimum consistency of beliefs: (B3) "For every background and every held belief, the denial of its being held is not believed." (B4) "For every background, believing that all x are A implies that for every x it is believed that x is A." An additional inference rule is (RB) "From A infer belief of A with some background." (RB) is, due to the existential quantifier, weak. Indeed, for any state of affairs A, a background of interest or expertise can be conjured, such that A is believed. This logic looks barely strong enough to cover beliefs we have, yet from (B3), (B4) and (RB) inconsistency is readily derived, so the set of beliefs under it is not definable (Benda 2009). Again, no mechanical means seem to be available to prevent an application of a belief predicate that brings about inconsistency. So the set of beliefs under this logic is not definable. On the other hand, there are good reasons to maintain that the physical states of a brain or, for that matter, of

the universe, are adequately mapped to a definable set. That does not require a grand unified theory. There may be several overlapping theories, each with a certain range of application, which approximately describe the physical universe, as long as they are fine-grained enough to identify single physical states. Alternatively, a definable set of physical states is obtained by a point-by-point description of the model of physical theory, the total quantum state of the brain (or the universe). The conjunction of the above entails that human beliefs do not supervene on brain states. **C5**

31 **The Singularity: A Philosophical Analysis** David Chalmers <chalmers@anu.edu.au> (Australian National University, Centre for Consciousness, Canberra, Australia)

The technological "singularity", or I.J. Good's "intelligence explosion", is the rapid transition from greater-than-human artificial intelligence to superintelligence. I will set out and analyze the argument for an "intelligence explosion", and will consider the forms that such explosion might take. Focusing on the likelihood that it will take place within a simulated world, I will consider resulting practical and philosophical issues. How, if it all, can we control the impact of superintelligence in a simulated world on our world? Will systems in a post-singularity world be conscious? Can we be among them? **PL6**

32 **Consciousness in Mixed Systems: Merging Artificial and Biological Minds Via Brain-Machine Interface** Alexandra Elbakyan <mindwrapper@gmail.com> (independent researcher, Almaty, Kazakhstan)

The rapidly developing field of Brain-Machine Interface (BMI) technology seeks to establish a direct communication-and-control channel between human brain and machines. Practical applications for BMI include restoration of lost vision and motor functions, and even extending normal human capabilities. But unfortunately current BMI systems are far too poor to achieve even a level of performance that is comparable to what humans are normally capable of, let alone improving it. And this situation holds on for quite a while. The possible solution for coming out is to move research focus to those aspects of brain-machine interaction that usually do not receive much attention. The study of consciousness is one of such important aspects, as this talk seeks to prove, that could eventually allow us to bring BMI technology to the advanced stages, making its capabilities closer to capabilities of those BMI devices that appear in science fiction. Understanding consciousness and how it arises from the brain is crucial for achieving that goal. And BMI technology itself provides a lot of new questions and opportunities for consciousness research. BMI can progress far enough to allow such levels of integration between artificial devices and biological neural networks that they could work as a single system, not just separate entities communicating between each other. But how consciousness can then be represented in this mixed system? Will consciousness be privilege of living part only? Can the artificial part add something to conscious experience or even expand it? Furthermore, it would be possible to integrate neural systems of different living organisms by interfacing them to single artificial network. Will their consciousness be integrated then too? And how can such integrated mind be experienced? This talk explores ways in which Brain-Machine Interfaces can contribute to consciousness research, and discusses how better understanding of consciousness in context of brain-machine interaction will allow us to build BMI systems with extended capabilities. **P1**

33 **Consciousness And The Technological Demiurge** Paul Evans <p.l.evans@att.net> (The Sapphire Institute, Charleston, SC)

In this presentation transhumanism and the role of machines in consciousness are explored as the central Zeitgeist of the early 21st century.. Literary works of Paolo Bacigalupi, Robert J. Sawyer and the technical writing of Ray Kurzweil are examined in the light of today's dominant movie genres and such films as Blade Runner, The Matrix, Terminator and Avatar. Also, emerging roles of virtual experience on Facebook, Second Life, and even modern drone warfare are suggested as vehicles for abstracting humans from face-to-face community and as surrogates for real life. The ideas that technological singularity will enable humans to be-

come imbedded with nanotechnology, wireless interfaces to pharmaceuticals, and the ability to procreate solely outside of the body are explored in relation to growing Gnosticism. Human abstraction from nature and embracement of Gnosticism as a kind of technological demiurge are suggested as driving forces of this Zeitgeist in contemporary literature, philosophy, entertainment, and warfare. **P1**

34 **Would James Buy Dennett's Conscious Robot?** Horace Fairlamb <fairlambh@uhv.edu> (Arts And Sciences, University of Houston-Victoria, Briarcliff, TX)

To contemporary materialists, James' spiritual metaphysics and introspectionist psychology have been overshadowed by advances in cognitive psychology and artificial intelligence. Who needs panpsychism when we can build thinking robots out of transistors and light sensors? Who needs a cosmic designer when we have natural selection and neo-Darwinian genetics? Though long departed, James' radical empiricism critiqued positivism's narrowing of science in ways that still apply, for instance, to the work of Daniel Dennett. Against introspectors such as James, Dennett defends an exclusively third person approach to science, claiming that first person phenomenology does not offer evidence that cannot be gained by third person reports. As his critics note, Dennett's third person shibboleth limits what can count as consciousness. Whereas James took first person experience to be the core of consciousness, Dennett reduces consciousness to behavior and cognition, dismissing qualia as artifacts of mistaken beliefs about the privacy of mind. Dennett's exteriorized view of consciousness inspires him with optimism about the possibility of a conscious robot. Dennett claims that if a robot were to perform all the behaviors of conscious persons, we ought not to assume it was not conscious. For James, however, such a claim would smack more of P. T. Barnum than of science. According to radical empiricism, the reduction of consciousness to cognitive behavior is simply methodological apriorism, and fails in several crucial ways to address the facts of experience. (1) Where James' panpsychism might seem to invite conscious robots, there is nothing in a machine that might suggest more than transistor-consciousness since computers, unlike brains, are not unified fields capable of supporting complex consciousness. Likewise, machines do not simulate conscious behavior due to their own consciousness, but due to someone else's. For James, the substance of consciousness is not behavior, but qualia. (2) Recently, Dennett has protested that religion has been spared philosophical accountability. But even if one set aside supernatural claims (e.g., miracles), making religion rationally accountable would require legitimating first person accounts of religious experience, just as James had done over a century ago. Dennett would have to start where James left off. (3) Dennett and Dawkins have charged that theology's argument for a First Mover is question-begging. But James recognized that framework choices in philosophy are aesthetic, not deductive. The argument for a First Mover is not a proof but a model of origins that one will find more or less credible. For James, the choice between theism and naturalism does not depend on whether theology's First Mover or positivism's verification principle is question-begging. Rather, such choices express personal philosophical priorities. But in favor of radical empiricism, James would add, at least it is open to all the evidence of experience. **P7**

35 **A Computer Program that has its Subjective Views** Machiko Fujiwara, Kenzo Iwama <m-fujiwara@engicom.co.jp> (Engicom Corporation, Tokyo, Japan)

This paper argues why our computer program has its subjective views about its world although very limited. The paper explains the program does experience; namely, it acquires how to solve arithmetic / mathematical problems and acquires meanings of words representing experiences as well as capabilities of the program. Then the paper shows how the program develops a view about its experience and capability and makes an answer on the basis of the view. The answer is a system reaction (Haikonen, 2004), and changes because the program forms and modifies how to solve the problems. A human gives our program two kinds of example sequences; one kind is sequences of how to solve problems and the other is sequences describing its experience and capability. The human gives the program examples of how to solve one problem and then examples of another problem. The examples are lines of text and are similar to those explained by a school teacher. Given those examples, the program keeps

the examples, generates a procedure to solve the arithmetic / mathematical problem, executes the procedure to solve new examples of the problem, and keeps execution results. An instance sequence describing its experience and capability consists of words of a question 'can you do division?' followed by an answer 'yes, I can' or 'no, I cannot' while the human confirms the program has acquired how to divide an integer by another or has not. Given the sequences of the words, the program generates a procedure to make a positive or a negative answer to a question 'can you do abc?' depending on its experiences on the problem abc. Now, the human gives the program examples that cover a part of a problem, for instance 'factorize 4', 'factorize 8' and 'factorize 16'. Then the program generates a procedure of factorizing an integer of a power of 2, and uses it to factorize an integer, 1024 say. In this situation, the program makes a positive answer to a question 'can you do prime factorization?' because the program has used the procedure to do prime factorization and has no experiences of failing prime factorization although the program is not able to factorize 27. The program has made a right answer at that moment, but it turns out to be self-satisfied if the program finds it fails to 'factorize 27'. A view of our program consists in the procedures that the program has generated. One kind of the procedures describes how to solve arithmetic / mathematical problems, and the other kind describes how to answer questions about its experiences and / or capabilities of solving the problems. Thus the view outputs a description of its experiences and capabilities, and is subjective because the human has not programmed the view but the program has developed it and is going to change it because the program forms and keeps modifying the procedures. **P7**

36 **Knowledge Argument on the Basis of Our Computer Program** Kenzo Iwama, Machiko Fujiwara <k-iwama@engicom.co.jp> (Engicom, Tokyo, Japan)

This paper argues that a pure phenomenal concept (Chalmers, 2004) can be explained by a seed of a procedure that our program generates when the program finds an inconsistency among currently active procedures. A recognitional concept (Loar, 1990; Carruthers 2000; Tye 2000) is formed later to index the pure phenomenal concept. Firstly the paper explains a computer program that acquires how to solve arithmetic / mathematical problems by generating procedures from examples and executing the procedures to solve new examples of the problems. Before getting the examples, the program does not have the procedures to solve the problems. If the program has got examples that cover only a part of the problem, the program fails to execute the procedure on a new example that is out of the coverage. The program always forms a seed of a procedure when the program finds an inconsistency among currently active procedures, and a failure is one of the inconsistencies. On the other hand, let the program have knowledge of how the program runs. Secondly the paper argues that procedures generated are the self-model of a program, and it focuses on the Knowledge Argument. Mary's knowledge corresponds to the knowledge about the program, and Mary's color experience corresponds to a failure of executing its procedure. A combination of examples and a new example of a mathematical problem determines if a failure occurs, and the new example makes the program experience the failure of executing a procedure to the end. The failure is characterized by the combination of the examples and the new example of the problem. The program forms a seed of another procedure to represent the failure because the program cannot have the procedure to represent it in advance. A seed thus formed is "a pure phenomenal concept", and is "isolated" from other concepts (e.g., Carruthers, 2007). The seed will be indexed within the self-model (or has its relation to a set of procedures already generated) only after the self-model with the seed reforms itself because the model has not included characteristics of the seed to form itself with indexes in advance. (Mary's self-model has not included wavelength of red yet.) The reformation makes a recognitional concept that indexes to the pure phenomenal concept and the concept can be applied when another failure occurs. Knowledge about our program is able to tell that the program is going to fail, to form a seed of a procedure to represent the failure after the program gets examples of a problem and a new example, and to tell how the program modifies the self-model to include characteristics of the failure. (Mary's knowledge can tell how the self-model is going to integrate wavelength of red into itself after getting the wavelength of red.) **P7**

37 **The Alien Pure Consciousness (APC) problem** Oded Maimon <maimon@eng.tau.ac.il> (Industrial Engineering, Tel Aviv University, Tel Aviv, Israel)

The alien has logic potential as a human being, but without any data at all. That is he knows nothing (of what we consider knowledge): He does not have any opinion, does not know any language, etc. This alien comes to the earth and is exposed to infinite data (e.g. the internet), but stays by himself - without any 'guidance'. What are the processes and transformation that the alien undergoes (if any)? This is the Alien Pure Consciousness (APC) problem. Can he learn? Does he learn? If yes, then what is his knowledge? Can we compare his knowledge, after a while, to the knowledge that a regular person has? This paper shows a process that solves the APC problem. This is a very relevant problem in today's environment, where we have access to abundance of data (without proper introduction), and especially for kids. In this paper we show a mathematical model and algorithmic process for learning from scratch, without any supervision, but data dependent, to solve the APC problem. **C5**

38 **A Critique on Artificial Intelligence Model of Mind** Rajakishore Nath <nath@hss.iitb.ac.in> (Department of Humanities and S, Indian Institute of Technology Bombay, Mumbai, Maharastra India)

Computer and Mind are the two concepts that together define an independent discipline called Artificial intelligence (AI). Mind collectively refers to the aspects of intellect and consciousness manifested as combinations of thought, perception, memory, emotion, will, reason and imagination; mind is the stream of consciousness. It includes all of the brain's conscious processes. Where as intelligence is one of the important properties of mind. In mid-twentieth century, the hypothesis, 'a machine can think' became very popular after, Alan Turing's article on 'Computing Machinery and Intelligence'. This hypothesis, 'a machine can think' established the foundations of artificial intelligence, and claimed that artificial intelligence has mind, with the power to compete with human beings. That is to say, an artificial, non-biological system could be a sort of thing that could give rise to mental activities. Thus artificial intelligence has emerged as a scientific programme in the twentieth century. In the first section, I shall show how consciousness is conceptualized in the domain of AI. The main aim of AI is not only to construct difficult programs to solve our day-to-day problems, but also to reproduce mentality in machines. It was claimed that all the mental qualities are ascribable to machines. My intention in this paper is to clarify consciousness from a subjective point of view. My claim is that consciousness cannot be fully represented in a mechanistic domain. There are subjective mental or conscious states, which can be seen in a first-person perspective of their proper understanding. **P7**

39 **A Logical Model of the Brain and Consciousness** John Strozier <john.strozierccs@yahoo.com> (Science, Mathematics & Technol, Empire State College/SUNY, Sedona, AZ)

We present a logical computational model of a brain and consciousness, complete with diagram and pseudocode; and discuss its consequences. We posit a real world out there that all animals must deal with in order to survive. Indeed, the simplest representation of the world as brain states of a given individual organism, i, at time t is: Bi = (1-Ki)^(-1)CiW where W is the sum total of the information comprising the real world at a given time, Ci the operator on the world that projects out whatever information about the world the senses can detect; and Ki is the operator on the brain that outputs the effects of that organism on the world. In general, Ci and Ki are different for each species and individual; having components in both genetic heredity and learning (where learning again has components in genetic heredity and learning, etc.).We agree with Pinker and others that the brain/consciousness is advantageously studied through its biological evolution. In one-celled animals; simple feedback chemical 'circuits' monitor the concentrations of essential chemicals (sugar, proteins, water, etc.) in the cell. When these get outside their set-points, determined by biological evolution, movement is generated to get to a new location. The logic of single-celled animals is straightforward; but as animals become more complex, due to biological evolution, so does the brain; building up as a set of 'modules' (Pinker) that run in parallel and increasingly become more complex with multiple interconnections. We suggest that at a certain level of complexity, a 'visual tableau'

(VT), or logical table containing all incoming stimuli (external and internal) and emotional flags in real time develops to service all brain modules that require sensory information. In addition, the organism continually writes the coordinates of itself on the VT, or more generally, is the real-time origin of the VT coordinate system. Without these coordinates of 'self' on the 'visual tableau', the animal could not act in a way to promote its survival. Does it remain motionless, go towards, flee, fight, etc.? Thus we suggest that the neural correlates of 'self-consciousness' are various modules in the brain that are continually looping over the VT, and hence recognizing one's self correctly located in the brain's representation of the outside world. The self, the I, is continually returned to and reinforced with each loop. Perceptions, P, the 'feeling' of a certain emotion and/or visual sensations (the "hard problem") in terms of Identity Theory (Smart, Armstrong) are brain states, and thus given in our terms by P=FB where the operator F is non-singular for any given individual organism. We also suggest the neural correlates of perception are nothing more than the offsets in the feedback loops between the quantities being targeted and their set-points. For example the emotion 'fear' goes away when the danger is passed. Someone standing on the edge of a cliff feels fear. The action taken, to step back, is initiated by that fear, which then goes away when the danger (of falling) has passed. **P7**

1.6 Mental causation and the function of consciousness

40 **The Physics and Neuroscience of the Role of Consciousness in Creativity and Psychological/Spiritual Development** Bill Baird <baird@math.berkeley.edu> (Neurotechnology Research and Consulting, Oakland, CA)

The aim of this theoretical account is to understand the phenomena of awareness, creativity, and personal growth from the perspective of a pan-psychic worldview in order to evolve new practices and technologies for accelerated psychological and spiritual development. While accepting the experimental findings and theories of science, this approach alters the ontological interpretation of the "unified field" from which all reality is created. We assume it is a field of universal consciousness instead of a "physical" field. What we call physical "matter" is self organizing vibration patterns in the evolving field of consciousness localized and concentrated into wave and vortex structures that appear as particles and atoms and molecules. In this view the universe is a conscious, intelligent and creative organism evolving toward ever greater self awareness. The ground field of universal consciousness is self aware in a rudimentary way but cannot see itself well because it is aware of everything at once - a "white noise" experience. It can't focus on anything and uses manifestation to develop its ability to see itself from local perspectives. The scope or range of the reflective capacity of the ground field develops steadily in cosmic evolution from particles to atoms to molecules to cells to organisms to animals and humans as part of its thrust toward greater self reflection. Personal consciousness is seen as the result of a coherent quantum state in the brain that brings the ground field of universal consciousness up into direct interaction with the dense spirit/matter of molecules and neurons that make up the brain. In this view our awareness brings creative inspiration, intelligence, and insight to the limited conditioned ego/computer aspect of the operation of the brain. Every conscious personal experience is a local act of reflection for the unified ground field that occurs at every collapse interaction of the quantum field state with the dense brain structure. The stream of content in ordinary reflective awareness at the focus of attention is generated by action/sensation cycles of neural activity alternating between sensory and motor areas which are communicating by gamma frequency synchronization and pass through the primary cortical areas supporting the quantum field of consciousness. Cognitive and affective neuroscience describes further how these mechanisms of attention can open brain operation to the transformative influence of consciousness and eventually expand its range of reflection to encompass all of reality in "self realization". We can see how this neurological opening occurs particularly in the states of "presence" found in artistic inspiration and cultivated in healing and spiritual practices. Intelligent insight from universal consciousness in these creative openings successively frees the cognitive/somatic ego system from layers upon layers of repressed traumatic distortions, rigid cognitive beliefs, and survival conditioning. Then we

can eventually see beyond the core self-identity representations, and personal history directing attention to reveal our true identity as awareness itself. In the expanded reflective capacity of meditation or peak experience or advanced spiritual development we can experience ourselves directly as the loving consciousness forming the structure all around us. **P1**

41 **How EPI are Phenomena: Velmans, Robinson, Dennett and Others** Bill Faw <bfaw@bpc.edu> (Psychology, Brewton-Parker College, Mount Vernon, GA)

The word Phenomenon comes from philosophical Greek referring to the appearing to one, of sense data, mental images, or thoughts in the mind. Epi-phenomenon comes from more whimsical Greek for surface, superficial appearances. To argue that 'consciousness' has causal efficacy – does something to something – necessitates (a) defining what consciousness is and (b) specifying what consciousness does. Psychologist Max Velmans maintains that conscious experience creates a phenomenal world around us, and thus allows the universe to look in on itself, and that conscious experience is responsible for the development of science, but denies that conscious experience has causal efficacy, even in cognitive processing, citing Wegner, Libet, and others. Velmans appears to hold what I label a form of empirical epiphenomenalism, which I argue is contradicted by the bulk of modern consciousness science. Philosopher Bill Robinson presents a form of philosophical epiphenomenalism, in which phenomenalism and physicalism are given their due, but never the twain shall meet. For Robinson, the existence of tasks – which can be done only through activation of brain processes that also cause conscious events – is not an argument against ephenomenalism. Dan Dennett helps me articulate my intuitive sense that Velmans and Robinson mean very different things by epiphenomenalism – an empirical (psycyhological, physiological) epiphenomenalism versus a philosophical epiphenomenalism. I make a case against empirical epiphenomenalism, while remaining agnostic regarding philosophical epiphenomenalism – presumably the opposite moves that Dennett makes!. **C9**

42 **The Human Mind May be a Turing-Machine-Like System Even If the Lucas-Penrose Argument is Right** Jenyu Liu <ciauaishere@gmail.com> (National Yang-Ming University, Taipei, Taiwan)

The conclusion of the Lucas-Penrose argument is that the operation of the human mind cannot be the operation of a Turing machine. Many people conclude from this argument that the human mind can not be a Turing machine. Though in the strict sense, if we accept the conclusion of this argument, the human mind is not a Turing machine, it's still possible that the human mind is very similar to a Turing machine. There are possible ways that make the human mind similar to a Turing machine. I will propose one possibility in this essay. The possibility: We can conceive the human mind as a Turing machine at a given time, and the human mind is a series of Turing machines, which change over time. This is coherent with the actual situation, for our brains are changing all the time. If so, we cannot apply the Lucas-Penrose argument on human minds. This is coherent with the actual situation, for our brains are changing all the time and we are learning all the time. So, we may conclude from the Lucas-Penrose argument that we are not a single fixed Turing machine, but we still can be a system of a series of Turing machines that change over time. If so, the Lucas-Penrose argument seems not to do many helps to convince us that human minds have more power than a computer. **P1**

1.7 The 'hard problem' and the explanatory gap

43 **The Hard Problem and a Possible Solution** Stephen Deiss <deiss@appliedneuro.com> (San Diego, CA)

If accepted for a talk in Tucson, I will present a definition of consciousness that is intuitive and usable. From that definition I will show how it helps to reset the "hard problem." The gist of the idea is that all our knowledge comes from how we interpret our sensations and then store them as memories to guide our future action. From a simple idea much ensues. **P7**

44 **Kicking the Psychophysical Laws into Gear: A Single Aspect Theory of Information, Part I** Tam Hunt <tam.hunt@gmail.com> (Lecturer, Bren School of Environmental Science & Management, UC Santa Barbara, Santa Barbara, CA)

A new approach to the "hard problem" of consciousness, the eons-old mind/body problem, is proposed. I define a "simple subject" as the fundamental unit of both matter and of consciousness. Simple subjects are inherently experiential, albeit in a highly rudimentary manner compared to human consciousness. With this re-framing, the "physical" realm includes the "mental" realm; they are two aspects of the same thing, the outside and inside of each real thing. This view is known as panexperientialism and is in itself a partial solution to the hard problem. The secondary but more interesting question may be framed as: what is a "complex subject"? How do simple subjects combine to form complex subjects like human beings? This is more generally known as the "combination problem" " or the "boundary problem," and is the key problem facing both materialist and panexperiential approaches to consciousness. I suggest a new approach for resolving this component of the hard problem, a general theory of complex subjects that includes "psychophysical laws" in the form of a simple mathematical framework. I present three steps for establishing the presence and type of complex subjects: 1) Temporal unity; 2) causal connectivity; 3) field coherence. I also suggest, as a second-order conceptualization, that "information" and "experience" may be considered identical concepts and that there is no double-aspect to information. Rather, there is a single aspect to information and it is inherently experiential. Part II of this paper will propose an experimental research program for obtaining data to support or negate the asserted framework. **P7**

45 **A Theory of Mind-and-Brain that Solves the "Hard Problem"** Robert Mays, Suzanne Mays <mays@ieee.org> (Chapel Hill, NC)

We propose that the human being consists of (1) an energetic, spatially extended, non-material "mind" that is united with (2) a material brain and body. The mind is a "field of consciousness"; it is non-material (does not consist of material atoms) but rather is a structured, energetic region of space that can interact with physical processes, in particular with neurons, and thus has physical attributes. The mind is united and co-extensive with the brain and body and interacts directly with the brain, probably via electrical interactions with cortical and other dendritic structures. The mind is the seat of conscious experience. All cognitive faculties (perception, thinking, feelings, volition, memory and self-awareness) reside in the non-material mind entity, not in the brain. However, the mind ordinarily is completely dependent on brain structures and neural activity for consciousness. Mental events become conscious only when there is sufficient electrical brain activity. If the electrical activity is not sufficient, the percept or other mental event remains subliminal. On the other hand, the mind can initiate electrical brain activity and thereby serves as the agent that initiates volitional activity, exerts "mental force", alters brain neural patterns plastically, and is the unified phenomenal field resulting in the sense of the unity of consciousness. When brain structures are damaged, mental faculties dependent on them are partially or totally impaired, due to interference with the interface between the neurons and the mind. The field of the mind has an internal structure which corresponds to the cortical and other neural structures of the brain. In fact, it is likely that the internal structure of the mind's field directly maps to the neural structure throughout the body. The mind depends on brain neural activity in particular cortical locations for particular cognitive functions. In support of this theory, we provide evidence from near-death experiences (NDEs), the aftereffects of NDEs and from various neurological phenomena. In particular we provide evidence of interaction of the non-material mind entity with physical processes, in NDE and phantom limb phenomena. This theory solves the "hard problem" of how conscious experience can arise from physical brain activity – conscious experience depends on a second entity with physical attributes, the conscious mind, which interacts with the brain to produce phenomenal experience. Subjective experiences of qualia are an effect in the mind resulting from neural electrical activity in specific regions of the brain. A philosophical zombie duplicate of a person is impossible because a physical duplicate would necessarily include a conscious mind as well as a physical body and thus would entail conscious experience. The unity of consciousness results from the unity of the mind's "field of consciousness". The mind

is the subject in whom phenomenal states are unified. All interactions in the mind have two sides: they entail both phenomenal experience *and* a physical causal role. Physical causal closure is maintained because the mind is a non-material entity with physical attributes, whose structures can act causally on neural processes. The domain of what constitutes "the physical" must necessarily be expanded. **P7**

46 **Identifying the Most Likely Explanation of Consciousness (Part 1): IBM and The SCALP Method** Colin Morrison <csdm1@o2.co.uk> (Philosophy, Independent Researcher, Fife, Scotland, UK, Cupar, Fife United Kingdom)

In this paper I propose that the proliferation of diverse and often incompatible views on consciousness in the philosophical literature is due largely to the fact that philosophers tend to be influenced by their intuitions when deciding which position to subscribe to, and I argue that this situation is extremely unsatisfactory. There are three main reasons for this: Firstly, it is clear from the history of science that human intuitions are not a reliable guide to a successful scientific explanation. Popular hypotheses have all too frequently been shown by experiment to be inadequate, and our explanations for things seem to have become 'more and more unreasonable and more and more intuitively far from obvious' (Richard Feynman 1965). Secondly, our best explanation for the origin of our intuitions, Darwinian evolution, gives us no reason to think they would make the most likely position on consciousness seem most likely to us. And thirdly, the private nature of subjective experience makes it unlikely that the results of experiments will ever be sufficient to rule out all wrong intuitions on this subject. For those reasons it is argued that whether a particular position on consciousness feels likely or not ought to be regarded as COMPLETELY IRRELEVANT when assessing whether or not that position is the most reasonable one. Instead, it is proposed that this assessment be based purely on fully justifiable estimates of the probability of that position (and of each alternative hypothesis) being true. Although our inability to justify inductive inference appears to prevent us from calculating the probability that a hypothesis is absolutely true, I believe I have successfully developed a method of approximating the probability that a hypothesis is true given that certain well-supported scientific theories are correct. My proposal (dubbed 'inference from the best methodology') requires that for each hypothesis on consciousness a general method of generating explanations for things be constructed that will not only yield the hypothesis in question when applied to the facts about consciousness, but will also (when applied to other facts) provide explanations for many phenomena for which well-supported scientific explanations are available. The probability that the hypothesis on consciousness is correct can then be approximated as the relative frequency at which that method, when applied to phenomena that have a reasonable number of features in common with consciousness, provides explanations that agree with the scientific explanations of those phenomena. Consequently, it is argued that the only way to construct a theory of consciousness that could be justifiably called "its most likely explanation" is by insisting that every aspect of that theory be determined by (or determinable from) a method of generating explanations that can be shown to provide 'scientifically correct' explanations for sufficiently relevant phenomena more often than can be achieved by any suitable alternative method. A proposal (dubbed 'the SCALP method' or 'SCALPEL') for that most successful method of generating explanations is developed and justified in this paper, and in a follow-up paper a theory of consciousness generated by that proposal is obtained. **P1**

47 **The Hard Problem of Concepts IS the Problem of Experience** Joel Parthemore <jep25@sussex.ac.uk> (School of Informatics, University of Sussex, Brighton, East Sussex United Kingdom)

In theories of concepts, many attempts have been made to treat concepts as first, abilities, and only second, representations; as first basic (first-order) and only second, higher-order; as first private, and only second, public (or vice versa). The reason why none of these strategies works is, at heart, the same, and the same as the one Chalmer addresses in his '95 paper: the problem of experience and its enduring habit of mixing the seemingly objective (e.g., when we both measure the length of a certain stick, we get the same result, and we assume that,

mistakes aside, others will get the same result, too); with the unavoidably subjective: the 'rich inner life' in which that measurement is inevitably embedded. Although we may (and should) conclude that there are first-order concepts, as soon as we try to say anything about them, then the second order intervenes. For much the same reason, it is not an option to start with concepts as some sort of non-representational entity – e.g., an ability to extract patterns, make associations, or form representations, etc., as being the underlying objective reality – and then derive concepts as iconic or symbolic representation, as many self-avowed anti-representationalists might attempt to; for that would require stepping outside our representational perspective on concepts – and that, I will argue, we cannot do, even for a moment, to get a perspective on concepts 'as they really are'. Of course, there is a sense in which the non-representational entity must logically be primary, unless representations are to be grounded strictly in representations (which would seem to invite vicious regress); but there is a competing sense, just as valid, in which the representations must be primary: because, whenever and wherever we look, they are there. Attempts to begin with or focus on concepts as public and therefore seemingly more objective entities likewise fall on stony or thorny ground, for where does private stop and public begin? My exercise of concepts in the public sphere is fundamentally shaped by my personal experiences of them, but my personal experiences are in turn shaped by my membership in society and my participation in a linguistic community. Furthermore, while the public may seem more objective, and is, indeed, less beholden to individual perspective, there is no obvious reason to think that it extends at all beyond the inter-subjective. In parallel to Chalmers' claim that "...a theory of consciousness should take experience as fundamental", I think that a theory of concepts must do so, too, with all that entails in terms of e.g. subjectivity, reflectivity, representation. Concepts relate to consciousness through the medium of experience. Experience gives rise to concepts, which in turn structure experience. Concepts and consciousness share an unavoidable subjectivity, for when we talk of concepts or of consciousness, it is human concepts and consciousness that form our starting model, and not just any human concepts or consciousness, but intimately and unavoidably our own. The key to understanding this relationship begins in Gordenfors' conceptual spaces theory. **P1**

48 **Avoiding the Ontologic Explanatory Gap** Robert Pusakulich <pusakulichr@bellsouth.net> (Psychology and Psychiatry, Mental and Behavioral Health Service, Memphis VAMC;Department of Psychiatry, Div, Memphis, TN)

This presentation will argue that an epistemic approach to the nature of phenomenal, self-aware consciousness will prove more fruitful than the traditional ontologic approaches of metaphysics. It also will argue that consciousness is a knowledge state, no more, but no less. It will argue further that an bridge to an epistemic theory of conscious mind lies in the metaphysics of physical identity theory, particularly the version known as 'neutral monism' and as conceptualized by Heil. Heil's interpretation of neutral monistic identity theory offers the opportunity to transpose an ontologic theory of mind into an epistemic theory. Such a transposition would obviate the 'explanatory gap' of theories of mind-body. The current arguments supporting theories of mind-body termed "property dualism", "functionalism", and "higher order theories" do not allow as effective a crossover. Heil's arguments for neutral monism allow such a transposition by their reliance on a distinction between the dispositional and the qualitative aspects of physical properties. He maintains that consciousness is a quality of brains, and, if we consider the brain to be a material object, then the quality of consciousness is a material quality. However, it is a material quality that uniquely enables its own 'direct acquaintance.' But that quality of direct acquaintance is a property that is considered neither material nor non-material, but both. Such a 'neutral' monism of mind-body is a beautifully symmetric ontology in its conception of a single material object having two essential natures, one material and one non-material. However, one can accept such a version of a mind- body singularity, but still remain puzzled by why mind, so conceptualized, is still experienced as separated from the body and its world. Also, why is subjectivity still so experientially opposed to objectivity, if in fact, they are one and the same material property? What is it about a 'direct acquaintance,' or self-aware material property that allows it to be subjectively experienced unlike any other natural thing? Heil doesn't address this, and it begs the question as to whether

or not the 'direct acquaintance' of subjective experience might be just that, an experience, and, thus, a knowledge. If consciousness were an experience and, therefore, knowledge, and not ontological, the explanatory gap would not be applicable, and the ontology of mind-body would become a straight forward and simpler material monism of body only. Accepting such would allow for a singular ontology common to all objects, and a conscious mind that is nothing more, but the dispositional result of natural brain activity. Thus considered, conscious mind could be reframed as unique self-referencing kind of knowledge, and an epistemic rather than ontologic entity. Consciousness so conceptualized would be a less mysterious, even if a still very complex feature of active brains. In the end it may not be a dualistic or even monistic ontology that is the key to understanding the place of mind in a physical universe, but rather the combination of an ontologic brain and an epistemic mind. **P1**

1.8 Higher-order thought

49 **Defending "Consciousness, Self and Attention"** Jason Ford <jford@d.umn.edu> (Philosophy, University of Minnesota, Duluth, Duluth, MN)

In his recent paper, "Representationalism, peripheral awareness, and the transparency of experience," Gennaro (2007) argues against the evidence offered by Ford and Smith ("Consciousness, Self and Attention," 2005), who used attention and psychopathologies to support a Self-Referential Approach to Consciousness. I would like to respond to Gennaro's arguments, and defend the Ford and Smith position. First, Gennaro seems to be lumping all of the Self-Referential approaches together, treating them as offering an explanation for consciousness that neatly parallels the Higher Order Thought approach. While true of some travelers under the Self-Referential umbrella, it is not true of others. I offer a more nuanced category scheme for Self-Referential approaches, and in so doing, defuse several of Gennaro's objections (which take some Self-Referential approaches to task for failing to match the explanatory structure of HOT theories). Second, Gennaro points out that Ford and Smith have not ruled out an alternative explanation for the psychopathologies that they use (loss of proprioception, depersonalization, and amnesia), namely, that the features of conscious experience thus illustrated may have been truly unconscious (prior to the pathology), instead of peripherally conscious, as Ford and Smith claimed. I will argue for a set of criteria that should help to negotiate the difficult distinction between the peripherally conscious and the truly unconscious. I will test the criteria against the above-mentioned psychopathologies, as well as cases of hemineglect (where half of the body, half of the world, or both are steadfastly ignored), anosognosia (where the subject denies that a limb is paralyzed), and somatoparaphrenia (where the subject denies that a body part belongs to them). **P1**

50 **Conceptualism and HOT Theory** Rocco Gennaro <rjgennaro@usi.edu> (Philosophy, Univ. of Southern Indiana, Evansville, IN)

Conceptualism is roughly the view that the content of perceptual experience is fully determined by concepts possessed by the subject. Although I think that conceptualism is independently defensible, I argue here that conceptualism has very close affinity with the higher-order thought (HOT) theory of consciousness, which says that what makes a mental state conscious is that a suitable HOT is directed at the mental state. To my knowledge, conceptualism has not been defended in the context of a specific theory of consciousness. After addressing some important definitional matters, I argue that HOT theory entails conceptualism and that each can shed important light on the other. I then apply these results to two problematic cases, i.e. our experience of ambiguous figures and the much discussed objection to conceptualism that our experiences are often more fine-grained than the concepts one possesses. I argue that HOT theory can help us to understand how a conceptualist might address these cases. **C2**

51 **The Epistemic Status of the Transitivity Principle in Higher-Order Theories of Consciousness** Alex Kiefer <akiefer@gmail.com> (Philosophy, CUNY Graduate Center, New York, NY)

Higher-order theories of consciousness are among the most widely discussed theories of

consciousness in recent philosophy of mind. Those who take a higher-order approach to philosophical theories of consciousness claim that to be in a conscious mental state is to have a higher-order awareness of oneself as being in that state. The initial motivation for such an approach is the alleged pretheoretical acceptability of what David Rosenthal calls the 'Transitivity Principle': the claim that conscious mental states are those states we are conscious of being in. It has been alleged, however (for instance, by Ned Block) that the intuitive acceptability of the Transitivity Principle merely marks a linguistic connection between the locutions 'conscious state' and 'state one is conscious of', and that there is no reason to suppose that such a linguistic connection, even if it were analytic, provides a good starting-place for an empirical theory of consciousness. In this paper, I discuss three possible sources of justification for acceptance of the Transitivity Principle: phenomenological, conceptual/linguistic, and experimental. I argue, following Uriah Kriegel, among others, that the main source of justification for the Transitivity Principle for most of us is phenomenological rather than experimental or conceptual: we accept the Transitivity Principle on the basis of first-person experience. The immediate acceptability of the Transitivity Principle upon the slightest reflection might lead one to suppose that the connection between conscious states and states that we are conscious of is merely conceptual, but I argue that in reflecting on the Transitivity Principle, we engage in an act of introspection, and that it is this act of introspection that motivates our acceptance of the principle. In reflecting on our conscious mental states, we come to realize that consciousness of those states always accompanies them. The status of the Transitivity Principle is, then, that of a metaphysical claim about the necessary coextensiveness of 'conscious state' and 'state one is conscious of', initially based on a generalization from one's own experience, but easily supplemented by third-person considerations, and, one hopes, eventually, by scientific investigation. It may seem that there is a difficulty with this proposal: if we have no way to fix the reference of 'conscious state' except with the description 'state one is conscious of', then the Transitivity Principle does after all turn out to express a linguistic triviality. I argue against this objection that the meaning of 'conscious state' is constituted by a rich network of connections to related notions such as the unconscious, reportability, subjective experience, and the like. Thus, our discovery that it is of the nature of conscious states that we are conscious of them is a genuine one. **C2**

52 **Prefrontal Lesion Studies Cast Doubt on Higher-Order Theories of Consciousness** Benjamin Kozuch <bigben@email.arizona.edu> (Philosophy, Cognitive Science, University of Arizona, Tucson, AZ)

In this talk, I will argue the following: A prediction of some higher-order (HO) theories of consciousness is that brain areas in and around the prefrontal cortex are necessary for visual consciousness; but lesions to these areas do not result in any loss of visual consciousness; therefore, we have strong evidence against these HO theories of consciousness. HO theories (as presented by Rosenthal, Kriegel, Carruthers, and others) hypothesize that a necessary condition upon some mental state being conscious is that it be represented (in some suitable way) by a HO state. Such theories are committed to there being some brain area(s) such that, because they produce these HO representations, their normal operation is necessary to visual consciousness. Let's call these 'integral' areas. An important prediction of a HO theory, then, is that lesioning of integral area(s) should cause a loss (to some degree) of visual consciousness. It is probably only areas in and around the prefrontal cortex (PFC) that produce the proper kinds of HO representations, as it is here that executive and monitoring functions are carried out. But, as Pollen has pointed out, numerous studies have shown even bilateral lesions to these areas to be not sufficient for causing a loss of visual consciousness. Among other things, such subjects still experience 'primary' visual qualities like color. This is true even in the case of lesions to the dorsolateral PFC, a brain area that some HO theorists (Kriegel, Lau) have thought to produce the requisite kinds of HO representations. It seems, then, that an important prediction of HO theories has not been met: When those brain areas that are likely to produce the appropriate kinds of HO representations are lesioned, there is no loss of visual consciousness. Here, the HO theorist can respond in various ways. I will consider what I take to be the strongest responses. There are some experimental data (due to Lau, Dahaene, Del

Cul, and others) that might be taken as favorable to the HO theorist. For example, activity in the dlPFC has been shown to correlate with subjects being able to consciously access stimuli in a masking paradigm. However, when we take into account the lesioning evidence discussed above, the best explanation for these data is not that the dlPFC is necessary for conscious experience, but rather that it influences which contents enter consciousness or can be reported upon. In another possible response, Gennaro has suggested some brain area outside the PFC might be an integral area. But, of each of the brain areas that might produce the requisite kinds of HO states (e.g., multimodal or unimodal visual areas), lesioning of them does not result in deficits of visual consciousness. **C17**

1.9 Epistemology and philosophy of science

53 **Avoiding The Perceptual Model of Introspection** William Adams
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The early introspectionist laboratories, Wundt's at Leipzig and Titchener's at Cornell, uncritically assumed introspection was simply inwardly directed perception. When the introspectionist agenda was rejected in psychology, this perceptual model was forgotten. Now that consciousness studies has led to renewed interest in first-person methods of investigation, questions about the nature of introspection are again germane, but the perceptual model has been resurrected and adopted without examination, and it is still wrong. Both perception and introspection entail epistemological dualism, which distinguishes the knower from the known, but that parallel is insufficient to justify the assumption that they are the same kind of process. They differ in two important ways. First, introspection requires conceptualization. There is no way to report experience without conceptualizing it in some way. If mental phenomena remain unconceptualized, it is like daydreaming and there is nothing to report. By contrast most perception is automatic, much of it not even amenable to conceptualization. Secondly, introspection creates its own objects. To isolate an idea, word, thought, or image from a continuous stream of consciousness requires an explicit shift in attitude, a self-alienation from un-self-aware lived experience to a reflective mode that produces a (more or less) bounded mental entity that can be stored or communicated. The perceptual model presupposes the presence of introspectable mental objects, like coins on a sidewalk waiting for someone to pick them up. But the objects of introspection are not lying around. They are creatively projected as part of the act of introspection itself. This is not obviously the case for perception, most of which occurs without any sense of performing some tricky mental act like conceptualization. By presupposing the erroneous perceptual model of introspection, the early introspectionists overlooked the critical role of conceptualization, which was what led to their interminable disagreements. Modern students of consciousness studies interested in developing a reliable first person methodology should avoid that error and concentrate on developing standardized procedures and language for the conceptualization component of introspection. **C8**

54 **Intersubjectivity: The Key to the New Science of Consciousness** J. Kenneth Arnette
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In the ongoing construction of a science of consciousness, the recent, very strong trend has been to approach the topic as science has approached all others: through third-person, so-called objective empirical study. Yet, consciousness is all about subjectivity and first-person experience, the very stuff of the conscious mind. In fact, at the base of what we call objectivity is subjectivity itself. Whether we look at an object and determine that its color is blue, or subject the object to a spectrometer scan that shows emission of light at wavelengths we have defined as blue, the great equalizer is that we must perceive personally a sensory experience. We deem something objectively true when we agree that we have all had the same subjective experience, which we can all describe with the same agreed-upon terms, whether this involves subjectively examining the object or subjectively examining the spectrographic results. This is intersubjectivity. Thus, given that consciousness is the topic, it is only proper that the data most useful in the science thereof are the data of subjective experience, even though this is contrary to the traditional objectivist, third-person nature of scientific inquiry (Guzeldere,

1995). One need not, however, give up entirely on objectivity: the data of subjective experience may reasonably be constrained by intersubjectivity (Hut & Shepard, 1996; Jack & Roepstorff, 2003; Piccinini, 2003; Thompson, 2001; Zahavi, 2001), which expresses "properties that are inherent in subjective conscious experience, but in addition are mutually agreed upon by different subjects" (Hut & Shepard, 1996, p. 317). With this constraint, subjectivity is harnessed in the quest for intersubjective truth. We therefore may and should consider subjective experience as primary data for the science of consciousness, and our effort to construct such a science must include intersubjective data. This approach will eventually become the new science of consciousness when coupled with investigation of a particular class of experience, anomalous experiences. This class of experience lies outside of our understanding at present, hence the labeling as anomalous, and thus provides the most crucial test of theories of consciousness: can a theory explain what has previously been a mystery? The usefulness of this approach will be demonstrated using data from two types of anomalous experience: the near-death experience and after-death communications. Both of these phenomena have been dismissed by skeptics as hallucinations, wishful thinking or lies, even though both have been experienced and reported independently by millions of people across human history and the planet. Examples of each phenomenon will be provided to show that common characteristics are present in these independent reports, thus providing an intersubjective data set that must be explained for our understanding of consciousness to progress. **P1**

55 **Is a Science of Consciousness Possible? Limitations, Doubts and Opportunities** William H Kautz <williamkautz@seznam.cz> (Former Director, Center for Applied Intuition, and President, Gaia Institute, Tucson, AZ)

Before embarking on the creation of a scientific theory of consciousness we would do well to check the root assumptions on which all scientific knowledge and scientific methodology are based. This is not merely a formal precaution, because these assumptions have already been fundamentally violated by some of this last century's strongest discoveries in particle physics, medicine and parapsychology, and to a lesser extent in some of the social sciences. We also know that some of these assumptions are only doubtfully satisfied for the study of consciousness in general, and one of them, objectivity, is not satisfied at all. If we cannot find a way to reformulate or circumvent these assumptions about our world, or to modify our methods so as to accommodate them as they stand, we are at risk of generating findings that are misleading, meaningless or downright wrong. This presentation discusses these unresolved issues and identifies some possible means for resolving them. The principal root assumptions up for reexamination are objectivity, measurability (positivity) and the aspects of causality and randomness inherent in reductionism. We present examples of prior studies in science in which all root assumptions were satisfied but the findings were meaningless, incorrect or directly challenged their own legitimacy. We then discuss how both the root assumptions and present-day scientific methodology might need to be changed in order to allow a depth study of consciousness. The nature of the failures just cited hints that such changes may not be possible at all, in which case entirely new assumptions and/or a new methodology may have to be created. We may be forced to turn to "other ways of knowing" than traditional science if we are ever to generate a foundation of solid, consensual knowledge about what consciousness is and how it works within the human mind. [300 words] **P1**

56 **We Will Know What We Are Looking For When We Find It** Morey Kitzman <kitzmanm@mscd.edu> (Psychology, Metropolitan State College of Denver, Littleton, COLORADO)

Thus far the field of consciousness research seems to lack any clear sense of what it is exactly that we researching. We have no consensus to either describe or define consciousness and a great many question the very idea of consciousness. Operational definitions have been completely absent. Perhaps the question we should be asking is not what is the nature of consciousness, but instead why are we in such a state of confusion about something that should be patently self evident. In other words, I am I, and should not the I of I am know itself. Should not that which is conscious have some understanding directly of its consciousness?

This ambivalence about our conscious nature would be similar to a fish being confused about water and needing an explanation regarding the nature of water. Imagine if the fish world had to commission other fish to study the nature of water because no one in the fish kingdom had a clue about water. Is this some kind of dissociative identity disorder? Just as the fish is immersed in water and sustained by the water so are we immersed in consciousness and sustained by consciousness. Every aspect of our being is consciousness, our ability to move, to think, to love, to will, to know, to create, to invent, solve problems, to appreciate and feel the beauty in patterns of music, art, architecture, dance, decorative arts and culinary arts. Your ability to recognize patterns, to form abstract concepts in mathematics, engineering, law, philosophy, politics, legal systems, government, this is all part of the conscious experience. We have several thousand years of people experiencing transcendent states of consciousness in every religion of this world, are they all deluded or is this part of consciousness too? So if you are in such an ambivalent state about who and what you are you might want to take at look at whether you are really enjoying the conscious experience. Do you love being you, are you in love with living, do you enjoy being? Look at your emotional state, what are the prevailing emotions, are they fear, anger, sadness, confusion and boredom? Is this the reason you say I have no mind, no will, is it out of a psychic void, a loss of sense of self, loss of the self-love? So what you see as the nature of consciousness just might be a reflection of what you see in your self and when you can come out of that cocoon of despair and self induced narcotization, you might just notice that this thing called consciousness is quite wonderful. In fact, we should not have to study it at all, what we should do is celebrate it every moment we draw breath through this body. Enjoy the multitude of new ideas that play like a kaleidoscope in our minds. Enjoy your ability to dream, to create, to hope and most of all to find meaning and unity with every aspect of the universe around you. **P7**

57 **Introspection, What?** Eric Schwitzgebel <eschwitz@ucr.edu> (Department of Philosophy, UC Berkeley-Riverside, Riverside, CA)

Self-knowledge – knowledge of one's own mind, in particular – arises in six completely different ways, none of which neatly deserve the label "introspection" I'll argue that the six methods work together, in different proportions and combinations in different cases, and that there is no distinctive faculty of introspection. Nonetheless, there's a commonality among the class of cognitive activities properly regarded as introspective: All involve a particular type of attention to conscious experience. **C8**

58 **Introspective Methodologies in the Science of Consciousness** Maja Spener <maja.spener@philosophy.ox.ac.uk> (Philosophy, Oxford, United Kingdom)

It is commonly said that the science of consciousness depends on introspective access to phenomenology. Scepticism about such access has led some to doubt the possibility of genuine progress in that science. Others have maintained that the limitations of introspection can be overcome in a properly conducted science of consciousness. I show that there is truth to both perspectives, depending on which questions about consciousness one investigates. Along the way, I provide a taxonomy of introspection-based methodologies used in both psychological and philosophical investigations of consciousness. **C8**

59 **Could Radical Empiricism Guide Neurophenomenology as the Future of Neuroscience?** Eugene Taylor <etaylor@igc.org> (Humanistic/Transpersonal Psych, Saybrook University, Cambridge, MA)

Neuroscientists such as Francis Crick and Francesco Varela have touted William James as a player in the solution to the so-called Hard Problem in the neurosciences - that elusive relation between the brain and the mind. William James's phenomenology of immediate experience, what he called radical empiricism, in fact has much in common with contemporary developments in neurophenomenology. Not the least of these involve an overthrow of the subject/object dichotomy in favor of intersubjectivity, the motives of the scientist influencing what he or she studies, the phenomenology of the science-making process itself, and the humanistic implications of the neuroscience revolution that forecast an end to reductionistic

positivism. But what is radical empiricism? Following Peirce's semiotics of Firstness, Secondness, and Thirdness, James developed a tripartite metaphysics of pragmatism, pluralism, and radical empiricism. Radical empiricism was pure experience in the immediate moment before the differentiation of subject and object. Noetic pluralism meant that each person is capable of experiencing those moments of pure experience, such as in transcendent states, in which the Universe became One, except that this one-ness might not be the same from person to person. Finally, pragmatism was a method of evaluating truth claims about peoples' beliefs in the ultimate nature of reality, particularly when they appear contradictory. James scholars such as John McDermott and Charlene Seigfried have shown that radical empiricism was actually the core of James's tripartite metaphysics, though it remained an unfinished arch at the time of James's death. Radical empiricism is radical because it abandons the classical definition of empiricism as sense data alone and makes empiricism stand for the full spectrum of human experience. Thus we ask, "Might not a more Jamesean focus on immediate experience from the standpoint of contemporary neurophenomenology define the future of neuroscience?" **PL1**

60 **Toward a Scientific Approach to First Person Reports** Burton Voorhees <burt@athabascau.ca> (Center for Science, Athabasca University, Victoria, BC Canada)

There has been much debate about how first person reports can be treated scientifically. This paper suggests that only half of the issue has been discussed. That is, while much has been said about how we, from an external perspective, can evaluate first person reports of subjective experience, the question of the nature of the first person making the report has not been addressed. There are two sides to this issue: (1) different ego structures will automatically report differently even though the experiences reported may be similar, and (2) there are natural forms of error that all individuals are prone to fall into. The sorts of error in (2) come under the heading of cognitive illusions - illusions arising from the way that the mind processes information. In this paper we discuss ways that can be used to deal with these two issues of the nature of the individual making the report. **P7**

61 **A Relational Account of Perception** Laura Weed <weedl@strose.edu> (Philosophy, The College of St. Rose, Albany, NY)

Many of the papers in Perceptual Experience, eds, Gendler and Hawthorne, (Clarendon University Press 2006) are leaning in the direction of a relational account of perception, but unwilling to quite go there. I will cite the near approaches in Gendler et. al, as well as older process thinkers who had something like this in mind, such as William James, John Dewey and JJ Gibson, on the way to arguing for a panpsychic, relational account of perception. I. Perception Requires Enactive Engagement with the World, on the part of the perceiver In Supersizing the Mind, Andy Clark criticizes the 'Brainbound' (Clark,p. 81) view of perception and cognition. Clark is following work by Varela, Rosch, et al. (1991) that argues for a dynamic, embodied account of perception as a relationship among a dynamic person, his or her body, brain, sensory organs, and capacities to move or do things, and dynamic aspects of his or her environment, physical and social. Susan Hurley adds to the enaction model a view of perception characterized by "shared information spaces" (Gendler and Hawthorne, p. 205ff.)). This paper will endorse the enactive view of perception that some of these authors have been working to develop, and expand it through greater consideration of kinesthetic and social self-awareness and environmental immersion. II. Perception Requires Dynamic Relationships between a Perceiver and 'Affordances' for both perception and cognition of an environment This paper will explore several ways of understanding affordances, via J.J.Gibson's work, systems theory and my own account. The robust notion of affordances developed here will serve simultaneously to explain: a)individually perceived opportunities for enaction at a kinesthetic level of perception, b) socially and collectively perceived opportunities for both action and understanding for groups of individuals, or humanity as a whole, and c) physical opportunities of activity among shared information spaces and the many layers of physical systems in the world. Some of these affordance relationships will be personal private or mental, in traditional meanings of those words. But others will not be, and the line between the

more and less mental will fade by degrees, rather than posing a sharp dualistic dichotomy between the mental and non-mental world. III. A Panpsychic Complex Systems theory of Perception The neurosciences are lending new support to a Jamesian and Deweyan account of perception (Baars, 1997), as are the physical sciences (Stapp 1993). The conclusion of the paper is that perceptual relations can be usefully understood as a subset of self-generating relations between affordances and perceivers, operating in a complex dynamical and relational system. The types of relations that can be formed can be somewhat limited by conscious access to some aspects of the processes, but this is a matter of degree, again, rather than of digital access or not. The account will leave open the potential for this type of relation to develop among systems and perceivers that may be quite unlike persons, potentially including a pan-psychic world **P7**

1.10 Personal identity and the self

62 **The Role of Affects in the Constitution of Pre-Reflective Self-Consciousness: How Current Approaches to the Study of Self-Awareness Could Be Integrated**
Anna Bortolan <anna.bortolan@virgilio.it> (Philosophy, Università Vita-Salute San Raffaele, Milano, Italy)

On the basis of the study of the exteroceptive, proprioceptive and interoceptive roots of self-consciousness it is possible to argue that there exists a primitive form of self-awareness which is both pre-linguistic and pre-conceptual. Although the 'first-person non-conceptual contents' which make up 'pre-reflective self consciousness' (Gallagher, Zahavi 2008) are conveyed by vision, auditory experience and somatic proprioception (Bermudez 1998), it seems necessary to integrate this account through the analysis of the contents of affective experience. Making use of both the phenomenological theory of affects (Scheler 1916) and the investigations on the nature of emotions carried out in Cognitive Science (Panksepp 1998), I suggest not only that there are essentially different kinds of affective phenomena, but also that these phenomena contribute to distinct forms of self- and other- awareness. As regards consciousness of the self as the bearer of physical properties, "background feelings" (Damasio 1999) or "vital affects" (Stern 1985) are a primary source of non-conceptual first person contents. By conveying information on the global conditions of our organism, these states contribute to the consciousness of ourselves as material subjects capable of acting on and being influenced by the internal and external environment. On this account, it is also possible to argue that consciousness of the self and consciousness of the world are constitutively connected. Although they seem to share many features with background feelings, moods are qualitatively different mental states (De Monticelli 2003). They are expression of our global psychological rather than physical conditions and thus they convey information about ourselves as bearers of psychological properties. The capacity to experience moods is fundamental in the development of early social interactions and thus also consciousness of the psychological self should be considered neither as a form of object consciousness nor as as the product of introspection, but as a specific kind of pre-reflective self -awareness. Emotional states, eventually, do not constitute an homogeneous category: it seems possible to distinguish between "primary" and "secondary" or "social" emotions (Denton 2005; Damasio 1999). However, all emotional states convey information about the physical or psychological significance of particular internal or external stimuli. Therefore, rather than being experiences of the global conditions of the self, emotions are sources of information regarding specific aspects of the self as a physical or psychological subject and, since they are present from early infancy, the level of self-consciousness to which they are relevant is the preconceptual and prelinguistic one. **P7**

63 **The Multiple Self: Dissociation in Normal Self-Identity**
Rita Carter <theritacarter@gmail.com> (ChippingNorton, Oxfordshire United Kingdom)

Personal identity - that is, an individual's sense of what constitutes their self - is generally intuited as unitary, consistent, and continuous. The subjective impression of integration is obviously illusory in the case of people with Dissociative Identity Disorder, where two or more distinct identity or personality states are evident, each with its own pattern of perceiving, re-

lating to, and thinking about the environment and self. (DSM-IV section 300.14 (dissociative disorders) Dissociative Identity Disorder (sometimes called Multiple Personality Disorder) is a form of dissociation, similar to that originally described by Pierre Janet in L'automatisme psychologique (Alcan, F. L'etat mental des hysteriques. (The mental state of hystericals). Paris, 1889). Dissociation is a brain mechanism which divides an individual's experience into conscious and non-conscious streams by focusing their attention on one part only of the currently available field of experience. Dissociation of identity is generally regarded as an adaptive response to trauma (especially in childhood). Recent brain imaging studies of people with DID show that overtly manifest personality switches (in these subjects) correlate with changes in brain activity which suggest that each personality has access to a different set of autobiographical memories (Reinders, S. et al. One brain, two selves. NeuroImage, Vol. 20, 2119, 2003; Tsai, G. et al. Functional magnetic resonance imaging of personality switches in a woman with dissociative identity disorder. Harvard Review of Psychiatry, July/August 1999.) Studies of state-dependent memory in normal people suggests that compartmentalization of autobiographical memory is not wholly confined to those with DID. (Ref: Ronald C Petersen, "Retrieval Failures in State-dependent Learning", Psychopharmacology No 55 pp 141-146, 1977) and observational studies show that distinct shifts in personality can be discerned in normal people across different situations. (Ref: Walter Mischel,Continuity and Change in Personality, American Psychologist 1969 24(11):1012-1018) In this presentation I argue that the personality changes seen in normal people are similar (though not as extreme) as those observed in people with DID, and that they are accompanied by a shift of consciousness such that the experience associated with one state is qualitatively different from that of another. Hence the normal "stream" of consciousness is disjunctive, even though a person's sense of it is one of continuity. I also suggest that the partial form of identity dissociation observed in non-DID individuals is becoming more common and more marked in response to an increasingly fast-changing and cultural diverse world. Such multiplicity is potentially beneficial, because it allows a person to function more effectively in challenging situations and provides them with protection from stress-related illness. This is especially so if a person has insight into their own multiplicity. People who report having many different "selves", for example, have been found to suffer fewer mood disorders, headaches, backache and menstrual problems than those who feel themselves to be unitary (Ref: Linville P.W. Self complexity as a cognitive buffer against stress-related illness and depression. Journal of Personality and Social Psychology, Vol. 52, pp. 663-76, 1987.) **C15**

64 **The Presence of Experience and the Experience of Presence** Wolfgang Fasching <w.fasching@univie.ac.at> (Department of Philosophy, University of Vienna, Vienna, Austria)

Conscious experiences, it is said, have a "first-person ontology" (Searle), i.e. they exist by being subjectively experienced. Yet what or who is this "first person" or subject who "has" the experiences? What am "I" as the experiencer of my experiences? Today, philosophers are quite reluctant to posit a "self"-entity that would be the bearer or owner of its experiences. Rather, the "co-subjectivity" of experiences is usually understood as being constituted by the experiences' being somehow bound together: i.e. by relations between the experiences instead of a common relation they all share to one and the same experiencing subject or self. Yet how much sense does this make if each experience only exists as being subjectively experienced (i.e. as being experienced by a respective subject) in the first place? My present experience is experienced by me completely irrespective of the relations it might have to other experiences. It is necessary to first understand what this experiencing "I" of my present experience is before one can ask what it might mean that several succeeding experiences are experienced by the same "I". Hence, the fundamental question with regard to the nature of the self is what makes my present experience mine (experienced by me). What I find when I reflect on my present being qua subjectivity is the taking-place of presence of manifold experiential contents (= experiences). This presence is as what I exist right now: What makes my present experiences mine is nothing other than that they are present (experienced) in this presence as which I am taking place. So I, qua subject, am not an agglomeration of my experiences but

their existence-dimension (that wherein they have their being-experienced and therefore, by virtue of their first-person ontology, their existence). I am none of the contents I experience (and also no constellation of such contents) but the event of presence of these contents. This is quite in accord with the understanding of the self we find in the Indian traditions of Advaita Vedanta and Samkhya/Yoga (among others). In their view, the self is no substance that would have consciousness as its property, but nothing but consciousness itself; yet they strictly distinguish consciousness from the mind in the sense of the mental contents and goings-on. It is precisely the consciousness of any conscious contents and goings-on. It is not itself an introspectable content but what makes contents present in the first place. In these traditions, this is not just an academic deliberation but forms the background of spiritual practices of self-realization which aim at an experience of this presence as such. Since this presence is none of the contents one experiences, these practices essentially consist in a process of de-identification from any contents one normally identifies with in order to come to realize oneself as the event of presence of any contents. The suggestion of this paper is that (in the light of the above reflections) this idea indeed makes sense. **C15**

65 **The Early Stages of Life and the Problem of the Self** Jorge Gonçalves <jorgalvesenator@gmail.com> (Philosophy of Language Instit., New Universityof Lisbon, Lisbon, Estremadura Portugal)

In this paper I intend to present an argument against the idea that one can dismiss the problem of the nature of the self as a separate entity. This argument is based on data from developmental psychology. To discuss the metaphysics of self, we must start by its phenomenology, following the method proposed by Galen Strawson . For phenomenology of the self I understand here 'how our self appears to us'. Thus we use introspection to investigate this reality we call the self. I think that the properties that identify any feeling of self is that the self is a separate entity, has unity and identity. Now, the problem is how to explain the existence of the self as a separate entity. Authors such as Metzinger (Being No One) have explicitly rejected the existence of a self: "the conscious self is an illusion which is no one's illusion" and "no such things as selves exist in the world: Nobody ever was or had a self." We have the illusion of being a self or of having a self because we have no knowledge of the sub-personal representational mechanisms and neural mechanisms that creates the process. It is a hallucination created by a system that does not recognize it as such. Recently Zahavi (Subjectivity and Selfhood), drawing on the continental phenomenological tradition, has tried to take this thingliness character of the self, arguing that we do not have to think of the self in analogy with material things. "the self is not something that stands opposed to the stream of consciousness, but is, rather, immersed in conscious life; it is an integral part of its structure. More precisely, the (minimal or core) self is claimed to possess experiential reality, it is taken to be closely linked to the first-person perspective, and is in fact identified with the first-personal givenness of the experiential phenomena". However I will argue, supported in psychologists as Wallon, Kohut, Melanie Klein or Lacan, that the sense of the self is not present in early stages of life and so it is a product of a mental elaboration. Although we don't have enough empirical evidence, we can infer that in the early stages of life we have experiences without the feeling of identity, unity or separability. For us adults is hard to think what it is because it is difficult for us to imagine what it feels like a body that is not unified and is undifferentiated with the environment. But as Dennett would say we cannot conceive the lack of imagination of the philosopher with impossibility. However, I'll not support that the self is an illusion. The self is a mental thing. To say that this mental thing is an illusion is to say in advance that the mind is an illusion. **P1**

66 **Self and Transparency** Shun-Pin Hsu , Allen Y. Houng <sphsu@ym.edu.tw> (Instit.of Philosophy of Mind, National Yang-Ming University, Taipei, Taiwan)

The most mystical phenomenon of consciousness is subjectivity, and Thomas Metzinger gives a self-model theory of subjectivity from the phenomenal transparency that conscious self emerges when self-model in the brain is transparent. In this paper, I argue that Metzinger's analysis of transparency is based on the confusion of the relationship between brain-level

and phenomenal-level, the relation between the processes of brain-level and the contents of conscious experience in phenomenal level is a constitutive relation which can't have a causal relation from a framework of level theory of consciousness. Metzinger's self-model theory of subjectivity claims that conscious self arises when your phenomenal self-model in your brain is transparent. In traditional view, phenomenal transparency is based on the distinction between vehicles and contents, and contents of conscious experiences can't access the properties of vehicles of conscious experience. Differ from the traditional view, Metzinger's concept of phenomenal transparency is the attentional unavailability of earlier processing stages in the brain for introspection. Metzinger claims that conscious self-model becomes transparent if the system doesn't recognize its currently generating self-model as a model simulating the reality. By this analysis, there are some examples of phenomenal opacity, hallucination and lucid dream, because in these situations conscious model of reality is suddenly experienced as a model. Furthermore, in Metzinger's analysis, because attentional unavailability of earlier processing stages in the brain is in degree, there are different degrees in phenomenal transparency. In Metzinger's analysis of phenomenal transparency, contents of conscious experience can access processes in brain in the sense of whether systems recognize they are representing, so the access is a kind of causal relation between brain-level and phenomenal level. However, from a framework of level theory of consciousness, brain processes are constitutive components of contents of conscious experience, so the relationship between brain processes and contents of conscious experience is a constitutive relation between different levels. The entities in a constitutive relation between different levels cannot have causal relations, for example, cells of stomach cannot have a causal interaction with stomach. Based on a framework of level theory of consciousness, I provide a analysis of phenomenal transparency for the distinction between vehicles and contents of conscious experience. In conclusion, I think this intuition from a framework of level theory of consciousness supports the distinction between vehicle and content, and it is the reason why the subjectivity is so hard to explain. **P7**

67 **Still Being Some One** Kuo Ling-Fang <s19409018@ym.edu.tw> (Dept. of Life Sciences, National Yang-Ming University, Taipei, Taiwan)

Some representationalists say that there is no self. What we are just the collection of representation. German philosopher Thomas Metzinger use some experiments to illustrate that we can manipulate representations to change the features of self which he calls 'Mineness', 'Selfhood' and 'Perspectivalness'. These experiments like the 'rubber-hand illusion' and the 'whole-body analog' of the 'rubber-hand illusion.' From these manipulations, Metzinger wants to show that these are just representations rather than any kind of thing which we call the self. It is really difficult to reject what they have done. The experiments indeed show the manipulability of self, but there still exist many kinds of possibility because manipulability of self does not imply there is actually no such thing as self. If we look these experiment more deeper, we will discover that there is a limitation of manipulation. No matter how radical the experiment is, they just still have some aspect of self's feature, because the manipulation is base on a minimal constitution of self, so we can never see the experiment without a self. So after all the experiments about manipulability of self, the data does not convince us of the thing that there is no self but let us believe more truly that there is something we can manipulate in faith. **P1**

68 **Color Content, Semantics, and Error Theories** Christopher Richards <cjrichards@uh.edu> (Philosophy, Houston, TX)

What if error theories of color were true? That is, what if there are no colors and we are systematically wrong about that fact? We judge there to be colors, but there are none. There are many powerful considerations in favor of this view, and it fits well with the known facts about color vision. But the error theorist about color has a major problem: there seem to be sentences that involve colors that are true. If there are true sentences involving color, then the error theorist must account for the appearance. This has consequences for any theory of the contents of consciousness; that theory must be capable of accounting for this error and our phenomenology. Some error theorists (notably, Boghossian and Velleman) hold that the folk

are wrong simpliciter. But it would be better if the error theorist could modify their account to show how certain color sentences can be true while still holding that the folk are wrong about color. I'll argue that Boghossian and Velleman's projective error theory offers up no acceptable way to understand what is going on in color talk, and propose my own theory. My main objection is that they base their semantics on pragmatic value, eliminating reference to truth in color sentences, but that there are sentences involving colors that are true. I'll then offer my own proposal. I'll show that object representations are necessarily colored, but that colors don't track objects the same way object representations do. From this, it follows that colors aren't represented as intrinsic properties (though phenomenology presents them as intrinsic). I'll argue that this gives us motivation to adopt an adverbial theory of color representation: objects are represented color-ly. This is deeply connected to Fregean strategies for perceptual content, such as that advocated by David Chalmers and Brad Thompson. I'll develop an adverbial theory within the framework of the Fregean theory of perceptual content, and then I'll answer objections, one involving inverted spectra and the other involving the veridicality of color representations. **P7**

69 **Consciousness, Access and Phenomenal Overflow: A Reply to Block** T. Bradley Richards <trichard@uoguelph.ca> (Philosophy, University of Guelph, Toronto, Ontario Canada)

Ned Block claims that phenomenology "overflows" cognitive accessibility, that the capacity of phenomenal experience is greater than the capacity of the "global workspace", and thus, that there are conscious experiences that are inaccessible. He thinks overflow is the best explanation of certain experimental results (especially from Sperling (1960) and Landman et.al., (2003).I have followed various critics, and Block himself, in insisting that phenomenal overflow is only a good explanation of the experimental results if the subjects in these experiments have specific (as opposed to generic) phenomenal contents of the relevant kind for all or most of the items presented prior to the cue. Block must distinguish between two kinds of access in order for his view to be intelligible, but he cannot use subjects' reports as evidence of specific phenomenology in the phenomenal overflow experiments: this would require subjects to both have and not have *cognitive access* to a content C at t. This leaves Block with only neural evidence, and at least current neural evidence does not support the claim that subjects have specific phenomenology of the relevant kind. Given that there is no evidence that the subjects have specific phenomenology, phenomenal overflow is not even a good explanation of the experimental results. While these considerations do not show that there are no inaccessible phenomenal states, they do show that we have no reason to posit them. Further, if there were inaccessible phenomenal states, it would be impossible to specify phenomenal contents of any kind. Thus, if phenomenal contents or the theories that employ them are of any value, we have a reason not to posit inaccessible phenomenal contents. Finally, I speculate that Block's original claim that phenomenology overflows accessibility would be vindicated if there was contentless phenomenal experience. This would account for our intuition that infants and certain kinds of animals can be conscious despite lacking the capacity for certain kinds of higher order thought, and broadcasting to the global workspace (and a global workspace). It would also account for correlates of phenomenal consciousness that are not broadcast, if there are any, without requiring inaccessible phenomenal contents. **P7**

70 **Theory of Consciousness and the Self. What was in the Mind of Marx, Freud and Einstein When They Conceived Their Respective Theories?** Juan Tomas Rodriguez-Colon <fidel_rodriguez_a@yahoo.com> (San Juan, PR)

The German philosopher, Wilhelm Gottfried Leibniz, stated that in a logical and truthful proposition the content or nature of the predicate (consciousness) must be derived from the nature of the subject. The proposed theory defines what constitutes the individuality of any person, explaining thus the nature of the predicate or behavior in terms of the subject as it was conceived by Leibniz. According to us, the essence of that individuality is based on a new conception regarding the proper group of names, their etymologies, and archetypes implicit in the constitution and development of the conscious personality. The theory establishes the idea

that consciousness is not separated from the myths or traditions (mostly characterized in the sacred books of our culture). These nevertheless rarely present themselves in consciousness as they are in themselves. It also denies the validity of the existence of a collective unconscious operating separately or outside the ordinary consciousness of the individual. Individual consciousness and its collective counterpart are both conceived otherwise as a unity in the mind of the individual person. The difference between what appears in consciousness, and the figure or image of a myth lies in the fact that consciousness transforms the myths implicit in the identity of persons into secular forms with actual meanings, generally understood by society. Findings suggest that the basic motive underlying behavior can be defined as an expression of the assertion that I am what I am, or more plainly, as an I am or I exist proposition. The first part of the expression is what is generally considered to be the ego or the self. In other words the behavior of any person, including its consciousness, is explained by the desire to demonstrate or prove that its identity exists as it is identified or called. This means that the behavior of any person is governed by a nominal essence which coexists as a unit with its existence, a postulate that tends to contradict the philosophy of existentialism which declares that existence is free and precedes essence. The theory postulates that the I in the proposition I exist (I am) has a particular or unique significance to each individual. It can be said that it determines the nature of its own existence. In other words, existence, by itself, is not absolutely free to determine the content or essence of the I or self. It is, on the contrary, the essence or content of consciousness, (in terms of the organized denominations or group of names) that determines the nature of the existence (mind or personality) of the individual. Those designations include the person's given name and surname and those concerning both parents. It must be reiterated that the identities and the myths of the individual are transformed by the necessity of being what one is in terms of one's personal identity, as defined by the special group or configurations of names proper to the individual and corresponding archetypes based mostly on the sacred books of the culture. **P7**

71 **A Set-Theoretic Model of Consciousness: The Structure of Self-consciousness as a Natural Solution for the Logical Antinomies** Robert Ware <antinomy@sbcglobal.net> (Philosophy, Southern Illinois Universit Edwardsville, Edwardsville, IL)

Why is consciousness always self-consciousness? This paper proposes a set-theoretic model of consciousness. Reciprocally, it proposes that the self-contained structure of self-consciousness suggests a previously unachieved "natural" solution to the logical antinomies, involving classes that contain themselves as members. Fundamental problems that appeared at the turn of the twentieth century in the foundations of logic and mathematics, concerning classes that contain themselves as members, find a natural solution in the self-contained structure of consciousness. They provide consciousness with a powerful set-theoretic model, which further suggests a solution for problems of quantum measurement. **P1**

72 **Heautoscopy, Out-of-Body Experience and the Subjective Perspectivity of Conscious Experience** Rex Welshon <rwelshon@uccs.edu> (Philosophy, University of Colorado at Colorado Springs, Colorado Springs, CO)

An argument for the conclusion that heautoscopic phenomena and out-of-body experiences are relevant for understanding not only the self's embodiment but also the subjective perspectivity of conscious experience enjoyed by such an embodied self is developed. Since heautoscopy and out-of-body experience provide neurological evidence that there can be shifts of subjective perspective from the corporeal body to the spectral body, these two neurological phenomena help identify neural correlates for subjective perspectivity. Hence, there is some support for the embodiment of subjective perspectivity. How much support is thereby provided is another question, for even if neural correlates are core realizers of subjective perspectivity, they may not be total realizers of subjective perspectivity. Implications of the distinction between core and total realizers are detailed. In the concluding section, embodied subjective perspectivity is put to work in resolving a dispute between higher-order and self-representationalist theories of consciousness. **P1**

73 **Consciousness and Its Selves: Subjectivity and the Autobiographical Ego**
Kenneth Williford , David Rudrauf; Carissa Philippi <williford@uta.edu> (Philosophy, The University of Texas at Arlington, Arlington, TEXAS)

By 'Self-Representationalism' we mean the thesis that every stream or episode of consciousness incorporates the awareness of that very stream or episode. This venerable model of consciousness has natural explanatory implications that remain largely under appreciated. In short, the model allows us to place the sense of subjectivity and the sense of personal identity smoothly into the general naturalistic framework of contemporary neuroscience, and it allows us to straighten out confusions about those senses that have led some neuroscientists to dismiss what is, we believe, at the very core of consciousness. First, the model allows us to escape implausible versions of the "no-subject" model of consciousness. There is always a subject: the stream itself is the subject. Second, it allows us to escape homuncularist renderings of that subject. There is no homunculus: the stream itself is enough. Third, the model allows us to understand the emergence of the diachronic unity of the stream and the derivation of the sense of personal identity. It is the same recurring structure of self-representation that is retended and protended (in the Husserlian sense) at each moment in the stream. This yields the sense of a single unified subject enduring over time; this sense of an enduring entity is, however, a sort of illusion derived from the recurrence of a structure. This in turn leads to the construction of a stable yet highly flexible model of oneself as an agent with a body, a history, a context, and a future. Onto that rudimentary diachronic self are superimposed accumulated memories, projects, and the knowledge of abiding dispositions. However, all these memories, projections, etc. are less fundamental than the core, self-manifesting structure and are evidently more susceptible to degradation and modification. We know this not only because our sense of ourselves as characters in an autobiography changes gradually over time in accordance with normal development but also because of radical changes brought on by various pathologies, conversions, psychedelic experiences, affective revolutions, etc. At the level of autobiographical cognition, our sense of personal identity indeed appears connected to a quasi-narratival object, but the narrative theorists of self often confuse this autobiographical self with the subjectivity of core consciousness, which is a basic mistake. This confusion is also behind an important rift in contemporary neuroscientific approaches to consciousness. Some (like Koch and Tononi) regard all forms of self-consciousness as derivative. Others (like Damasio and Tranel) regard a minimal form of self-consciousness as essential. Our model clarifies the different senses of 'self' at play here in a way that might go some way toward ending this rift. Finally, our model can be naturally related to current neuroscientific work on self-consciousness and, possibly, the Default Mode Network (DMN). DMN activity has been associated with the processing of self-related information including autobiographical memory retrieval. Some researchers suggest that beyond subserving self-relevant processing, the DMN may be responsible for self-consciousness and our sense of self. We speculate that it might undergird the recurrent structure of primitive self-representation at the core of consciousness. **C15**

74 **Self-Representation and Kant's Transcendental Self-consciousness** Jerry Yang
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The paper investigates whether Self-representationalism can be rooted in Kant's theory of consciousness. According to Self-representationalism, one's mental state does not only represent the world and the mental state, the content of which is about the world , it can also represent one to oneself as the subject of that mental state. Brook recently (2006 & forthcoming) suggests that Kant's theory of consciousness, anchored in the conception of transcendental apperception (TA), can provide an account of self -representing representations in favor of Self-representationalism. The paper starts with a formulation of Brook's account of Kant's theory of consciousness-Kant's notion of the representational base of consciousness. Afterwards, I shall present Strawson's view expressed in Bounds of Sense, which implicitly maintains that for Kant's theory of consciousness to sustain, an empirical reference for each subject of experience is required. Following Strawson's steps, I point out that Kant's account,

as it stands, cannot undertake the task as Brook hopes. For the consciousness performed by TA lacks the empirical reference of personal pronouns "I" for each subject of experience thanks to the fact that TA can only represent the manifold of representations in Kant's original design. In other words, TA cannot self-represent, i.e. representing one to oneself. I suggest that "the self " in Kant's theory of consciousness should be treated as something single and complete with two kinds of properties, a subject that has both empirical properties and transcendental ones, a position that is also held by Brook, not merely " a logical function" as many Kantian scholars and consciousness thinkers thought. The paper then maintains that there is a distinction between the thematic activity and unthematic activity for the operations of TA. The thematic activity of one's faculty of transcendental apperception is to represent the manifold representations; the unthematic activity of TA, on the other hand, is to self-represent, i.e. to represent one to oneself. For this distinction to work, however, it has to presuppose Kant's idea of " the self " mentioned above. The paper shall explore the relation between the distinction in question and Kant's idea of "the self." The thematic activity and the unthematic activity have different but complementary abilities of transcendental apperception. Together, they run out a complete phenomenon of the operations of TA. By adding the unthematic activity to the transactions of TA, we do not only picture a scenario where self-representationalism can be rooted in Kant's theory of consciousness, but also enhance our understanding of the nature of consciousness, meaning, the scope of our knowledge of human consciousness will go beyond the limits of empirical self-consciousness while entering the territory of transcendental self-consciousness. **P7**

1.11 Free will and agency

75 **How the 162 Basic Patterns of the Human Personality Matrix Reflect Free Will and Are the Catalysts for Health Issues** Michael Brill <michael@awakener.com> (Human Personality Development, Institute for Self Awareness, Pecos, New Mexico, Santa Fe, NM)

Using a hybrid mathematical system composed of quantum numbers, I intend to illustrate how numeric strings, derived from core behavior patterns, determine whether our interactions with others will be based on unconscious reactive behaviors or conscious proactive choices. The entire process is described in my book "Numerology for Healing," (Inner Traditions, Destiny Books 2009.) There are nine basic patterns that identify the human personality matrix and their accompanying behavior patterns; each of these behavior patterns has nine aspects. Each of these nine aspects has eighteen basic personality/behavior patterns, nine unconscious reactive patterns and nine proactive patterns (determined by conscious choice.) Within these same nine aspects are eight repetitive behavior patterns and four mirroring patterns that reflect four complimentary patterns. If one chooses to work on the two most frequently recurring negative behavior patterns and resolve them, all other patterns synchronize with the new positive patterns. These overlapping patterns explain how and why we behave the way we do with family, friends, coworkers, partners, and the world at large. Each of the nine core numbers has nine numeric strings. A numeric string begins and ends with the same number. Numeric strings range in length from three to thirteen digits. The nine strings associated with each core number can also be expanded horizontally and vertically from the original numeric chain giving a much deeper insight into an individual's current emotional, mental, or physical state. Each of the numbers for the nine core behavior patterns are determined by adding the numeric value of the month and day of birth (for an individual or business) and reducing the sum to a single digit. The single digit numbers one through nine represent very specific behavior patterns and personality characteristics. Each core pattern has both a positive (solution) and negative (challenge) component. If a person can learn to live according to their positive patterns they can live a more proactive life. If they choose to be immersed in negative patterns, based on their need to either be loved or to maintain control, they will live a reactive and codependent life. Accepting the tenet of Free Will, this matrix provides individuals or businesses a means for changing negative patterns into positive patterns by providing formulae and methods for making proactive choices. **P7**

76 **Can Freely Voluntary Acts Appear Without Micro-Determinism?** Weisiang Huang <akiws2004@yahoo.com.tw> (Instit. of Philosophy of Mind, Taipei, Taiwan)

In Libet's study of 'Unconscious cerebral initiative and the role of conscious will in voluntary action' (1985), he presented that our conscious intention or decision which initiates the action happened after the start of the cerebral processes. It seems that the conscious intention does not really initiate an action; rather, an action is initiated by the cerebral process before our conscious intention. In another article 'Do We Have Free Will?' (2002), Libet tried to leave room for free won't in the last 200 millisecond before the action. He introduced the conscious veto as a control function which appears without prior unconscious processes. I think this approach cannot really escape from determinism. Even there is a control function; we can accept either of the two possible situations about this function. First, this control function is still realized by a micro-mechanism which may further be initiated by other cerebral process. Second, this control function has no underling substrate. In the first way, it is impossible for free won't to appear without prior unconscious processes, and it still falls into a deterministic approach. In the second way, the free won't seems to be something non-physical, and it will turn into a dualistic approach. In my article, I try to accommodate these two conflicting possibilities in a biological approach. I will introduce the levels of organization in complex systems, and try to resolve the confliction on the surface of these two possibilities. In this approach, I will explain how can free will be possible but at the same time constituted by a physical substrate. **P1**

77 **Applying Dynamical Systems Theory to the Problem of Conscious Intentional Action** Anthony Peressini <anthony.peressini@marquette.edu> (Marquette University, Milwaukee, WI)

In this paper I consider the problem of conscious human agency and how one might make use of the insights of dynamical systems theory (DST) in neuroscience in a way that both (a) accords with its actual use in neuroscience, and (b) shows sensitivity to the traditional philosophical concerns about conscious human agency and the explanatory role of common sense (or "folk") psychology (CSP). Philosophical uses of DST in conscious studies tend to embrace it more as metaphor than actual scientific theory. I consider one such account, Hanna's and Maiese's Embodied Minds in Action, and argue that DST isn't at all integral to the account in that it merely incorporates loose ideas from DST into philosophical "business as usual." Such philosophical applications make the natural (if obvious) use of the DST notion of emergence in that they associate emergent properties with CSP mental states like belief and desire, so that psychological explanations get the benefit of scientifically validated "downward causation," though again, only metaphorically. On the other hand, neuroscientist Walter Freeman's How Brains Make Up Their Minds, whose account of conscious agency is firmly and literally grounded in his pioneering work in dynamical modeling of the brain, leaves insufficiently addressed important philosophical questions like the causal efficacy of content and the status CSP explanation. His discussions of emergent meso-level properties, which are higher level than the neuronal but lower than conscious intentional states, come directly from groundbreaking work in neurodynamics. These meso-level properties are taken to be the emergent properties that explain behavior. Instead of the natural move of taking the emergent properties to be mental states (propositional attitudes), Freeman's emergents are his meso-states, and these are the ultimate explanation of behavior. So while DST is integral via meso-emergence, it is an unnatural application of DST in that CSP explanations are excised from his account. This elimination of CSP's propositional attitudes and their explanatory apparatus leaves important philosophical holes in our account of agency and causal/explanatory efficacy of CSP. I argue that the unnaturalness of the meso-level approach of Freeman can be mitigated in way that does address philosophical concerns with conscious agency and CSP explanation. I propose we understand CSP as constituting a set of constraints or boundary conditions intrinsic to the dynamical system of the brain/body. Construed in this way we see how and why CSP has the explanatory and predictive power it does with respect to the behavior, even if it does not (itself) actually model the underlying causal dynamics of the behavior. Additionally, viewing

the CSP explanatory apparatus as a constraint system or structuring cause is in keeping with common interpretations of DST's emergent downward causation as just such constraints or boundary conditions. Hence such "unnatural" meso-emergent accounts can be modified to address the problem of agency and the explanatory status of CSP. **P7**

78 **Felt Agency and the Consistency Criterion** George Seli <gseli@gc.cuny.edu> (Long Island City, NY)

D.M. Wegner takes perceived consistency between volition and act to explain a person's sense of causing her bodily movements, along with the other principles given in his Theory of Apparent Mental Causation: priority (that the agent perceive the volition to occur just before the movement) and exclusivity (that she perceive no other cause of the movement). The drawback to Wegner's conditions, however, is that they constitute a phenomenological ground for felt agency: If a person is to feel agentive in the course of action, she must (inter alia) judge her act to be consistent with her volition during that time. But in the course of everyday action, volitions are typically nonconscious: we are simply aware of acting, and feel agentive in so doing. And even when volitions are conscious, they tend to be "phenomenologically indeterminate," as T. Metzinger has observed. Prima facie, these factors would prevent the person from assessing volition/act agreement. In this paper, I adapt Wegner's theory to address this problem, arguing that an act agrees with a volition based on the latter's representational content, which need not be conscious. Positing a nonconscious consistency judgment, one based on nonconscious volitional content, preserves Wegner's intuition that will/act consistency supports the feeling of causing a movement. Further, if nonconscious consistency assessments regularly occur during action, the structure of mental processing can reflect – and arguably supervene on – a subpersonal mechanism of action-control, namely the "comparator" model proposed by several researchers. Thus, on my view, the sense of agency can serve the cognitive function of indicating operations at nonconscious levels of action-control, as the product of those operations. It would be a poor indicator of the conscious consistency assessment that Wegner requires, as the latter seldom occurs while felt agency is quite prevalent. **P1**

79 **A Developmental Model of Volition for Personal Transformation** Mark Thurston <mthursto@gmu.edu> (Ctr for Consciousness and Tran, George Mason University, Fairfax, VA)

The problem of free will is not just a philosophical riddle but also a matter of practical application within the process of personal development and transformation. Drawing upon an array of transformational psychology systems, a multi-faceted functional definition of volition is offered with the attention-directing capacity of the will at its center. Next, a five-stage developmental sequence for ever- increasing capacity of the will is described – beginning with a stage in which volition is essentially dormant, then through a series of stages of expanding personal autonomy and empowerment, and culminating what has been called transpersonal will. This five-stage developmental model for human volition can then be applied to a variety of practical issues. For example, within a single session of mindfulness or meditation, the practitioner can move through these distinct stages; and understanding the nature of each stage can potentially assist the practitioner to deepen his or her practice. Or, the transformation of a conflict (either an internal, personal conflict or an external, social conflict) invariably involves issues of volition,. This developmental model can be applied toward recognizing how individuals get stuck in their conflicts, and the model can be prescriptive for transforming the conflict. **C18**

1.12 Intentionality and representation

80 **Fodor and the Structure of Iconic Representations** Jacob Berger <jfberger@gmail.com> (Philosophy, The Graduate Center, CUNY, New York, NY)

In his recent book LOT 2: The Language of Thought Revisited, Jerry Fodor presents a novel way to distinguish so-called iconic representations from discursive representations (henceforth, "icons" and "discursives" respectively). The paradigmatic example of an icon is

a picture, whereas the paradigmatic example of a discursive is a sentence. Of course, Fodor's concern lies not with representations in general, but with mental representations, and he offers empirical evidence that people enjoy mental representations of both sorts. Fodor suggests that mental states such as thoughts are discursive, whereas states of, for example, mental imagery are iconic. Since Fodor believes mental icons are ipso facto unconceptualized, he thereby presents a spirited defense of the existence of what is known as non-conceptual content. Fodor claims that what cleaves the distinction between icons and discursives is the fact that discursives have what he calls canonical decompositions, whereas icons do not. Fodor acknowledges that both icons and discursives are compositional insofar as the structure and semantic properties of the wholes are dependent on the structure and semantic properties of the parts. However, Fodor maintains that what marks the difference between them is the way in which the parts of these representations compose. Since icons lack canonical decompositions, they thereby lack structure and so are unrestricted in the ways in which their parts compose. By contrast, discursives have canonical decompositions and hence have structure, and thereby are restricted in the ways in which their parts compose. My main aim in this paper is to challenge Fodor's way of drawing distinction between icons and discursives. I remain (mostly) neutral about whether there is non-conceptual content, and I do not even dispute that there may be a distinction between discursives and icons. But, whether or not a distinction can be drawn, I do not think that we can draw it the way Fodor does. After briefly discussing Fodor's program in general and his way of drawing the distinction, I turn to some reasons to think that icons are structured. In short, I argue that Fodor conditions for being an icon are at once too permissive and too restrictive. Fodor's account entails that few or none of the things that we traditionally take to be icons, such as pictures, are iconic and that all sorts of things we do not take to be representations, such as footprints, are icons. I then catalogue several extant accounts of pictorial representation. I suggest that, on any of these plausible theories, icons are structured and I proffer a way to understand the sense in which icons have canonical decompositions. I then briefly discuss some empirical evidence that all mental representations, even at the earliest stages of visual processing, have structure. In closing, I critique Fodor's reasons for thinking there are unstructured mental icons in the first place, and question the utility for Fodor's theory in general of admitting unstructured icons into our mental ontology. I conclude we are thus better off thinking that Fodor's condition for iconicity should be rejected. **P1**

81 **What is an Unconscious Mental State?** Berit Brogaard <brogaardb@gmail.com>
(Philosophy, University of Missouri, St. Louis, St. Louis, MO)

Conscious mental states have phenomenal character. There is something it is like to be in them. Having phenomenal character is sufficient for mentality. Furthermore, having a representational phenomenal character is sufficient for having intentional content. Unconscious states do not have phenomenal character. Yet intuitively some unconscious processes are (or correlate with) intentional mental states, for instance, dorsal stream processes and the residual visual processes responsible for blindsight. Here I consider and reject four candidate accounts of unconscious intentional mental states: dispositionalism, interpretivism, functionalism and potentialism. Dispositionalism treats the dispositions of individuals to behave or feel or think in certain ways as constitutive of mental states. However, this view has severe drawbacks. It misclassifies states that merely mimic states grounded in the right sort of underlying realizer. Interpretivism takes an unconscious state to be an intentional mental state just in case an ideal interpreter would judge that this is so. This sort of account encounters the same sorts of difficulties as dispositionalism when an individual's behavior is not grounded in the right sort of underlying realizer. Functionalism does better in this respect. Though functionalism takes an unconscious state to be an intentional mental state just in case the state satisfies a certain prespecified role, the specification of the role can involve specifications of properties of underlying realizers. However, because functionalism does not require that unconscious mental states are adequately connected to phenomenal consciousness, it predicts that unconscious states that evidently are not states of the mind are mental states. Potentialism holds that an unconscious state is a state that has the potential to become conscious. However, on its most natural rendition, this view is implausible, as unconscious intentional mental states do not have the

potential to become conscious. My own sympathies are broadly functionalist. I argue that the right sort of account of unconscious mental states needs to account for both the mentality and the intentionality of the state. I propose a phenomenal-functionalist account that satisfies these two adequacy conditions. On the phenomenal-functionalist account proposed, an unconscious state of type T is an unconscious intentional mental state of a system just case: (i) The system's type T states are regularly semantically influenced by conscious mental states. In order for an unconscious state to be semantically influenced by conscious mental states, it must be semantically influenced by conscious top-down factors such as attention, intention, expectations, goals, task representations, and perceptual recognition. (ii) The system's type T states normally reliably guide action or the production of other mental states. An unconscious state of type T is a mental state if the first criterion is satisfied, and an unconscious state of type T is an intentional state if the second criterion is satisfied. While my proposal is consistent with various non-materialist approaches to mental states, it should also have special appeal for those of functionalist disposition who have been wary of classical dispositionalist and interpretivist approaches to mental states. **C1**

82 **It's All in Peirce! Modern Theories of Consciousness Were Prefigured in Peirce's Tripartite Logic** Allan Combs <allan@sourceintegralis.org> (Transformative Inquiry, California Institute of Integral Studies (CIIS), Santa Rosa, CA)

It has been said that the three pillars of William James' thought, radical empiricism, noetic pluralism, and pragmatism, were influenced by Charles Sanders Peirce's notions of firstness, secondness, and thirdness (Taylor, 2009). Interestingly, an analysis of Vimal's (2009) exhaustive review of contemporary meanings attributed to the word consciousness suggests that virtually all of them can also be understood as variations on Peirce's three basic themes. Thus, they are mirrored in James's three-part philosophy as well. For example, theories of consciousness as experience - qualia, 'what it is like..,' phenomenological approaches, etc.'are instances of firstness, i.e., initial pre-conceptualized or 'raw' experience. Peirce himself equated phenomenology, or phaneroscopy as he called it (phaneron being a name for 'all that is in the mind'), to firstness. Externalism (e.g., Alva Noe), however, corresponds to Peirce's secondness, the pre-reflective confrontation of the world in its actuality, as does radial pluralism (e.g., John Searle). Functional approaches tend to be conceptual, emphasizing relationships within the physiological processes of the brain (e.g., Walter Freeman), or conceptually considered processes such as computationalism (e.g., Jerry Fodor, Michael Arbib, Daniel Dennett). A variation on functionalism that takes its cue from Francisco Varela's concept of enaction attempts to combine materialism and functionalism 'secondness and thirdness' in a pragmatically grounded notion of consciousness. Theories of self, on the other hand, virtually all involve self-reflective dynamics, or thirdness, of one ilk or another. **P1**

83 **The View from Everywhere: Consciousness, Intentionality, and Naturalized Phenomenology** Christian Coseru <coseruc@cofc.edu> (Philosophy, College of Charleston, Charleston, SC)

Recent calls to naturalize phenomenology (Petitot et. al, 1999, Gallagher 2003, 2004, Thompson 2007) are indicative of the constraints imposed by cognitive science on any tradition of inquiry that seeks to contribute to its research programs and participate in its internal disputes. Clearly, if phenomenology can contribute either novel approaches or supporting evidence to current scientific theories of consciousness and cognition, then, its principles and its hypotheses need to be aligned with the rest of the available models and methodologies currently pursuing their candidacy. I argue that the project of naturalizing phenomenology, while most promising in expanding and refining the embodied and enactive models of cognition, must take seriously the phenomenologist's reversal of priority claims (phenomenology is, or is also (after Husserl), concerned with transcendental subjectivity). Following Zahavi (2004, 2009) I claim that a mutual entailment strategy that expands our understanding of the constitutive elements of experience can (and must) be both scientifically informed and phenomenologically constraining. This mutual entailment strategy, in which first and third-person perspectives (conceived as intersubjective, pragmatic, and public rather than private) emerge

from, rather than define, engagement with a world whose structures already contain references to others, is what I call the "view from everywhere." My proposal, which is conceived heuristically, takes as paradigmatic the intentional structure of embodied self-awareness (Merleau-Ponty's intentional arc), leaving open the question of how phenomenological perspectives can contributes to our understanding of the dynamic aspects of consciousness and cognition. My operating premise is that descriptions of intentional objects, much like access to the intentional acts that correlate with those objects, are neither static nor fixed, but characterized by varying degrees of plasticity. As such the enactive model of cognition at work in phenomenological approaches to intersubjectivity, while in need of constant revision to accommodate the findings of cognitive science, must also expand (and occasionally alter) our understanding of naturalism itself, so as to account for intentional and meta-cognitive states of awareness. The project of naturalization, then, must take into account that our already public and pragmatically embedded self-awareness marks an intentional relation to the world. **C10**

84 **How to be Judgmental: On the Need for a Two-Dimensional Account of Content** Melissa Ebbers <melissa.ebbers@gmail.com> (Philosophy, University of Maryland, College Park, College Park, MD)

David Chalmers employs epistemic two-dimensional semantics in the service of his modal argument against materialism. Robert Stalnaker argues that we do not need both primary and secondary intensions in order to give an account of the contents of judgments (including instances of conceiving, which can reasonably be considered to be modal judgments). Of particular interest are the judgments which, on an externalist account of content, would lead us to attribute to the agent a judgment the content of which is a necessarily false proposition (such as 'Hesperus is not Phosphorus'). Instead of appealing to primary intensions (understood as something like narrow content) to explain the content of these judgments, externalists instead appeal to the diagonal proposition, which is parasitic on the standard externalist semantics and allows us to give a pragmatic account of the content of the judgment. Of interest to us here is the difference in the epistemic security of the judgments as understood on each account. Unlike the externalist acount, on which an agent may be wrong about the content of her judgment (e.g., she may think that she is conceiving of a case in which 'Hesperus is not Phosphorus' is true, though it is necessarily false), there is a much greater degree of epistemic security on the two-dimensionalist's account: the agent has access to the narrow content (primary intension) of her judgment (as it is "all in the head" – setting aside, for the moment, worries about transparency). This fact about the epistemic two-dimensionalist's account, provided that the link can be motivated between primary and secondary intensions (perhaps due to the semantic stability of expressions), is thus a more plausible candidate for motivating a link between conceivability and possibility. For this reason, defending epistemic-two dimensional accounts of the content of judgments is desirable in motivating the modal argument against materialism. It is crucial to note, in evaluating the relative strengths of the epistemic two-dimensionalist and externalist accounts of content, that their assignments of content be such that the content can explain the role in reasoning and behavior – these are the data to be explained. I argue that in at least some cases, the externalist account attributes to the agent a judgment with content that is significantly more fine-grained than is warranted by the data. Furthermore, these are cases to which a notion of narrow content is particularly well-suited for the same task. This indicates that, pace Stalnaker, we cannot adequately explain all judgments on the externalist's account, and that there is work for the primary intension to do in explaining such judgments. **P7**

85 **Does Mary Know I Mean Plus Rather Than Quus?** Philip Goff <p.goff@herts.ac.uk> (Department of Philosophy, University of Hertfordshire, Hatfield, United Kingdom)

Kripke argues that conscious states cannot determine that I mean plus rather than quus by '+'. However, this argument is premised on: (i) a crude conception of phenomenal qualities as 'raw feels', (ii) a crude conception of how conscious states might be supposed to ground meaning, i.e. by standing in a relation of identity or one to one correlation to meanings. Once we adopt a more nuanced conception of conscious states and their relationship to the content

of thought and language, it is clear that my conscious states are sufficient to make it the case that I mean plus rather than quus by '+'. Kripke also gives us strong reasons to think that the physical workings of my body and brain can't determine that I mean plus rather than quus by '+'. In the light of these considerations, I offer the following rule-following argument against physicalism: (i) If Mary only knows that physical facts about me, then she won't know whether I mean plus of quus by '+', (ii) Once she learns about my conscious states, Mary knows that I mean plus rather than quus by '+', (iii) Therefore, the facts about my conscious states are not physical facts. **C1**

86 **Phenomenal Externalism and Self-Knowledge** Amir Horowitz <amirho@openu.ac.il> (History, Philosophy and Judaic, The Open University of Israel, Ra'anana, Israel)

Semantic externalism has been charged for not respecting the a poriori nature of self knowledge. Specifically, it has been argued that it is a consequence of externalism that one can distinguish a priori between the content of one's beliefs and all other possible contents, but that externalism entails that one cannot distinguish one's water-beliefs (beliefs about H2O samples) and one's twater-beliefs (beliefs about XYZ samples). An extension of this charge applies to phenomenal externalism. In this talk, a new way for defending semantic externalism from that charges is suggested, and then it is applied to the respective charge against phenomenal externalism. Central to the suggested solution is the "quotation principle": that if one has the belief one would express by "I believe that P", one would normally have the second-order belief one would express by "I believe that I believe that P". It is argued that the resolution of our a priori knowledge of our beliefs is no greater than the resolution that is embodied by the quotation principle, and that this is true also on the assumption that contents are externally determined. Thus, the resolution of our second-order beliefs vis a vis our first-order beliefs on the assumption that their contents are externally determined is identical to the resolution that it makes sense to attribute to our knowledge of our beliefs independently of any assumption about content-determination, and semantic externalism can rebuff the attack from self-knowledge. Phenomenal externalism comes in two varieties. The first simply follows from the conjunction of semantic exeternalism and the representational theory of phenomenality (or any theory according to which representational content plays a role in the determination of phenomenal character). Phenomenal externalism of this variety faces a challenge that is identical to the one that semantic externalism faces and can be treated in the same way. Phenomenal externalism of the second, stronger, variety is the view that the object of a perceptual state plays a constitutive role in the state's phenomenal character, so one's veridical perception and one's related hallucination necessarily differ in phenomenal character. This variety of phenomenal externalism faces a challenge that is different, although related, to the previous one, a challenge that concerns one's ability to distinguish a priori between one's veridical perception and one's related hallucination. It is shown how the suggested solution to the challenge for semantic externalism can be applied to this challenge as well. **P1**

87 **The Reflexive Nature of Consciousness and Anti-Individualism** Bernard W. Kobes <kobes@asu.edu> (Philosophy, Arizona State University, Tempe, AZ)

Tyler Burge, in Foundations of Mind (2007), argues that phenomenal consciousness is, in a certain sense, reflexive: sensation x (of e.g. color, pain, or visual blur) is present in phenomenal consciousness to subject S through x itself. For Burge this is one species of a generic 3-place relation: x is present to subject S through mode of presentation m. Phenomenal consciousness involves a species of this generic relation in which the first and third relata are identical. Burge restricts his discussion to cases in which reflexive modes of presentation are individualistically individuated. I consider an extension of the theory in which intentional contents may be rational-access conscious in virtue of externally individuated reflexive modes of presentation. **C1**

88 **From the Self-Awareness to the Other Minds** Chia-Hua Lin , Allen Y. Houng <clin.chiahua@gmail.com> (Institute of Philosophy of Min, National Yang-Ming University, Taipei, Taiwan)

Developmentally speaking, there can be three possible temporal relation between self mental-state attributions (SMA) and other mental-state attributions (OMA). Namely, it is that 1) SMA emerges prior to OMA, or 2) OMA prior to SMA, or 3) these two abilities develop at about the same time. We argue for the simultaneity of the emergences of SMA and of OMA because the 1) is inconsistent with empirical studies and the 2) is conceptually incoherent. The self-referencial ability plays a crucial role in both self and other mental-state attribution. To support our simulaniety hypothesis, we propose a new model of mental-state attribution?the three-staged synchronic development model. First is the subject stage (first few weeks until ~7 months old), followed by the transitional stage (age ~7 to 15 months), and finally the emergence stage (age ~15 to 24 months). The simultaneity hypothesis states that there cannot be mental-state attribution to others prior to self-attribution, and self- and other-attribution are depicted in the emergence stage. In the subject stage, an infant has first-order mental states: belief, desire, and feelings, whereas in the emergence stage, this infant aquires the ability to represent certain first-order mental states as about it self, else as about others. The transitional stage is a turbulent period where a subject encounters incongruent mental states which result from observing others, as the function of mirror system. Above all, to attribute certain mental state to others is to have second order mental states about others who are not self. This model is based on empirical findings from developmental psychology, cognitive science, and neuroscience. In particular, it has recently been put forward that the mirror system is responsible for the development of mental-state attributions in human beings. This paper aims to show the role of self-awareness in attributing mental states to others. **P7**

89 **The Paraphenomenal Hypothesis** David Pitt <dalanpitt@yahoo.com> (Philosophy, California State University Los Angeles, Los Angeles, CA)

Gilbert Ryle accused Descartes of advancing what Ryle called the “Paramechanical Hypothesis,” according to which, though the body is a physical thing and the mind is a non-physical thing, mental operations can be understood in essentially the same terms as physical ones. The body is “a bit of clockwork,” the mind “a bit of not-clockwork.” Mental processes are the same thing as physical processes, only you don’t have the matter - i.e., they’re paramechanical. This is of course absurd: mental processes can’t be the same as physical processes if the mind isn’t physical. Whether or not Descartes actually made such an error, I believe that contemporary reductive representationalists make a logically analogous one. These theorists propose that the qualitative features associated with conscious experiences - those that characterize what they’re like - are properties, not of experiences, but of the things they represent. The blue one mentions in describing what it’s like to see a clear sky at noon is not a property of one’s experience of the sky, but of the sky. Its relevance to the characterization of the experience is due to the fact that the experience represents it, not that it instantiates it. A prima facie problem for this sort of externalism about experiential character is the existence of dreams and hallucinations. Though such experiences have qualitative character, there seem to be no appropriate external objects to which it can be attributed. In hallucinating pink rats, one represents there to be rats that are pink where there are none - a fortiori where there are no rats to which the represented pinkness may be attributed. A typical representationalist reply is that in such cases the properties one’s experience represents are uninstantiated (in the actual world) - though this doesn’t prevent one from representing them as such. In veridical cases one represents properties that are instantiated; in dreams and hallucinations one represents properties that are not instantiated. Otherwise the experiences are the same (at least from a subjective point of view). Hallucination is the same thing as veridical perception, only minus the objects. However, given that uninstantiated properties don’t appear, the way instantiated ones do (uninstantiated colors don’t look like anything), this proposal can’t account for the subjective indiscriminability of veridical and non-veridical experience. If subjective sameness of experience is understood in terms of the ways things appear, and uninstantiated properties don’t appear, hallucination and veridical experience can’t be the same, minus the object and

its properties, any more than a mental process can be the same thing as a physical process, only without the physical stuff. The reductive representationalist is guilty of advancing an absurd Paraphenomenal Hypothesis. **C1**

90 **When are the Contents of Experience Mulitmodal?** Susanna Siegel <ssiegel@fas.harvard.edu> (Philosophy, Harvard University, Cambridge, MA)

Suppose you carefully unzip a pouch, watching your hand as it pulls open the zipper. Since you can both see and feel the unzipping, it is natural to think of your experience as jointly visual and kinesthetic. But what about its contents? In what sense, if any, does your experience have distinctly visual and distinctly kinesthetic contents? I discuss a new argument that some contents are irreducibly multimodal. **C16**

91 **Conceptualism and the Richness of Perceptual Content** John Spackman <jspackma@middlebury.edu> (Philosophy Department, Middlebury College, Middlebury, VT)

This paper presents an argument for conceptualism about conscious human perceptual experience, the view that the conscious contents of human perception are similar in kind to belief contents in being constituted by concepts. There has recently been what might be seen as a second wave of arguments for nonconceptualism, arguments for what has sometimes been called content nonconceptualism as opposed to state nonconceptualism. State nonconceptualism is the view that it is not necessary, in order for a subject to have a given perceptual experience, that she possess the concepts used in a canonical account of it. Content nonconceptualism, on the other hand, holds that perceptual content is nonconceptual just in case it is different in kind from belief contents, in that it is not constituted by concepts. Proponents of content nonconceptualism such as Michael Tye and Richard Heck have suggested, rightly I think, that even if state nonconceptualism is true, this does not establish content nonconceptualsm, and they have thus offered stronger arguments to show that in fact perceptual contents are not constituted by concepts. I argue, however, that the conscious perceptual content of adult humans, at any rate, is constituted by concepts in the sense that its nature is determined by them. My argument has the following form: 1. It is a necessary condition of an item being a constituent in the conscious content of a given perceptual experience that the subject recognize it as a token of some type. 2. If a subject recognizes an item of perceptual experience as a token of some type, and perhaps satisfies certain other general conditions on concept possession, she satisfies the minimal conditions on possessing a concept of that type. 3. The kind of content which any conscious perceptual state has is determined by concepts possessed by the subject. 4. Content conceptualism is true of conscious perceptual content. My support for the first premise derives from considerations of the richness of perceptual experience, and in particular of studies of change blindness and inattentional blindness. I argue for a middle path in the interpretation of such studies, between those such as Alva Noe and Kevin O'Regan who view them as showing that visual experience is much less rich than we suppose, and those like Michael Tye, who take them to show only that subjects' memory of the detailed content of their experience is of limited duration. What the studies show, I suggest, is that it is a necessary condition of an item belonging to conscious perceptual content that the subject recognize it as a token of some type, however general. Finally, I maintain that what this conception of perceptual content supports is not just state conceptualism but content conceptualism. On this view, concepts are not merely correlated with conscious perceptual content. Concepts determine the nature of that content, for it is part of the nature of the constituents of such content that subjects' recognize them as tokens of some type, and this is precisely to possess concepts of them. **C1**

92 **What Role for the Brain in Vehicle-Externalist Theories of Perceptual Experience?** Pierre Steiner <pierre.steiner@utc.fr> (Compiegne University of Technology, Compiegne, France)

Up to now, a crucial flaw of recent vehicle-externalist or enactive theories of (qualitative) perceptual experience (Noe 2004, 2009; Hurley, 1998; O'Regan and Noe, 2001) is their inability to provide a clear account of what the brain is specifically doing when perceptual

experience supervenes on its (supposed) extended vehicle (namely, the brain coupled with the (skilled active) body coupled with the environment). It is obviously required that this expected account should be coherent with the theory, and thus that it does not attribute to the brain features that would ultimately be compatible with the (rejected) assumption that the brain could be the sole or the main realizer of perceptual experience. The main arguments and the structure of this talk are as follows: (1) I first argue that there is currently only one available model of brain activity that is coherent with these vehicle-externalist theories of perceptual experience. It can be found in Humberto Maturana and Francisco Varela's biological theory of operational closure and autopoiesis (Maturana and Varela, 1980; see also Thompson 2007). In this model, the nervous system is defined as a closed network of neuronal interactions, themselves generated by the network. It is an autonomous dynamical system which maintains the coherence of its own activity. It is organized by the operational closure of a network of reciprocally related sub-networks giving rise to sets of coherent activity. Its role is to couple movements with a stream of sensory modulations in a circular fashion, and thus to control the sensori-motor cycle of the organism in order to ensure its living character. It compensates for the perturbations and breakdowns of the ongoing perceptual-motor life of the organism. The sensori-motor coupling between the organism and the environment (coupling on which conscious experience is supposed to (partially) supervene) modulates and constrains the activity of the nervous system, which mediates and coordinates this sensori-motor coupling. (2) This model of neural activity is clearly non-representationalist. That is, it assumes that the activity of the brain cannot and does not need to include the manufacture, retrieval and use of mental representations of the environment or of the body. (3) Therefore, if vehicle-externalist theories of conscious experience endorsed this model of neural activity in order to answer to the (basic) question 'what is the brain doing in your theory of perceptual experience?' (the plausibility of this hypothesis is high, since these theories have to answer to this basic question, and that this model is currently the only available coherent answer), they would necessarily accept a non-representationalist strategy for describing both their explanans and explanandum. I conclude by examining whether these theories are able to endorse non-representationalism with coherence, and by assessing the prospects and consequences of such an endorsement, especially the following points: (a) what would the consequences of non-representationalism be for an explanation of the nature of the (non-phenomenal) contents of 'bodily disengaged' experience (as we can find them in reflexive or monitoring consciousness for instance)?; (b) Does this non-representationalism amount to a denial of the intentional character of perceptual experience? **P7**

93 **Seeing Things Outside the Head** Leopold Stubenberg <stubenberg.1@nd.edu> (Philosophy, University of Notre Dame, Notre Dame, IN)

According to Bertrand Russell, common accounts of vision are deeply mysterious. There are two problems. The first is a version of the hard problem of consciousness: how can a chain of purely physical events give rise to a visual experience? The second has to do with the remarkable saltatory (C.D. Broad's term) power of vision-its ability "to leap the spatial gap between the percipient's body and a remote region of space." How can the visual experience that exists in me make me visually aware of an object that exists outside of me? My visual experience is the last link in a long causal chain that started at the external object. How can the last link of this causal chain make me aware of its first link? How does this visual experience make me perceptually aware of an object that is causally and spatially remote from itself and myself? Russell has interesting things to say about the first problem. But this talk is about the second problem. Direct realist theories of perception as well as intentional or representational theories of perception appear to address this issue head on. Direct realism introduces a perceptual relation-such as appearing or acquaintance-that is supposed to bridge the gap between the perceiver and her object. Russell himself subscribed to an acquaintance view for some time, but ultimately abandoned it. Intentional or representational theories are also often represented as addressing the problem by appealing to the special relation-the intentional relation. According to this view, my visual state is directed at, or is a representation of, or is about the object I perceive. I get at the remote object by representing it. But the nature of this "relation" as

well as it's ability to bring us into contact with the objects we take ourselves to see turn out to be problematical. Perhaps, then, we are faced with the uncomfortable choice between, on the one hand, embracing a mysterious account of the saltatory capacity of vision and, on the other, embracing an account that holds that vision cannot leap the gap between ourselves and the surrounding world. **C16**

94 **An Auto-Theoretic Model of Consciousness** Zoltan Veres <veresz@c3.hu> (Social Sciences, College of Dunaujvaros, Dunaujvaros, Fejer Hungary)

Exploring more the possibilities offered by the metaphor of anamorphosis (see my abstract for the TSC 2009, Anamorphosis and Consciousness) we might get a clearer 'theoretical' picture of a model of consciousness that does not have the disadvantages of a representation from a Cartesian theoretical systemic view. The Cartesian systemic approach would consist of a horizontal and a vertical axis standing for the experiential field and the theoretical explanatory conceptual framework. It seems like the approaches, which try to combine these axis, fail to recognize the necessity of a different type of 'mental geometry'. Using anamorphosis as a metaphor in looking at problems regarding consciousness may provide us with a model that enables us to produce a shift from a Euclidean (Cartesian systemic view) to a non-Euclidean 'mental geometry'. According to an anamorphotic view on consciousness, phenomenal features will appear as temporary and yet constituting a system that we understand as the phenomenal matrix of our experiences (the what-it-is-like-ness). Subjectivity, when based in its own experiential field, is not necessarily and solely identified with its phenomenal character. Failed attempts to describe the discrepancy between subjectivity and the phenomenal character, or in its role to describe the specificity of the experiential field constituting it can be seen via the drawbacks of theoretical approaches like the HOGS or Uriah Kriegel's theoretical distinction between two types of intentionalities (ps-intentionality vs. ph-intentionality, see in Uriah Kriegel: Intentionality and Normativity, http://uriahkriegel.com/downloads/FlyRide.pdf). I am using the term 'auto-theoretic' with yet another optical metaphoric content to it. The term 'theorein' implies 'sight', visuality, in this case a view from 'within' without a spectator. To understand what that leads to I should recall the experiment carried out and described by Rafael Malach (Abstract No. 112. in Toward a Science of Consciousness, April 8-12, 2008., Tucson, Arizona, Consciousness Research Abstracts, http://www.weizmann.ac.il/neurobiology/labs/malach/, Perception without a Perceiver). According to Malach's results, during the experiment self-identification is somewhat inactive in the subjects. This may suggest that subjectivity can be well conceived off even without giving an overwhelming theoretical position to the phenomenal character of our experiences. A revaluation of the causal link between subjectivity and the phenomenal character may follow as a result. Even more, a revaluation of the role of causality as such in explanatory models seems to be unavoidable (see for instance Gregg Rosenberg's A Place for Consciousness, Oxford University Press, 2004.) **P7**

1.13 Miscellaneous

95 **Scientific Consensus: The Importance of Measuring For and Methods For Tracking Such** Brent Allsop , Steven Lehar <brent.allsop@canonizer.com> (Canonizer LLC, Sandy, UT)

The traditional scientific methods starts out with myriads of competing theories, none of which have yet been falsified. Ultimately, the demonstrable science falsifies all but one theory. Of course, the most definitive way to rigorously know if such has happened, is when all the experts abandon all falsified theories, and converge on one theory as their working hypothesis. In short, it is when we achieve a 'scientific consensus'. It seems that most people think there is almost no consensus on much of anything in this field. But is this truly the case, or could the people that think this way be terribly mistaken? Are we making any progress, and converging on any one theory? Or are the number of theories and the consensus for such diverging? Chalmers and Bourget recently completed one survey (see: http://philpapers.org/survey). Are such traditional surveys the best method to count how many theories their might be going forward, and how much consensus there is for each? At canonizer.com we're work-

ing on harnessing modern internet based collaborative wiki systems and crowd sourcing tools to develop more capable, real time survey methodologies. Our goal with what we are calling a consciousness survey project, is to continuously collaboratively develop concise descriptions of the best theories and to rigorously measure how much consensus there is for each. We want to do this in real time, with definitive history (who are in and developing the most well accepted camps first), as ever more scientific evidence comes in. We've added 'camps' to a wiki system, and the ability to 'join' (or abandon) such camps which makes it into a real time survey system. Some structure, and a set of rules have been programmed into the system to encourage people to discover, and spend more time on developing concise descriptions of what they agree on, rather than focusing so much eternal yes it is, no it isn't, yes it is time on lesser issues of disagreement. Some significantly improved communication is taking place between the growing number of participants. To date, only a relatively small number of experts, such as Steven Lehar, John Smythies... have participated, but already there are some very concise collaboratively developed descriptions of some theories emerging along with quantitative measures of how much consensus there is for each. As some incorrectly assume, our goal isn't to 'determine truth via popularity' but simply to better communicate through more well accepted concise descriptions of the best theories, and to measure how much acceptance there are for each, by the experts, at any given time, as the scientific data, and improved way of thinking of things continues to come in. For more information on the Consciousness Survey Project, see: http://canonizer.com/topic.asp/105. **P7**

96 **A Mosquito Bite Against the Enactive View of Bodily Experiences** Frederique De Vignemont <fdv208@nyu.edu> (Department of Philosophy, CNRS - NYU, New York, NY)

The enactive approach aims at providing a unified account of perceptual experiences in terms of bodily activities. Most enactive arguments come from the analysis of visual experiences (Noe, 2004), but there is one domain of consciousness where the enactive theses seem to be less controversial, namely, bodily experiences. After drawing the agenda for an enactive view of tactile experiences, I shall highlight the difficulties that it has to face, both conceptual and empirical. In particular, I argue that the enactive approach faces a dilemma. On the first horn, the enactive account of bodily experiences is in terms of spatial know-how relative to the bodily location that has been touched (how to reach it or how to move it). But this is challenged by a series of empirical results with patients and the Rubber Hand Illusion that reveal that bodily experiences are separable from the perceiver's actions. Especially, I shall show that spatial know-how is neither sufficient nor necessary to account for the spatial content of bodily experiences. On the second horn, the enactive account is not in terms of spatial know-how. But then it is unclear what type of sensorimotor expectancies could provide both the exteroceptive and the interoceptive spatial content of any kind of tactile experiences, including instantaneous passive touch. **PL3**

97 **Introspection about Phenomenal Consciousness: Running the Gamut from Infallability to Impotence** Terry Horgan <thorgan@email.arizona.edu> (Philosophy, University of Arizona, Tucson, AZ)

I will argue that instrospective capacities with respect to one's own phenomenal consciousness run the gamut from infallibility in some respects to virtual impotence in other respects. The argument will rest heavily on a distinction between two kinds of introspection that I call, respectively, attentive and robust. The latter is a matter of forming judgments about aspects of the phenomenal character that one is currently attending to. This judgmental element is what underlies the wide variation in the reliability and power of phenomenology-directed introspection. I will discuss some morals concerning the appropriate methods for ascertaining the satisfaction conditions that govern the intentional content of various kinds of phenomenology (e.g., agentive phenomenology, moral phenomenology). **C8**

98 **Varieties of Multimodal Experience** Casey O'Callaghan <casey.ocallaghan@rice.edu> (Philosophy Department, Rice University, Houston, TX)

Empirical work has demonstrated that the senses cooperate and interact with each other, and that this impacts conscious perceptual experience. This challenges traditional accounts on which the senses are discrete, encapsulated channels of awareness. Explaining the significance of multimodal and crossmodal processes raises questions concerning the nature and varieties of conscious multimodal perception. I distinguish several varieties and defend an account that makes room for a surprisingly rich form of multimodal perceptual experience. **PL5**

99 **The Science of Mind: Vedantic Perspectives** Sunita Singh Sengupta <sunita.singhsengupt@gmail.com> (Faculty of Management Studies, University of Delhi, Delhi, Delhi, India)

Mind in the Indian philosophical systems is uniquely conceived. Most schools of thought propounded three entities, namely, buddhi (intelligence or knowledge), ahankara (ego), and manas(mind), all of which in some way or other belong to Atman (self). In Indian Psychology the study of the total mind (conscious, unconscious, and superconscious) is very important. Western psychologists mainly studied the conscious states of mind, however, Indian psychologists have always laid great emphasis on the understanding of not merely the conscious but also various kinds of superconscious and extra-sensory perceptions. The present paper is an effort to understand the context and techniques of knowing the unknown - the unconscious and then superconscious. The fulcrum is the awakening atman (self). The present paper is an effort to understand how the regulatory role of mind in controlling the three gunas (tamasic, rajasic and sattvic) for realizing super consciousness - where mind resides in soul. **P7**

100 **Attention, Introspection and Inner Sense** Charles Siewert <siewert@ucr.edu> (Philosophy, University of California, Riverside, CA)

Does introspection involve a kind of "inner sensing," distinct from reflective thought or judgment, whereby we attend to our own experience? I argue for a negative answer to this question, but partly via a positive account of introspection that does justice to what is attractive about the notion of inner sense, and retains an important role for attention in first-person ("phenomenological") reflection on experience. I start by arguing that there is a fundamental disanalogy between ordinary (first-order) perceptual thought and (higher-order) thought about experience. What enables us, in first-person reflection, to distinguish first-order thought from sensing, and to distinguish what is sensed from the sensing of it, is not similarly to be found beyond the first-order level; the thinking/sensing distinction does not iterate for us phenomenologically above the "ground-floor." This emerges from a proper examination of phenomena of blindsight and perceptual constancy. Next, I consider the proposal (drawn from Lycan and Carruthers) that, in the face of this, there still would remain theoretical reasons to postulate an inner sense. Unlike some opponents of inner sense (such as Dretske and Tye), I accept that we can attend to our own experiences in a non-trivial, epistemically significant way. But I argue that this is to be accounted for – not by postulating an inner sense – but by recognizing a special form of phenomenal-demonstrative thought that constitutes a way of attending, at the same time, both to the objects of first-order sensing and to the manner in which they are sensed. Thus, no higher than "first-order" sensing is needed. This suggests also an explanation (though not vindication) of the perennial appeal of inner sense. The resulting model of introspection does not reject "inward" attention in favor of an "outward" variety, but dispenses altogether with the inner/outer metaphor, while still preserving a special place for attention in first-person reflection, and in the process, illustrating its deployment. **C8**

101 **"Toward a More Perfect Union" - The Prospects for Integrating Diverse Theories of Consciousness** Robert Van Gulick <rnvangul@syr.edu> (Philosophy, Syracuse University, Syracuse, NY)

There are at present many competing theories of consciousness including a wide variety of philosophical theories (higher-order, representational..), cognitive theories (global work-

space, information integration, attended mid-level representation....), and neurobiological theories (local reentrant, thalamo-cortical loop, synchronous oscillatory.....). Although most of these theories are developed and defended in isolation, there are open questions about the degree to which they might be successfully combined. Some combinations are obviously contradictory but others might be jointly accepted. At a minimum this might be a matter of mere consistency among pairs or larger groups of theories. However, there are cases in which diverse theories can be combined in complementary or mutually supportive ways. Such combinations might occur in at least three ways: 1. Different theories many describe consciousness at different levels of organization, and a lower level theory may describe processes or mechanisms that implement those at a higher level. This may occur within a given domain, e.g. a lower level of cognitive processing implementing a higher level of cognitive processing or across domains as with a neurobiological process providing the substrate for a cognitive model of consciousness.) 2. Different theories may describe distinct and separate aspects of consciousness, each of which needs to be included in a comprehensive account (a bit like "the blind men and the elephant"). These parts or aspects of consciousness may divide at different scales: at the very macro level, e.g. the supposed distinction between access consciousness and phenomenal consciousness, or at more micro levels - e.g. the distinction between conscious and unconscious processing may apply differently with respect to memory than it does with respect to perception. 3. Two or more models of consciousness may describe what turn out to be mutually interdependent aspects of consciousness. Integrating the two theories (or models) in such a case may provide an important and useful reconceptualization of each. The union of the two may transform our understanding of each in a way that allows us to better see how they together contribute to the nature of consciousness. I will provide a quick overview or "map" of some of the leading philosophical, cognitive and neurobiological theories/models of consciousness. I will then briefly survey some of the major prospects for integration among them with regard to each of the three types listed above. I will then focus on one particularly promising possibility for integration. That option aims to transformatively combine the reflexive view of consciousness as a form of self-awareness (whether higher-order or same-order) with global integration accounts. Both prior theories undergo a significant reconceptualization in the process of integration. The integrated account also provides an explanatory link between access and phenomenal consciousness, and deepens the connections to various proposed neural susbtrates. **PL9**

102 **The Phenomenal Element** Benjamin D. Young <byoung@gc.cuny.edu>
(Philosophy, City University of New York, Graduate Center, New York, NY)

Olfactory consciousness suggests a new theory of qualitative consciousness, which can predict the epistemic explanatory gap (Levine, 1983, 1993) without regress to a metaphysical gap (Kripke, 1980; Chalmers, 1996; Jackson 1982, 1986, 1993; Chalmers & Jackson, 2001). To demonstrate this conclusion the paper defends three key claims. First, it is argued that we smell objects. The olfactory object is identified as the chemical structure of molecular compounds or mixtures within odor clouds. The molecular structure itself is responsible for the quality of smell, which suggests that we smell matter. Second, based on research of blind smell (Schwartz, 1994, 2000; Sobel, 1999), mate selection (Wilson & Stevenson, 2006), and selection of social acquaintances (Li, et al., 2007), it is argued that qualitative consciousness within the olfactory system arises at the sensory level. Third, the content of our olfactory experiences is nonconceptual. Evidence for this claim derives from the properties of molecular compounds (Earley, 2005, 2007), the mechanism olfactory transduction (Friedrich & Laurent, 2001; Schaefer, 2007), our psychological ability to recognize odorants within a complex odor (Laing, 1998; Livermore and Laing, 1998), and our ability to track olfactory objects (Porter et al., 2005, 2007), which all suggest that olfaction employs a combinatorial and functionally compositional system of representation (van Gelder, 1994; Young, 2003) that does not obey classical concatenative compositionality (Fodor, 1981, 1987; Fodor & Pylyshyn 1988; Fodor & McLaughlin 1990). The consequences of accepting these three claims are a new understanding of consciousness and the qualitative nature of our experiences. While the quality of smell is inherent to a chemical object, we can only know what it smells like and gain access to

this experience through having an olfactory experience of the object. We cannot predict what something smells like just by mapping its chemical structure or understanding it conceptually, since our conceptual states cannot fully access olfactory sensory states based on their nonconceptual format. Nevertheless, once we have smelled the object, we can predict what kind of an experience a person is having by combining our knowledge of the genetic basis of olfactory receptor genesis (Buck & Axel, 1991) together with a determination of the olfactory object using chemistry. Aside from providing reason to doubt conceptual inferences of our olfactory qualitative states from mere descriptive concepts, the chemical nature of the olfactory object calls into question the reduction of qualitative consciousness to physical objects. Given that chemistry and its molecular structures are epistemically autonomous from physics (Scerri and McIntyre, 1997), we cannot give a purely physicalist account of the phenomenal nature of olfactory consciousness. The nature of our olfactory qualitative consciousness predicts an epistemic explanatory gap, while suggesting that the qualitative character of our olfactory experiences derives from the phenomenology of elemental structures. **C17**

2. Neuroscience

2.1 Neural correlates of consciousness (general)

103 **Consciousness as Validation of Prediction by Attention** Giedrius Buracas <gburacas@ucsd.edu> (Radiology, University of California, San Diego, La Jolla, CA)

The last decade has seen an increasing appreciation of the significance of predictive information-processing strategies in the brain. A variety of predictive systems, forward model-based control systems, are capable of generating perceptual/sensory outcomes of commands or intended actions. Such systems may include a stage at which the output of the predictive forward model is compared to the actual outcome of an intention/command so that the accuracy of the forward model could be assessed and the model modified if necessary. There is increasing evidence suggesting that mammalian cerebral perceptual systems, among others, are organized such that they incorporate forward models capable of simulating outcomes of cognitive acts and motor commands. I propose that the conscious experience is an outcome of the process that compares predictions of the forward model with the actual outcomes produced by intentions or motor commands. Specifically, the forward models are engaged via attention allocation mechanisms that facilitate behaviorally relevant neuronal representations - expectations. Outcomes of the cognitive/motor acts then are matched to expectations. Neuronal forward models that generate expectations matching the neuronal representations of the actual cognitive/motor act outcomes are potentiated and synchronized such that they join the network of neuronal populations participating in conscious experience ("workspace"). Hence, the content of consciousness is populated by forward models whose predictions match closely the actual outcomes. While thus activated forward models include rich information about attended objects/situations, the actual matching process operates on only partial evidence. This provision helps explain such dramatic perceptual lapses as change blindness. The proposed model in effect possesses a "validation" mechanism: forward models are "validated" if their prediction matches the outcome of cognitive/motor acts. In case of failure to validate (insufficient match), a mismatch signal reorients attention (and thus competing forward models suppress the previously active one). This aspect of the proposed model is consistent with ubiquitous phenomena related to violations of predictions/expectations. For example, unexpected (unpredicted) flashes of light initiate orienting response, unexpected auditory stimuli result in the mismatch negativity, violations of semantic or syntactic rules in sentences ending with incongruent word produce the N400, etc. Herein I propose functional-anatomical circuitry that might support such "validation of prediction" mechanism. The key feature of the mechanism is reinterpretation of the thalamo-cortico-thalamic reentrant neuronal circuits as performing the comparator function matching anticipated vs. actual thalamo-cortical inputs. The model draws on ideas by Jones, Llinas, and Sherman & Guillery and implements a forward model capable of simulating in real time expected inputs. In conclusion, I propose that perceptual awareness is a consequence of the predictive perceptual process and is a result of matching

predicted percepts and actual sensory (perceptual) data. I present a neuroanatomically and neurophysiologically plausible model of thalamo-cortical circuitry that might support the process of prediction validation that leads to conscious perception. **C3**

104 **Projecting Thoughts Using the Decoded Activity of Single Neurons in the Human Brain** Moran Cerf , Nikhil Thiruvengadam, Florian Mormann, Alexander Kraskov, Rodrigo Quian Quiorga, Itzhak Fried, Christof Koch <moran@klab.caltech.edu> (Computation and Neural Systems, Caltech, Los Angeles, CA)

Every day we are continuously confronted with a vast amount of external sensory stimuli, alongside a rich stream of internal thought. How does our brain select which of many thoughts and stimuli enter consciousness? We tested the ability of people to control which thoughts enter consciousness, and which are suppressed. By recording from single neurons in patients implanted with intracranial electrodes for clinical reasons, we demonstrated that humans can learn to access and regulate the activity of neurons in the medial temporal lobe to determine which of multiple external stimuli will enter awareness, altering the internal representation of the environment within their brain. Recording from patients' brains revealed single neurons representing explicit concepts (familiar individuals, landmarks, animals, etc.). We asked the patients to think of a single of these concepts as a time while decoding the activity of these neurons. As we were able to correctly identify a particular thought in these patients' brains we gradually projected an image representation of this concept on a computer screen. Thus, the patients learned to reflect their thoughts of one of few concepts on a computer screen at their will. Showing hybrid image representation of multiple concepts to the patients, we asked the patients to think of one but not the others. We showed to the patients the same hybrid images and only changed the instruction which of the concepts to become conscious of, showing that subjects can control which thoughts they are aware of. Our results could enable us to develop neural technologies to read the minds of individuals unable to communicate their thoughts, and provide an interface between our brains and the environment. **PL 10**

105 **Tononi's Integrated Information Theory is Inconsistent with Chalmers' Principle of Organizational Invariance** Michael Cerullo <cerullmc@ucmail.uc.edu> (Psychiatry and Neuroscience, University of Cincinnati, Cincinnati, OH)

Giulio Tononi has developed a promising new theory of consciousness he terms Integrated Information Theory (IIT). IIT links conscious experience with the amount of integrated information contained in the neurons of the brain. Koch and Tononi suggest that IIT can help guide empirical research searching for the neural correlates of consciousness. Tononi defines integrated information using a version of the mathematical definition of information first proposed by Claude Shannon in 1948. Shannon developed his definition of information as part of a mathematical model of communication. The amount of information H in a signal is defined as H=n*log(s), where n refers to the number of possible symbols used in the message and s refers to the total number of possible symbol types in the language used. Using this definition it is quickly deduced that the amount of information in a signal is directly proportional to the number of possible messages available using the same alphabet and string length. Tononi suggests that the amount of information in the brain is related to the number of sensory possibilities ruled out by the brain. However, and this is the key to his theory, the information only counts if it available to the system as a whole. This availability is what Tononi means by integration. David Chalmers convincingly argues that any functionalist explanation of consciousness must satisfy the principle of organizational invariance. This principle states that experience is invariant across systems with the same fine-grained functional organization. In other words, any two computationally isomorphic systems (i.e. any systems that map to the same Turing machine) should share the same experience regardless of the details of how the functional pattern is enacted in the physical world. IIC fails to satisfy organizational invariance because integrated information is not defined in a way that would guarantee that any computationally isomorphic system has the same level of integrated information. Thus it is relatively easy to come up with a simple counter example of two systems that are computationally isomorphic but have very different levels of integrated information in two physical

systems. In fact, any functional system could be realized in an infinite number of physical systems each having different amounts of integrated information. Organizational invariance requires each of these systems to share the same experience while IIC states each physical system would have a unique experience. Tononi often uses the example of human vision versus a camera. Clearly a camera is not functionally isomorphic to the human visual perceptual system and contains much less information so there is little reason to believe it generates visual qualia similar to human vision. On the other hand, computational theory suggests that our visual perceptual ability can be duplicated by a cleverly programmed computer or alien brain using a functional architecture that generates significantly different levels of integrated information from the human brain. Organizational invariance assigns similar visual experiences to these systems while IIC could potentially assign wildly opposing subjective experiences. Hence IIC is inconsistent with Organizational invariance. **P2**

106 **Meditation May Optimize Attention and Behavior in the Changing Environments of the Present Moment by Activating the Cortical Salience-Detecting Frontoparietal Control Network** Nancy A Craigmyle <ncmyle@ix.netcom.com> (Carmel Valley, CA)

The fMRI data collected during meditation, particularly during open monitoring meditation, indicates that included amongst the areas of the brain activated by the intentional, impartial attentiveness of meditation are the cortical areas of the salience-detecting frontoparietal control (FPC) network (anterior medial prefrontal cortex, anterior insula, anterior cingulate, anterior inferior parietal, and the dorsolateral prefrontal cortex). This FPC network is thought to shift between the externally directed dorsal attention network which receives the stimuli of the present moment from the external environment and the internally directed hippocampal-cortical memory system, a part of the default network. The anterior insula and the anterior cingulate of the FPC network also receive the interoceptive information from within the organism, which underlies the sense of oneself and of one's emotions. The interoceptive information is carried to the cortical anterior insula and anterior cingulate from the peripheral noradrenergic sympathetic nervous system via its ascending lamina 1 spinothalamocortical tract. In turn, the anterior cingulate modulates activity in the sympathetic nervous system via the rostral ventrolateral medulla, completing a feedback loop. The anterior cingulate also directly modulates the norepinephrine levels throughout the brain by controlling the activity of the locus coeruleus, the principal central noradrenergic nucleus. The locus coeruleus projects throughout the brain and has been found to optimize attention and behavior in changing environments. Norepinephrine is considered the principal neuromodulator adapting the state of both the body and the brain for optimal behavior. As a part of the salience-detecting FPC network, the anterior cingulate is in a position to integrate the information concerning the state of the external, the internal and the interoceptive environments in the present moment. By rapidly modulating the activity levels of the principal noradrenergic systems, the anterior cingulate is in a position to adapt the state of the whole organism to optimize behavior as changes are detected in any of these environments. Meditation, particularly open monitoring meditation, may optimize attention and behavior in the changing environments of the present moment by activating the salience-detecting FPC network. **C12**

107 **The N400 and LPC Effects Reflect Controlled but not Automatic Mechanisms of Sentence Processing: An ERP Study to Auditory Sentences with Varying Levels of Acoustic Degradation** Jerome Daltrozzo, Norma Wioland; Boris Kotchoubey <jdaltrozzo@olfac.univ-lyon1.fr> (CNRS - UMR5020, Claude Bernard Lyon 1 University, LYON Cedex 07, France)

This study focused on the automatic versus controlled nature of the generators of event-related potentials effects to sentence processing. Event-related potentials to sentence final words were recorded in 20 right-handed native French-speakers (10 males, aged 18 - 26) who listened four times to a list of 100 sentences (50 with a congruent and 50 with an incongruent ending word) with a decreasing degradation (noise) level each time. Under moderate degradation (allowing controlled sentence-level processing) the N400 effect (i.e. N400 to incongruent minus congruent words) and the late positive complex effect were delayed and the late

positive complex effect was reduced. Under stronger degradation, allowing only automatic sentence processing, these two event-related potential effects disappeared. The results suggest that these effects are generated by controlled but not by automatic mechanisms of sentence processing. These results are relevant for the diagnosis of awareness in coma and other low responsive patients. **C4**

108 **The Neural Self** Antonio Damasio <damasio@usc.edu> (Director, Brain and Creativity, University of Southern California, Los Angeles, CA)

I will outline my approach to the neural basis of consciousness, which focuses on the self. I will identify brain regions critical for constructing tiered levels of self processing in humans (proto self, core self, autobiographical self), giving special emphasis to particular regions of the brainstem and cerebral cortex. I will discuss hypothetical mechanisms involved in the generation of different self stages, at the large-scale systems level. **PL8**

109 **A Computational Model for a Mobile Zone of Synchrony Mediating Consciousness** Marc Ebner , Stuart Hameroff <marc.ebner@wsii.uni-tuebingen.de> (Abt. RA, WSI Für Informatik, Eberhard Karls Universität Tübingen, Tübingen, Germany)

Cognitive brain functions, sensory perception, motor control, and learning can be either non-conscious (on auto-pilot or in zombie mode) or accompanied by consciousness. Non-conscious cognition is explained by computation in networks of integrate-and-fire neurons whose dendrites and cell bodies/soma receive and integrate synaptic inputs to a specific threshold. When threshold is met, axonal firing occurs, sending an electrical impulse, or spike, along the neuronal axon to the next layer of neurons. These same cognitive functions may at times be accompanied by consciousness. What is the distinction between cognition with consciousness, and cognition without consciousness? Most theories presume consciousness emerges from complex computation in synaptic networks of integrate-and-fire neurons, i.e. that consciousness is a higher level or degree of the same activity underlying non-conscious, auto-pilot cognitive functions. An alternative view sees consciousness as an added factor to otherwise non-conscious integrate-and-fire cognition and neurocomputation. What could this added factor be? An essential marker of consciousness is synchronized neuronal electrical activity in a particular frequency band (30 to 90 Hz) of the electroencephalogram (EEG) called gamma synchrony EEG. Gamma synchrony is mediated largely through dendritic-dendritic gap junctions, sideways connections in input/integration layers of the brain's neuronal networks. Gamma synchrony correlates with conscious perception. In the Hameroff `conscious pilot' model, a gamma-synchronized zone of conscious perception and volition move through the brain as gap junctions open and close, thereby converting non-conscious auto-pilot cognition into conscious cognition. In the present study we used a single layer artificial neural network whose spiking neurons are connected laterally/sideways through gap junctions. Within the single layer, neurons with similar function are gap junction-connected, forming a resistive grid. Open gap junctions between adjacent neurons causes the two neurons to synchronize their firing rates. The neurons receive and temporally integrate visual inputs from a virtual retina using real scenes (moving flowers). The out-going spikes are temporally and spatially averaged. The spatial average of out-going spikes is used as a feedback signal determining whether gap junctions between adjacent neurons are open or closed. Gap junctions are open if the temporal average of the neuron's input is above the spatial average of the output (synchronizing their firing). Otherwise, gap junctions are closed. Thus, eventually all neurons receiving input from the `figure' (flower) will fire in synchrony. Various moving flower photographs are presented as inputs. As each flower moves across the `retina', the flower/figure is extracted from background and tracked by a zone of synchronized activity whose topology represents/correlates with the flower. Though we show only results for visual processing, the same method can be used to perceive any sensory input mode, or to combine modes. Similar synchronized integration zones moving through the brain can correlate with conscious perception and control, representing the additional factor needed for conscious perception. In the brain's multi-layered networks, local and distant gap junction connections (via inter-neurons and glia) can lead to extremely complex topologies of synchronized zones. Such

a gap junction-defined zone of synchronized integration moving through the brain may be the neural correlate of consciousness. **PL4**

110 **I Think Therefore I Am: Alterations in the Sense of Self by Stimulation of the Prefrontal Cortex** Michal Gruberger , Hendler T., Harel, E.V., Harari, H., Levkovitz Y.,* And Zangen A.* <miballas@gmail.com> (Tel-Aviv University, Hod-Hasharon, Israel)

The human tendency to think spontaneously in the absence of cognitive load is considered a basic aspect of the 'self'. This state of mind is also suggested to be related to the 'default-mode' neural network of increased activity at rest. Specifically, the medial prefrontal cortex (MPFC) was found to be related to the sense of 'self' while also exhibiting increased activity at rest. Yet, the causal relation between the sense of 'self' and the 'default' MPFC activations during rest is yet to be established. The current study examined the effect of a temporary 'functional lesion' to the MPFC on the relation between the sense of self and rest. This was performed by means of deep transcranial magnetic stimulation (dTMS) administered to the MPFC with the H-coil, a novel TMS coil for deep brain stimulation (approx. 5 cm of depth). We assumed that inhibitory dTMS prior to rest will attenuate 'default-mode' activity in the MPFC during rest. 55 healthy participants first filled a battery of questionnaires to obtain baseline data about situational self-awareness and situational sense of dissociation (as a form of altered self-awareness), as well as about other types of awareness, mood and affective state. Participants then received superficial ,sham or deep TMS administered over the PFC in an inhibitory, 'offline' manner (15 min; 1 Hz). Following TMS, participants in the task condition went through a 'rest' session (two minutes of sitting quietly with eyes closed) whereas participants in the control condition performed a sound-discrimination task with eyes closed. Assuming that the dTMS effected MPFC structures, and that the neural activity during rest in these areas enables spontaneous thinking and self-awareness, we expected a decrease in self-awareness and an increase in dissociative sensation when rest was preceded by inhibitory dTMS. Results show that only participants who received dTMS which was followed by rest reported a decline in the sense of self-awareness. In addition, only participants in this group reported a sharp rise in their sense of dissociation. These results could not be accounted for by changes in awareness in general or in affective state of the participants in this group. These results provide first-of-a-kind support to the notion that disrupting PFC 'default mode' neural-activity during rest results in a reduction in the sense-of-self, potentially by restraining the spontaneous thought enabled at rest by this 'default-mode' activity. **PL 10**

111 **Influence of Nondual Awareness on Anti-Correlated Networks in the Brain** Zoran Josipovic, David J. Heeger <zj232@nyu.edu> (Psychology/Center For Neursci, New York University, Center for Neural Science, New York, NY)

Globally distributed anti-correlated networks in the brain, the task-specific extrinsic and the task-negative intrinsic network, have been the focus of considerable research interest recently. Previous work has found the activity in the intrinsic system during rest to be anti-correlated with that of the extrinsic system, regions that typically exhibit response increases during goal-directed task performance. While the overall task-positive extrinsic network has been fairly well defined in relation to a variety of cognitive tasks, the full understanding of the task-negative intrinsic or default network and its functional significance has not yet emerged. Nondual awareness presents a unique opportunity to study the functioning of the intrinsic/extrinsic networks in the brain, as it is characterized by the cessation of habitual fragmenting of the field of experience into inside vs. outside, self-related vs. other-related processes. It can be described as a special case of unity consciousness in which there is no blocking of the sensory input and one is fully oriented to time and space, yet one transcends the confines of the dualistic mind. Studies of meditation indicate that these practices create lasting functional and structural changes in the brain, thus increasing our understanding of the extent of the brain's ability to reorganize itself in response to experience. Our study seeks to contribute to this understanding by looking at the question of whether the anti-correlation between the task-positive extrinsic network and the task-negative intrinsic (default) network is an inherent property of brain organization or whether it is subject to cognitive control and learning. **C3**

112 **Neurocognitive Theories of Consciousness: a Critical Overview** Sid Kouider <sid.kouider@gmail.com> (Département d'Etudes Cognitiv, CNRS & Ecole Normale Supérieure, Paris, France)

The two last decades have given rise to a large number of scientific theories of consciousness. I will provide a critical overview of the most influential cognitive and neurobiological accounts of consciousness. I will first introduce the difficulty of constructing a scientific theory of consciousness, and the problem of relying on neural 'correlates' rather than 'bases' of consciousness. I will then present several influential neurobiological theories, depicting them from the most globalists to the most localist accounts of the link between brain structures and conscious contents (e.g., The Re-entrant Dynamic Core theory of Edelman & Tononi, the Global Neuronal Workspace theory of Dehaene, the Coalition model of Crick and Koch, the Duplex Vision theory of Milner & Goodale, the Local Recurrence theory of Lamme, the Micro-Consciousness theory of Zeki, etc). I will contrast these theories according to their functionality and explanatory power. I will also discuss how these theories deal with important issues, such as the existence of a hard problem, the distinction between access and phenomenal consciousness, the link between attention and consciousness, the dissociation between primary and self-consciousness, and the crucial problem of measuring consciousness in a scientific manner. **PL9**

113 **Brain Dark Energy and Default Mode Networks** Marcus E. Raichle <marc@npg.wustl.edu> (Department of Radiology, Washington University School of Medicine, St. Louis, MO)

Brain regions active when our minds wander may hold a key to understanding neurological disorders and even consciousness itself. Imagine you are almost dozing in a lounge chair outside, with a magazine on your lap. Suddenly, a fly lands on your arm. You grab the magazine and swat at the insect. What was going on in your brain after the fly landed? And what was going on just before? Many neuroscientists have long assumed that much of the neural activity inside your head when at rest matches your subdued, somnolent mood. In this view, the activity in the resting brain represents nothing more than random noise, akin to the snowy pattern on the television screen when a station is not broadcasting. Then, when the fly alights on your forearm, the brain focuses on the conscious task of squashing the bug. But recent analysis produced by neuroimaging technologies has revealed something quite remarkable: a great deal of meaningful activity is occurring in the brain when a person is sitting back and doing nothing at all. It turns out that when your mind is at rest-when you are daydreaming quietly in a chair, say, asleep in a bed or anesthetized for surgery – dispersed brain areas are chattering away to one another. And the energy consumed by this ever active messaging, known as the brain's default mode, is about 20 times that used by the brain when it responds consciously to a pesky fly or another outside stimulus. Indeed, most things we do consciously, be it sitting down to eat dinner or making a speech, mark a departure from the baseline activity of the brain default mode. Key to an understanding of the brain's default mode has been the discovery of a heretofore unrecognized brain system that has been dubbed the brain's default mode network (DMN). The exact role of the DMN in organizing neural activity is still under study, but it may orchestrate the way the brain organizes memories and various systems that need preparation for future events: the brain's motor system has to be revved and ready when you feel the tickle of a fly on your arm. The DMN may play a critical role in synchronizing all parts of the brain so that, like racers in a track competition, they are all in the proper "set" mode when the starting gun goes off. If the DMN does prepare the brain for conscious activity, investigations of its behavior may provide clues to the nature of conscious experience. Neuroscientists have reason to suspect, moreover, that disruptions to the DMN may underlie simple mental errors as well as a range of complex brain disorders, from Alzheimer's disease to depression. **PL2**

114 **Baseline Brain Energy Supports the State of Consciousness** Robert G. Shulman <robert.shulman@yale.edu> (Molecular Biophysics & Biochem, Yale University, New Haven, CT)

^ 13 C MRS measurements of the Cerebral Metabolic Rate of Glucose Oxidation and of the coupled Glutamate Neurotransmitter flux (1) showed that >80% of brain energy in the rat or human is devoted to supporting the work of neuronal firing in contrast to earlier proposals of an inefficient use of energy. Calibrations of the fMRI BOLD signals showed that their energy consumption was of the order of a few percent of the total energy.(2) These values refuted the model of a computer-like brain which only did work when stimulated and showed that positive and negative BOLD signals were both small differences of large firing activities.(3) Subsequently multi-unit electrical recordings of the rat brain(4) showed that during sensory stimulation a large fraction of the neurons in the somato-sensory cortex chang(ed their firing rates with a majority firing faster and a minority slower. The high level of global energy(and firing) has been studied by ^ 13 C MRS during anesthesia in the rat with results that resemble the several PET studies of humans(5). The person,or the rat, in a State of Consciousness, as determined by its observable response to stimuli, looses awareness with deepening anesthesia until the global energy is decreased by ~50% beyond which it is no longer aware of stimuli. FMRI BOLD patterns change significantly with deepening anesthesia and histograms of neuronal firing show the loss of high frequencies in the ~40Hz. range.High global energy serves the supporting role that Christof Koch had postulated as the enabling Neuronal Correlates of Consciousness,(NCCe), needed to bring focal responses to sensory stimulation to a higher awareness. Physical understanding of neuronal energy and work have allowed us to reliably determine brain properties of the person in the State of Consciousness, identified from observable behavior, and have eliminated the need to postulate imprecise psychological processes. (1) Sibson,N et al Proc Natl Acad Sci U S A. 1998 Jan 6;95(1):316-21 (2) Hyder F,et al.(2001) NMR Biomed 14:413-431. (3) Shulman,R.G. & Rothman,D.L.Proc Natl Acad Sci U S A. 2002 Aug 6;99(16):10765-70. (4) Smith. A. et al (2002) Proc Natl Acad Sci U S A. 2002 Aug 6;99(16):10765-70. (5)Alkire MT, Hudetz AG &Tononi G (2008) Consciousness and anesthesia. Science 322:876-880. (6) Shulman, R.G. et al Proc Natl Acad Sci U S A. 2009 Jul 7;106(27):11096-101. **PL2**

115 **Modulating the Wandering Mind: The Tonic Norepinephrine Mode and Mental Exploration of the Global Workspace** Jonathan Smallwood , Kevin Brown & Jonathan W. Schooler <smallwood@psych.ucsb.edu> (Department Of Psychology, University of California, Santa Barbara, Santa Barbara, CA)

In the last decade, interest in mind-wandering has burgeoned and we now have a reasonable understanding of the brain systems that support off-task thought (the so-called default mode), the consequences of these episodes when they occur, and the possible role that such experience play in daily life. Notwithstanding the success of these accounts, current theory fails to account for how the brain co-ordinates selection between these internal and external modes. Recently, Aston-Jones & Cohen (2005) proposed that the norepinephrine system (NE) plays a crucial role in selecting between current goal state (exploitation) and alternative goal states (exploration). Building on this proposal, we review evidence that the NE system may play a role in modulating the contents of the global workspace between task relevant and task unrelated internal information. Importantly, such a model helps address a fundamental tension in research on mind-wandering - why an seemingly adaptive form of internal thought (such as thinking about the future) so often leads to error on complex tasks. **PL12**

116 **An Unconscious Neural Strategy Synthesizes Information from Different Senses, Creates a Coherent Picture of External Events, and Executes Adaptive Behaviors** Barry E. Stein <bestein@wfubmc.edu> (School of Medicine, Wake Forest University, Winston-Salem, NC)

One of the more remarkable features of the brain is its ability to synthesize information from different senses to create a singular percept of the external world, so that adaptive behaviors can be executed. This process of 'multisensory integration' is unconscious, and takes

place at many brain loci simultaneously. However, it is best understood in a midbrain structure that is involved in orientation and localization behavior: the superior colliculus (SC). SC neurons can integrate information from various combinations of visual, auditory, and somatosensory inputs; a process that dramatically alters their responses and the behaviors that depend on them. Cross-modal stimuli that appear to be derived from the same event have preferential access to SC neurons, and can produce striking enhancements in their activity. In contrast, cross-modal stimuli that are likely to be associated with different events either yield no multisensory integration or degrade physiological responses and behavioral performance. Contrary to some theories of sensory development, these multisensory integrative abilities are not present in the newborn's brain, and their fundamental characteristics are not pre-specified. Rather, the acquisition of multisensory integration capability, and the crafting of its operational principles is a postnatal process that depends heavily on at least two factors: the development of a cooperative interaction between descending projections from association cortex, and the acquisition of experience with the statistics of cross-modal events. These factors are used by the brain to develop the neural circuitry underlying multisensory integration, and to adapt its operational principles to the environment in which it will be used. The anatomical, physiological and behavioral properties of this circuit, its developmental antecedents, its plasticity, and the likely neural site at which early experience is coded will be discussed. This research was supported by NIH grants EY016716 and NS36916. **PL5**

117 **Searching for Evidence of Phenomenal Consciousness in NCC Research** Justin Sytsma <jmsytsma@gmail.com> (HPS, University of Pittsburgh, Pittsburgh, PA)

The search for neural correlates of consciousness (NCC) is at the forefront of current scientific interest in consciousness. It is frequently asserted that the NCC project is the starting point for a science of consciousness. This is especially true for those researchers who aim to give a neurobiological theory of phenomenal consciousness – members of what I have termed the new science of consciousness. Many prominent new scientists hold that the first step in developing such a theory is to find neural activity that specifically correlates with the contents of a subject's phenomenal consciousness. If these researchers are correct in their assessment of the importance of the NCC project, then the new science will rise or fall with the search for neural correlates of the contents of phenomenal consciousness. In this paper, I assess the empirical prospects of this research project. I challenge the claim that phenomenal consciousness exists, concluding that new scientists are erroneously trying to correlate neural activity with the contents of phenomenal consciousness. To see this, we need to begin by articulating the phenomena that new scientists are interested in (the contents of phenomenal consciousness) and the data that are collected during NCC experiments (records of the behavioral reports of subjects and measures of their neural activity). I argue that the data that are collected in these experiments are insufficient evidence to establish the reality of the hypothesized phenomena of interest. This is shown by considering two alternative interpretations of the standard NCC experiment – viz. an eliminativist interpretation and a disjunctivist interpretation. **C17**

118 **Framework of Consciousness from the Semblance Hypothesis of Memory** Kunjumon Vadakkan <umvadakk@cc.umanitoba.ca> (Neurology, University of Manitoba, Winnipeg, MANITOBA Canada)

A causal relationship between neuronal activity and consciousness is not yet discovered. Here, we present the framework for consciousness derived from the semblance hypothesis of memory(www.semblancehypothesis.org). A unit of memory, in the presence of an external or internal cue stimulus, results from the ability to induce specific postsynaptic events at the synapses of the neurons from the learned item without the requirement of action potentials reaching their presynaptic sides. For this, co-activation of the fibers from the item to be learned and the cue during learning need to induce specific changes that will later allow the cue stimulus alone evoke activation of a set of postsynapses that belong to the learned item. Oxygenation-state dependent functional LINKs are hypothesized to form between the postsynapses of the synapses belonging to the item to be learned and the cue during learning. During retrieval, by re-activating these functional LINKs the activity from the cue stimulus spreads to the post-

synapses of the synapses belonging to the learned item. Activating the postsynapses belonging to the learned item without activating their presynaptic terminals will evoke cellular hallucination of an action potential-induced synaptic transmission from presynapses belonging to the learned item inducing synaptic semblance. When more than one postsynapse (dendritic spine) of a neuron gets depolarized through the functional LINKs, during memory retrieval, it enables spatial and/or temporal summation of excitatory postsynaptic potentials to evoke an action potential. The activity from this neuron propagates in the downstream network that belongs to the learned item and induce network semblance (creating hallucination of sensory inputs from the learned item). The net effect of synaptic and network semblances provide virtual sensation of a stimulus in its absence, which is memory. Since there are several suggestions that consciousness is related to some form of memory (Crick and Koch, 1998; Ramachandran and Hirstein, 1997; Rosenbaum et al., 2007), it is reasonable to formulate a framework for consciousness from semblance hypothesis. Neuronal activity from the hippocampal and cortical oscillations as well as those that are triggered by background environmental stimuli activate a non-specific set of neurons result in the formation of highly non-selective semblances named as primary semblances. The prominent one among them is named as consciousness semblance (C-semblance). Qualia can be described as a primary semblance formed from sensory inputs from a single sensory system. Secondary semblances form in the presence of a cue stimulus used in previous associative learning. Examples include memory, decision-making and path finding. Tertiary semblance occurs as a response to a novel cue stimulus and may result in more than one semblance leaving the animal with an option to choose from. If the semblances are of nearly equal strength, choosing one of them becomes a probability problem similar to that in quantum mechanics. Extent of previous associative learning and the nature of the problem (cue) giving rise to tertiary semblance may explain the existing arguments for and against "free will". This work should be considered as unproven until it is verified against experimental evidence. **P8**

2.2 Vision

119 **Inversion of the Retinal Layers as Necessary Condition for Spatial Constancy** Eduard Alto <eduard.alto@kolumbus.fi> (Vantaa, Finland)

The retinal layers inversion means that the brain 'looks' at the image from the awkward direction. All the objects are turned twice: from left to right and upside-down. For example, the figure '5' reflected on the retina can not be restored into its initial shape by rotations in the plane. But in the case of uninverted retina (as if the brain looked at the image from the opposite side of retina) the objects would be seen simply as turned over ones. Thus, there must exist a serious reason for the 'awkward' choice. The reason may lay in the requirement for constancy. If there is a single and minimal visible dot within the completely empty visual field, it remains spatially constant even in monocular conditions. In lack of any additional information there can be the only one possible way for that. Even single photoreceptor comparable with the minimal visible dot evokes polysynaptic input to a number of neurons, and each transition from one separate photoreceptor to another one changes 3D grating of exited synapses. Nevertheless, the smallest visible dot represented by these continuously changing gratings retains its constancy. It means that the synapse grating changes its shape in some special way which lets the brain know the precise direction to the dot. This three-dimensional stimulus representation allows the visual system to directly compare successive phases of stimulus form and location within the interval of approximately 1/15 sec. Moreover, this precision provides stereopsis even for monocular vision as well, as it follows from the well-known experiments with the artificial stabilized images on the retina. (Both effects were described in the author's previous abstracts). And need for the correct view of this 3D shape dictates the direction of sight which is awkward in other aspects. As a result, there arise some new problems. Though the correct order of mutual positions of receptive fields can be reconstructed by means of chiasmatic redirections, geometric forms of stimuli within receptive fields themselves would retain their original inverted shape. The problem could be resolved by mirror transformation, and it forces us to remember the layers inversion in the lateral geniculate nucleus where the layers 4 and 5

can be interpreted as 'looking' at each other. But the inversion of all the movements depicted on the retina sets the problem of chirality within the visual system. **C3**

120 **A New Paradigm of Vision: 40Hz Coherence in Amacrine Cells. Microsaccade Drift/Tremors and Visual Illusions** David Saunders <drsaunders42@earthlink.net> (San Diego, CA)

Amacrine cells interconnect bipolar cell/ganglion cell synapses across an area in the retina. 40Hz coherence in amacrine cells has been reported. What could be its function? I believe it is associated with the phototransduction cascade in cone photoreceptors and the drift/tremor phase of microsaccades, the quick transit phase being too fast and brief to sufficiently stimulate cones. I submit that the function of some, or all, amacrine cells is to track, correlate, contrast and compile the information gathered from a single bit of the scene bitmap that strikes the retina as the retina moves under it when the eye executes the drift/tremors of microsaccades and saccades. A saccade is a microsaccade with an extra long quick transit. There are approximately 29 unique types of amacrine cells, each type dedicated to one of the five discrete layers of the retina. The amacrine cell field of coverage varies greatly among the types from very narrow for some to extremely wide for others, and the spatial distribution within and among the five retinal layers produces tiling such that any quick transit of a microsaccade or a saccade in any direction and for any distance will be tracked. This results in the continuity of information produced by a scene bit from the previous drift/tremor to the present drift/tremor. I contend that it is the amacrine cells that produce the signal that exits the eye via the ganglion cells, and that the signal is composed of all the information gathered from both the previous and present drift/tremors. This functioning offers an explanation for many things. Our foveas, which produce our most important, detailed central vision, are composed of only red/green cones and yet we also see blue in this area. Blue cones are found in the parafovea, which surrounds the fovea. I contend that previous and present drift/tremors will have traversed both the fovea and the parafovea and therefore we see both red/green and blue in our central vision. I believe that there has to be a contrast and comparison between the information gathered by the previous and present drift/tremors, and there will be because each bit of the scene bit map will have traversed a constantly changing cohort of photoreceptors. When there is no change, vision ceases because the amacrine cells no longer have cross input to work with. This latter point, not neural adaptation, explains visual fading: when an image is stabilized on the retina, the image disappears. It is also why we do not see the opaque blood vessels of our retinas: wherever the retina moves, the blood vessels move. Another point is that our vision seems to be composed of a series of frames or snapshots, and I believe this is an artifact of the way amacrine cells function across space and time to produce an output signal. This latter explains the 'wagon wheel illusion'. Lastly, the passage of time in the process explains visual masking, change blindness, change-lag effect and other visual illusions. **C12**

2.3 Other sensory modalities

121 **What is Synesthesia? - A Current Overview** Sean Day <s.day.70029@ttc.mailcruiser.com> (English & Journalism, Trident Technical College, North Charleston, SC)

In 1826, Mueller posited the law of specific nerve energies, stating that perception is defined and constrained by the pathway by which sensory information is carried. This, in turn, became a matter of debate regarding functionalist approaches to the nature of qualia; which, in turn, are cornerstones of some current approaches to the hard question of consciousness. However, if we are going to explore what insights the phenomena of synesthesiae bring to our understanding of consciousness, we must first have a good grasp as to what synesthesiae actually are, and are not. 'Synesthesia' is often defined as the involuntary, invariable overlaying of sensory perception either onto perceptions from 'another sensory modality', such as color overlaid upon musical sounds, or upon a cognitive constructs, such as the letter 'A' or the month 'January' being connected with an odor or flavor. There are (at least) four different categories of synesthesia: congenital; adventitious; drug-induced; and via altered states of consciousness (ASC) attained through meditation or trance. This presenta-

tion investigates the biological aspects of synesthesia, from genetic to neuro-architectural to whole body, giving consideration also to cross-cultural differences in how sensoria and thus synesthetic correspondences might be shaped. Towards this, the presentation features the integration of material by Anton V. Sidoroff-Dorso, who explores questions of the variable constructs of sensoria and consciousness from an 'anthropology of the senses' perspective; additional materials by Sidoroff-Dorso will be made available to workshop and conference participants. Genetically, synesthesia has been tentatively linked to chromosome 2q24, with some indications that chromosomes 5q33, 6p12, and 12p12 are also involved. This raises the question of the relationships between different types of congenital synesthesia and the integration of multi-genetic factors. Is congenital synesthesia an adaptation? A neotenic retention? A spandrel? Why and how does our brain anatomy allow for the other categories of synesthesia? On the cyto-architectural level, we have evidence that at least some types of congenital synesthetes have increased connectivity between brain areas; but the question remains as to how – or even if – this increased connectivity plays into facilitating synesthesia. Synesthesia can result from or be lost due to brain injury; however, congenital synesthesia can also be lost due to severe stress or depression. Certain drugs can produce synesthesia, while others can attenuate it. Fluctuating levels of neurotransmitters have also been seen to affect synesthesia. How does this factor in with inhibition-excitation theories of synesthesia causation? Although frequently posited as two sides of a debate, the increased connectivity and inhibition/excitation models of synesthesia are not mutually exclusive. Both aspects are apparently involved in synesthesia. So, how do we construct a model that correctly integrates both? Synesthesia is usually described as being one-way; however, there are cases of bi-directional synesthesia. How do those situations work? Synesthesia is also usually described as the overlay of one additional sensory mode's perceptions; however, for some synesthetes, a single mode's inputs may produce multiple modes' synesthetic outputs. Is projector synesthesia, for example, thus actually multiple synesthesia? **V13**

2.4 Motor control

122 **The Primacy of Proprioception- A Thesis Derived from Evolutionary, Neurological, Neuropathological, Clinical, Robotic Design and Philosophical Considerations** Bruce Carruthers <bcarruth@telus.net> (Retired physician and scholar, Vancouver, British Columbia Canada)

Gibson wrote of proprioception, not as a separate sense, but as the essential self-referring component of all sensory systems. Brooks, in writing about designing robots (top-down), mentions in his list of hard, unsolved problems, their inability to patch together a stable world-view while walking through a room. Merleau-Ponty wrote of the primacy of perception as a direct presentation from reality which serves as a foundation for mental images to be stabilized before crossing the body-mind barrier in being re-presented, while leaving the "things in themselves" behind. He notes the function of subject/object reversibility within sentient corporeal flesh which serves to found perception of both self- and outer-objects/events, stabilized in ways that don't involve the mind/body irreversibility of subject/object relations, and which can thus form discrete, yet mobile, zero points for orientation of movement and a source of general dimensionality. Dillon points out that any reference (e.g. sensation) presupposes some form of self-reference. Sheets-Johnstone wrote of the primacy of movement, and projected an evolutionary history of proprioception, initiated primarily in "surface recognition sensitivity" as expressed in chemo- and touch receptors, which later migrated inside the body as proprioceptive organelles, informing muscles of their position/activity in inner space and coordination dynamics. They also remained on the surface to become long distance sensors, informing organisms of objects in outer space and their smell/motion. She notes Macnab's suggestion of whole body proprioceptive sensing of "proton motive force" or "electrochemical potential" in bacteria and contrast between "physiological" vs. "environmental" sensing. Dillon's considerations regarding reference would suggest that proprioception must necessarily develop prior to surface dualistic awareness mediated through (objective) organelles. Parker wrote about evolutionary "selection pressures" starting perhaps a billion years ago that

shaped the preCambrian bottom-up surge of basic animal internal body plans (from 3 phyla to our present 32), and the "selection pressure" of a preditor/prey relationship during the "enlightened" Cambrian explosion, leading to numerous explorations of hardened external body forms including eyes being "invented" during this (evolutionarily) restricted period of 10-15 million years. Unfortunately selection pressures resulting in proprioception, if a prerequisite for perception, cannot form fossillized objects to provide hard evidence, and we must rely on logical principles. Jacob and Jeannerod wrote of disparate egocentric and allocentric neurological systems that have evolved to provide complementary frames of reference for the visual system, but do not deal with logical necessities or selection pressures involved in this choice nor the need for ocular prorioceptive transparency. Cole described the dire consequences of losing motor proprioception, with vision an inadequate substitute. These disparate considerations can be transduced into a thesis of the Primacy of Proprioception that provides a mobile yet constant (hence paradoxical) frame of reference for bodily senses used to regulate self-organized intra-corporeal movements, and to found distance senses to observe extra-corporeal objects and events regulated by external causal relationships, both mobile and otherwise. It can provide coordination dynamics for both intra- and extra-organismal movements in the "here and now", and a flexible dimensional framework for extending into the "there and then". **P2**

123 **Neural Basis of Decision-Making and Assessment: Self-Control, Will and Willian James** Gabriel Mograbi <gabriel.mograbi@gmail.com> (Philosophy, Federal University of Mato Grosso (Brazil), Cuiabá, Mato Groso Brazil)

The paper has as its standpoint an epigraph from an already classic author, namely, William James, that cope with the relationship between will, self-control, inhibition and reasoning. My aim is to analyze those philosophical and psychological ideas in light of a cutting-edge neuroscientific experiments. I contend that self-control mechanisms can modulate more basic stimuli and interpret that fact as an example of how higher-level properties can be related to lower-level properties. Decision-Making is one the most intricate and misguided subjects in neuroscience. It is often argued that laboratorial research is not capable of dealing with the necessary complexity to study the issue. Whereas philosophers in general neglect the physiological features that constitute the main aspects of thought and behavior, I advocate that cutting-edge neuroscientific experiments can offer us a framework to explain human behavior in its relationship with will, self-control, attention, inhibition, emotion and reasoning. Assuming the above-cited standpoints, I show the physiological mechanisms underlying the necessary mental capacities involved in social assessment and decision-making. In this research, I also establish a difference between veridical and adaptive decision-making that helps us understand how is possible to create experimental designs that can better mimic the complexity of costs and values present in our day-by-day decisions in more ecologically relevant laboratorial research. Moreover, I analyze some experiments in order to develop an epistemological reflection about the necessary neural mechanisms to social assessment and decision-making. **P2**

124 **Information Theoretic Model of Action Awareness** Anatoly Nichvoloda <nichvoloda@yahoo.com> (Graduate Center City University of New York, Brooklyn, NY)

In an attempt to formulate Helmholtz's (1867) ideas about perception in terms of modern-day theories Karl Friston and Klaas Stephan in their "Free-energy and the brain" (2007) arrive at a model of perceptual inference and learning that can explain a remarkable range of neurobiological facts. Their idea rests on Empirical Bayes and hierarchical models of how sensory information is generated. The use of hierarchical models enables the brain to construct prior expectations in a dynamic and context-sensitive fashion. According to their model, perceptual processes are an emergent property of systems that conform to a free-energy principle. The free-energy principle represents a bound on the surprise inherent in any exchange with the environment, under expectations encoded by its state or configuration. A system can minimise free-energy by changing its configuration to change the way it samples the environment, or to change its expectations. These changes correspond to action and perception, respectively,

and lead to an adaptive exchange with the environment that is characteristic of biological systems. This treatment implies that the system's state and structure encode an implicit and probabilistic model of the environment. Building on mathematical equivalence of free-energy principle and mathematical theory of communication (Shannon and Weaver (1949)) I suggest a model of perception that offers a construal of Helmholtz's efferent/afferent dynamic in terms of a Shannon communication channel. In my model, Friston and Stephan's free-energy is construed as Shannon information, i.e. inherently a surprisal value. In other words, informative perception is construed as a function of a difference between a system's expectation of the sensory input value and the actual value of the sensory input. I apply the model to a motor control system and argue that the model provides a meaningful way of distinguishing between conscious and nonconscious awareness of action. **P2**

125 **Controlling Your Body from an Out-of-Body Perspective Impairs Movements of Contralateral Body-Parts and Reduces Sensation and Proprioception** Hein Van Schie, Willem W. A. Slegers; Nathalie Theelen; Michiel Van Elk <h.vanschie@psych.ru.nl> (Behavioural Science Institute, Radboud University Nijmegen, Nijmegen, Netherlands)

The recent surge in online virtual realities and development of gaming interfaces (e.g. Xbox whole body controller) that provide users with control over an external visual body raises interesting issues about the neurocognitive mechanisms supporting agency, bodily control, ownership and embodiment. Still little is known about the psychological effects and limitations that humans may experience in external body control (EBC). In the present study subjects engaged in a motor control task (grasping and transportation of colored blocks) while wearing a head-mounted display that provided a live feed from a high-speed webcam placed sideways behind the subject (3rd person perspective from a left or right angle) or was attached to the head-mounted display (allowing a regular 1st person perspective). Considering that in the EBC conditions the usual integration between eye-, head-, and shoulder centered coordinate frames is disturbed we expected subjects to encounter problems in controlling their hand movements and experience a reduction in embodiment as a consequence. Results indicate that subjects' in the EBC condition moved more slowly and made more errors in selecting blocks of the wrong color as compared to subjects from the regular perspective condition. The difficulties experienced by the EBC group were found most pronounced when they had to use their contralateral hand (i.e. hand contralateral to the position of the camera). This pattern was confirmed by the results of a questionnaire that asked subjects about ease of control experienced during the task. In addition to disturbances in external body control questionnaire data revealed that subjects noted reductions in sensation (less prickling sensation and less feeling of the hands) and a clear decrease in the weight their arms and hands. These findings suggest that EBC may be accompanied by impairments in movement control, especially in body-parts contralateral to the viewpoint of the user. Furthermore, reductions in sensation and proprioception may correspond to frequent media reports of gamers collapsing behind their computers, presumable because of losing touch with their bodily needs. Further study is necessary to investigate prolonged effects of EBC and extend these findings towards virtual applications. **C6**

2.5 Memory and learning

126 **'Memory Bytes' - A Molecular Match for Activated CaMKII Encoding Microtubule Lattices** Travis Craddock, Jack A. Tuszynski; Stuart Hameroff <tcraddoc@phys.ualberta.ca> (Sherwood Park, Alberta Canada)

Conscious memory and long-term potentiation (LTP) are understood as synaptic modulation, however mechanisms for encoding and distributing memory-related information remain unknown. LTP is supported by numerous factors including post-synaptic calcium ion influx, which activates the hexagonal calcium-calmodulin kinase II (CaMKII) holoenzyme, causing a remarkable transformation. Upon activation a maximum of six kinase domains extend upward, and six kinase domains extend downward from the CaMKII association domain, the activated holoenzyme resembling a robotic insect 20 nanometers in length. Each of these

six extended kinase domains can be capable of phosphorylating other proteins, or not, thus potentially encoding information as an ordered collection of six binary 'bits' and thus a 'byte', with 26 (64) possible phosphorylation states, programmed by calcium flux waves implicated in conscious memory. Where and how could activated CaMKII memory bytes be processed, encoded and distributed? Though generally overlooked, the neuronal cytoskeleton including microtubules, intermediate filaments, actin and centrioles are logical candidates. Microtubules are cylindrical lattice polymers of the protein tubulin, which binds, and is phosphorylated by activated CaMKII. Using molecular modeling, in this study we found that spatial dimensions and geometry of the six extended CaMKII kinase domains precisely match those of microtubule hexagonal lattices (both A and B-lattices), and show two feasible phosphorylation mechanisms. In one, the 'S site' on CaMKII extended kinase domains interacts with a recipient site Serine 444 on a C-terminus 'tail' of beta tubulin in the microtubule lattice. In the second mechanism, the extended CaMKII kinase domain unfurls, allowing the 'S-site' to contact surface Threonine and Serine sites in the C-terminal region of tubulin in the microtubule lattice. We suggest cellular mechanisms for memory include activated CaMKII holoenzymes encoding information bytes (6 bits) to hexagonal microtubule lattices for processing, distribution and storage. We present a testable framework for conscious memory via CaMKII-microtubule phosphorylation in brain neurons. **C 13**

127 **Have You Ever Thought that Memory is Not Inside Your Brain?** Eugene Ledezma <eugenio@inaoep.mx> (Astrophysics, INAOE, San Andrés Cholula, Puebla Mexico)

For any of the diverse definitions of consciousness, memory is one of the most important ingredients. However, more than a century after the discovery of neurons, we haven`t been able to propose a mechanism to explain how memory works. We have relied on gross "models" such as file drawers, videotapes, hard disks or microchips, none of whom have had any experimental support. Although the ideas here presented have no any scientific evidence either, it is not the intention to provide a model, but rather just a pointer to guide research into another direction, that may produce better results than the current lines of investigation.The main idea to be discussed is that the brain is not a repository or warehouse of reminiscences or memoirs, but rather, that some parts of the brain/body function as transducers, a kind of "eye" to the past, that allows us to "see" images of past events or situations in a very similar way as we have perceived them. An analogy to this would be that of a TV screen, that allows us to perceive images that are produced far from us. In this situation, a TV technician can observe how the voltages, currents and temperatures of the different integrated circuits, resistors and capacitors that make up the TV set change according the type of image that is seen in the TV, but if the technician tries to dissect the different components of the set in order to find any images, of course s/he will fail, since the images aren't there, but in the TV station.The above situation may be similar to our modern neuroscientists trying to find memory correlations by identifying the regions of the brain activated by the fact of remembering some things. They will find changes in PET or FMRI scans in certain parts of the brain that correlate with certain types of memoirs, but this doesn't exactly means that the memoirs are in that region, although it may mean that that region is in charge of "receiving" that particular type of past information. Up to this point, the author (an independent researcher in this field) has tried to explore this hypothesis by means of meditation and alpha rhythm enhanced by neurofeedback, but after a total of more than 6 years living as a hermit has not written any valuable report. Given the fact that after hundreds of presentations by the most brilliant minds of our time on more than 18 years of TSC meetings have not produced a significant advance in the understanding of consciousness (although there have been impressive advances in neurosciences and related fields), the inclusion of some how far fetched ideas such as this may be good for the field. Even if only a small degree of certainty is found, the potential to produce new knowledge is great. Some favorable suggestions based on the studies and biographies of painters, songwriters and other artists will be discussed, as well as some drawbacks and inconveniences of these ideas. **P8**

2.6 Blindsight

2.7 Neuropsychology and neuropathology

128 **Christopher Badcock's "The Imprinted Brain" and the Brain's Default System** Uziel Awret <uawret@gmu.edu> (School of Quantum Computation, George Mason University, Falls Church, VA)

Christopher Badcock's "The Imprinted Brain" (2009) suggests that a wide behavioral spectrum stretching from autism to psychosis is determined by competing maternal and paternal genes. While compelling the theory is not meant to be a neurological theory and the Brain's Default Network (BDN)is not mentioned in the book. This paper suggested that Mark Beeman and John Kounios' "The Aha! Moment, The Cognitive Neuroscience of Insight" provides us with the missing neurological chapter and could be seamlessly combined with Badcock's theory. The BDN is closely related to the aforementioned spectrum, from schizophrenia (Susan Whitfield-Gabriel) to autism. As we move away from the edges of the behavioral spectrum we encounter a genetically determined mixture of what Beeman describes as two distinct cognitive styles. One more intuitive, activating far ranging associations, and one that is more analytic and detail oriented. The genetic balance itself is determined by the population?s need for different problem solving styles. Discovering the pertinent gene clusters (autism and schizophrenia are hereditary) is a great challenge that will demand combined input from genetics, proteomics and cognitive neuroscience. To end I will suggest that the connexin protein family that has about 80 different members and the way it is distributed in the different parts of the BDN like the precuneus, the MPFC and the ACC could have something to do with it. The Aha! Moment , John Kounios and Mark Beeman, Current Directions in Psychological Science Vol. 18, No. 4. (2009) Hyperactivity and Hyperconnectivity of the Default Network in Schizophrenia and in First Degree Relatives of Persons with Schizophrenia. Susan Whitfield-Gabriel et all. PNAS, Jan 27, 2009. **P2**

129 **Mind Wandering - Feelings and Thoughts** Wlodzimierz Klonowski , Pawel Stepien; Robert Stepien; Michal Pierzchalski <wklon@ibib.waw.pl> (I.Biocybernetics & Biomed. Eng., Institute of Biocybernetics and Biomedical Engineering Polish Academy of Science, Warsaw, Poland)

Dynamical rules governing processes in the brain are not known and mathematical theory that would make possible analysis of such rules does not exist. That is why we based our simulations on simple probabilistic rules on a 2D lattice with 'excluded volume effect' that provides a kind of coupling and is a counterpart of 'recovery period' of a neuron when the neuron may not transmit another nerve impulse. This way processes characterized by short time-scale, that we call 'feelings', may occur unconsciously and temporarily exclude large number of neurons from taking part in logical conscious processes, that we call 'thoughts'. As our simulations suggest mind wandering is connected mainly with feelings, which dynamically change brain's phase space, influencing in such a way logical thinking. In our opinion cognitive tasks are processes characterized by a relatively long time scale in comparison with feelings [1]. Nonlinear dynamics shows that even a very simple dynamical rules may lead to very complicated behavior of some dynamical systems [2]. Changes of complexity of EEG-signals measured by correlation dimension [3] or by Higuchi's fractal dimension in time domain [2] show decreasing of EEG-dimensionality, and so of the complexity of brain processes, when a patient becomes more anesthetized. Consciousness may thus be described as a manifestation of deterministic chaos in the brain/mind [2,3] and mind wandering decreases when subsequent 'levels of consciousness' are being switched off. Chaos in the brain and mind wandering are in our opinion essential properties of mental health. References: [1] W.Klonowski: Significance of time scale differences in psychophysics. Cognitive Processing Vol. 10, Issue 1 (2009) S119-S126; cf. http://www.ncbi.nlm.nih.gov/pubmed/18688668 ; [2] W.Klonowski, From conformons to human brains: Informal overview of nonlinear dynamics and its applications in biomedicine, Nonlinear Biomedical Physics, 2007; http://www.non-

linearbiomedphys.com/content/pdf/1753-4631-1-5.pdf [3] Watt RC and Hameroff SR. Phase space electroencephalography (EEG): a new mode of intraoperative EEG analysis. Int J Clin Monit Comput. 5(1): 3-13, 1988. **C19**

130 **Anti-Aging and Neuroprotective Effect of Estradiol in Aging Female Rat Brain** Pardeep Kumar, Pardeep Kumar, Asia Taha, R.K. Kale, S.M.Cowsik And Najma Zaheer Baquer <epardeep@gmail.com> (Jawaharlal Nehru University, School of Life Sciences, Jawaharlal Nehru University, New Delhi, India)

Aging in females and males is considered as the end of natural protection against age related diseases like osteoporosis, coronary heart disease, diabetes, Alzheimer's disease and Parkinson's disease. Most of these changes increase during menopausal condition in females when the level of estradiol is decreased. The objective of this study was to observe the changes in activities of Monoamine oxidase, Glucose transporter 4 levels, Membrane fluidity, Lipid peroxidation levels and Lipofuscin accumulation occurring in female rats of 3 months (young), 12 months (adult) and 24 months (old) age groups, and to see whether these changes are restored to normal levels after exogenous administration of estradiol (0.1 micro-gram/g body weight for one month). The results obtained in the present work revealed that normal aging was associated with significant increases in the activity of monoamine oxidase, lipid peroxidation levels and lipofuscin accumulation in brain of aging female rats but decrease in GLUT 4 level and membrane fluidity. The present study showed that Estradiol treatment significantly decreased MAO activity, lipid peroxidation and lipofuscin accumulation in brain regions of aging rats, and reversal of GLUT 4 levels and membrane fluidity. It can therefore be concluded that Estradiol's beneficial effects seemed to arise from its antilipofuscin, antioxidant, antilipidperoxidative and thereby anti-aging actions. The results of this study will be useful for pharmacological modification of the aging process and development of new drugs for age related disorders. **P8**

131 **Self Evidence: Cognitive Neuroscience and Consciousness as a Variable** Nathan Munn <munnn@umhelena.edu> (General Education, University of Montana - Helena, Helena, MT)

"Self" as a construct is difficult to define. Brain imaging is implicating the precuneus and ventral medial prefrontal cortex as possible default areas of activation during self-reflection, working in concert with other brain structures such as the dorsal-lateral prefrontal cortex, the hippocampus, and limbic structures. In addition, a cohesive conscious experience corresponds to cortical EEG synchronization. Support for these data is found in literature on borderline personality disorder, dissociative identity disorder, major depression, and other psychiatric disorders. Pathological childhood development contributes to these disorders' impaired self-image, self-identity, and self-statements. Psychotherapy is efficacious in treating these disorders of self. Taking these lines of evidence as a whole implies the self is not necessarily a stable entity but rather can be very plastic. A definition of "self" based on these data is presented, along with ramifications on consciousness per se as a variable. A detailed phenomenological/existential case report of a suicidal person is used to illustrate these findings and proposals. **P2**

132 **Voices from the Other Side: Neuroscience, Attachment Theory and the Creative Self** Carole Brooks Platt <carolebrooks.platt@gmail.com> (Independent Scholar / Ph.D. Rice University, Bellaire, TEXAS)

Julian Jaynes originally identified the right temporal lobe's role in the inspired voices of poets and prophets. In his Muse Factor experiment, Michael Persinger used a college questionnaire to show that a sense of alien presence was triggered by intense verbal meaningfulness, which he attributed to synchronous firing of the left and right temporal lobes. Applying the Muse Factor theory to the biography and words of great poets, religious figures and mediums, we see how male dissociative poets and mystics erect a hierarchical and self-confirming system to stabilize the self. Their female counterparts more often self-destruct. In either case,

collaboration between the hemispheres and in therapeutic or creative dyads produces both presence and poetry. What was absent from Jaynes and Persinger was the role of childhood trauma in dissociation. Yet, 19th-century pioneers in psychology had already discovered the traumatic origins of dissociation. Recent scientific research is showing how genetic predisposition plus trauma cause dissociation along with observable changes in the brain. EEG and PET scans have demonstrated that distinct neural networks lie at the base of dissociative states, with differences as striking as blindness versus sight. Neuropsychologist and attachment theorist Allan Schore points to the role of the right hemisphere in developing a core sense of self through the mother-infant bond and dividing it in response to childhood trauma and later stressors. Analysts from the nineteenth through the twenty-first century have witnessed frequent paranormal claims, such as telepathy, in mediums and dissociative patients. Case studies point to the role of an empathic therapeutic matrix where unconscious transfers of information occur and imaginative constructs both heal the patient and change the therapist's own beliefs. **C20**

2.8 Anesthesia

2.9 Cellular and sub-neural processes

133 **The Hypersite Model of Electrofractal Consciousness and the Search for "Bright Matter"** Erhard Bieberich <ebieberich@mcg.edu> (Institute Of Molecular Medicin, Medical College of Georgia, Augusta, GEORGIA)

Consciousness research has focused on defining the physiological substrate of consciousness. However, defining this substrate may not distinguish between the physiological substance generating consciousness and the substance that is conscious. While it is reasonable to assume that these substances are similar, conscious or "bright matter" must have additional features that distinguish it from a non-conscious physiological substance. Bright matter emerges as a physical substance mediating information sharing between cells and molecules. In this study, the location of consciousness will be defined as a hypersite, a biological entity that encompasses the physiological substrate of consciousness and the bright matter emerging from it. The hypersite can be formed by an ensemble of molecules within a single neuron, but may also stretch over cells such as a cortical column of neurons or a neural network. The amount of shared information will determine the spatial extension and duration of the hypersite, which will eventually become self-aware. In this study, we will discuss how information can be shared in such a way that a short-lived molecular hypersite with primitive proto-consciousness extends to an ensemble of neurons with continuous self-awareness. Instrumental to this type of information sharing is the fractal topology of bright matter and its programming by a neural network with equivalent topology. We will also discuss overlapping electron orbitals in membrane lipids and microtubules as candidate substrate for bright matter ("electrofractal consciousness"). Finally, we will discuss how bright matter can be generated in an artificial device and how its presence can be detected. **C3**

134 **Response to recent attack against Penrose-Hameroff Orch OR** Stuart Hameroff <hameroff@u.arizona.edu> (Anesthesiology, Psychol., CCS, University of Arizona, Tucson, AZ)

INTRODUCTION The Penrose-Hameroff orchestrated objective reduction (Orch OR) theory postulates quantum computation in microtubules (MTs) inside brain neurons as an explanation for consciousness. Orch OR has been attacked by McKemmish et al (Phys Rev E, 80:021912, 2009) who assert Orch OR in MTs is biologically unfeasible, and unsalvageable. BACKGROUND MTs are cylindrical lattices of peanut-shaped tubulin proteins. The basic Orch OR idea is that discrete MT tubulin states act as information bits and quantum bits (qubits) in MT computers inside brain neurons. Orch OR suggests MT tubulin qubits switch coherently and compute by entanglement with other tubulins, performing quantum computations which self-collapse by Penrose objective reduction. SPECIFIC CRITICISM OF ORCH OR McKemmish et al focus on switching between discrete tubulin bit and qubit

states, describing tubulins flexing between two conformations (shortening by ~3%) depending on GTP hydrolysis to GDP. They assert such GTP-dependent switching is involved in MT treadmilling in which MTs polymerize at one end and depolymerize at the other, finding such conformational switching too slow for Orch OR. RESPONSES IN DEFENSE OF ORCH OR 1) Neuronal MTs have specific caps (e.g. STOP proteins) which stabilize MTs, preventing depolymerization and treadmilling (J Cell Biology 142:167, 1998). Hence the McKemmish et al scenario does not generally apply to MTs in brain neurons. 2) Contrary to McKemmish et al assertions, tubulin switching in Orch OR is driven by quantum electronic London forces in hydrophobic pockets, non-polar regions formed by aromatic amino acid rings and other non-polar groups within proteins, and sites of anesthetic gas binding and action. Each tubulin has over twenty hydrophobic pockets, including phosphorylation sites for GTP, MAPs and CaMKII. Thus GTP hydrolysis is but one factor regulating tubulin states and coherence, all potentially mediated through collective London forces in quantum hydrophobic pockets. 3) McKemmish et al assume that protein conformation stems exclusively from atomic nuclear motions which then affect delocalizable electrons. This is the bus turning the steering wheel. The rationale for quantum devices is for low energy quantum states to be amplified to regulate conformational (nuclear) motions. Thus quantum events (including conscious events) can exert causal efficacy in the classical world. McKemmish et al completely miss the point. 4) Experimental evidence shows coherent dipole excitations in MTs at 8.085 megahertz (Pokorny, Bioelectrochemistry, 63:321, 2004). McKemmish et al validate MT megahertz coherence, but claim it cannot help Orch OR because energy required to drive coherence of tubulin conformational flexion states is too high. But Orch OR requires superposition separation of only diameters of atomic nuclei, and asserts low energy electronic quantum London forces govern tubulin states. Megahertz coherence in MTs strongly supports Orch OR. 5) McKemmish et al assertions that Orch OR is untenable and unsalvageable are based on misrepresentations and misconceptions. Their funding (from Artificial Intelligence) and statements such that denial of Orch OR gives hope to the vision that digital computing could achieve truly significant levels of artificial intelligence shows their attack is not science but a political hit job. **P8**

2.10 Quantum neurodynamics

135 **The NQUIET (Neuronal Quantum Information and Energy Transduction) Hypothesis An International MindFitness Foundation Initiative** Adam Crane <adam@mindfitness.com> (International MindFitness Foundation/ Sr. Ed., Brain & Cosmos, Ossining, NY)

At least 100 billion neurons in the brain are imbedded in 100's of billions of glial cells. Neurons manifest an AC electrical potential which makes intuitive sense because AC is better for transferring information and energy over distances. This fits well with the established Binding Theory of Consciousness. On the other hand glial cells manifest primarily DC potentials which are (probably) better for transduction. NQUIET hypothesizes that the glia can transduce information and energy directly from quantum fields both inside and outside the brain. The concept is that quantum information and energy is transduced - possibly via microtubules imbedded in the cytoskeleton of the glial cells. A metaphor would be the radio antenna (microtubules) on the top of a ship which transduces radio waves down into the guidance system allowing the massive ship (glial cell) to improve navigation through the sea (consciousness). This model suggests that quantum information and energy is transduced 'into' microtubules of the glial cells and undergoes further transduction into holographic interference patterns which are further transduced into consciousness (perception / creative process / imagery). Creative processes thrive on energy and information from the source - nature. Such information may be further transformed into imagery (think imagination). Glial cells have been shown to have a holographic potential which may be a mechanism that projects creative and coherent thinking imagery into (onto the 'screen' of) the neurons. It is reasonable to suggest that there probably is a way to use neurofeedback (NFB) to facilitate and enhance this innate natural ability. Considerable research demonstrates that (AC) neurofeedback protocols, already developed, enhance creativity. However, the emerging field of DC/SCP EEG may rep-

resent a potential for further enhancing creative processes through self-regulation strategies, which improve the harvesting of information and energy directly from the quantum fields (potential). There is growing scientific interest in what is generically referred to as 'subtle energies'. There are extraordinary correspondences between what modern science calls the quanta and quantum potential, and ancient concepts called by many names such as kundalini, chi, qui, etc. I have begun research with the intention of proving (or disproving) NQUIET Hypothesis, as well as searching for one or more DC/SCP and, or DC/SCP/AC NFB protocols which are more effective in terms of creativity than NFB protocols already developed. The latest expanded, annotated version of the NQUIET Hypothesis has been published in Somatics, 2009, Volume XVI Number 1. I discuss NQUIET implications to brain cell regeneration, evolution, education, self-regulation (including neurocardiology), performance enhancement, longevity and contemporary theories of consciousness including Binding theory, Orchestrated Objective Reduction, Theater of Consciousness and the Holonomic Model. I view NQUIET as a work in progress. Suggestions for evolving the NQUIET Hypothesis are welcome and have been coming in steadily. I expect integrating incoming ideas will further strengthen this model by the time of the conference in April 2010. **P8**

136 **An EEG Quantum Model of Consciousness** Russell Hebert <rhebert@va.gov> (Anesthesiology Care Line, Michael E. DeBakey V.A., Houston, TX 77023)

Consciousness will be divided into ground state and excited state. The ground state will be a state of no information as in transcendental consciousness. The excited state will be cognitive processing. Our findings of alpha standing waves in Transcendental Meditation may represent the link between the brain and the ground state of physics, the vacuum state. Author will discuss inflated quanta, fractals, resonance phenomena, decoherence, recoherence, zero-point motion, super-symmetry and broken symmetry in terms of the ground state and excited states of consciousness. **P8**

137 **The Biochronos Theory: All Cells Possess a Core of Electrons in an Unobserved Quantum State Residing in the Intraluminal Vacuum of Tubular Proteins of the Cytoskeleton** Jesper Ronager <jronager@biochronos.dk> (Neurology, Rigshospitalet - Copenhagen University Hospital, Copenhagen, Denmark)

The MTOC determines the morphology of all cells, and it is equivalent to a quantum cavity; the cytoskeleton polymerizes according to quantum resonance maxima of the intraluminal field. The MTOC replicates by quantum resonance prior to mitosis, surplus electrons are provided by the negative cell membrane potential. In eukaryotes, the temporospatial organization of chromosomes is controlled by quantum resonance patterns in the electromagnetic domain. With focus in the centromere, the Biochronos field extends to telomere region. The nucleosomes act as quantum resonators, controlling gene expression patterns, inclusive the HOX master genes. In animals, the MTOC is located to the centrioles; the perpendicular arrangement allows the daughter centrioles to resonate to a different phase of the Biochronos field (differentiation). 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 Biochronos field grows in complexity (evolution) by auto-resonance; the quantum wave describes a superposition of the morphology of all the generational cycles. The oldest part creates strong resonance (ontogeny recapitulates phylogeny); new patterns can only be added at end of each generational cycle (terminal addition). 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 resonance patterns. 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. The binding of data across maps, between maps, and between the hemispheres takes place in the electromagnetic domain and is mediated by gamma oscillations. A quantum observation exclusively

takes place in a living cell, and implies transfer of information to the Biochronos field, eventually changing the organism's morphology, metabolism or both, thereby in a teleological way increasing the long term stability of the organism?s core quantum field. In one of the possible universes, the physical constants allowed carbon based life to form, and an extraordinary recursive quantum solution created the first cell, LUCA, and hereby the first observer. The first observation caused the primordial quantum wave to collapse, creating a one-dimensional singularity in the time dimension, extending from Big Bang 13.7 billion years ago to the LUCA singularity 3.7 billion years ago. Since then, the Earth-centered Hubble volume has moved forward in time, driven by the quantum Zeno effect from continuous observations by the cells in the Biosphere. This anthropic model explains the initial low cosmic entropy, the flat cosmic geometry, and the alignment of the cosmic microwave background with the solar system. The model does not require inflation or Higgs particles, and when correcting observed cosmic red-shift for the growth in the time dimension, both black matter and black energy can be shown to be illusionary. **P8**

2.11 Pharmacology

138 **Effects of the Psychedelic 3,4-Methylenedioxyamphetamine (MDA) in Humans** Matthew Baggott, Jeremy R. Coyle, Jennifer D. Siegrist, Keith Flower, Gantt P. Galloway, Lynn C. Robertson, John Mendelson <matt@baggott.net> (Cal Pac Research Inst & UC Berkeley, San Francisco, CA)

3,4-Methylenedioxyamphetamine (MDA) is a psychoactive phenethylamine that is related to MDMA ('Ecstasy'). Research increasingly supports the idea that this latter drug has emotional effects, including feelings of closeness to others and sociability, that are not shared by most hallucinogens. However, because MDA has not been studied in humans in over 30 years, it is not clear in what ways it is similar to MDMA and in what ways it is similar to hallucinogens like LSD. To better characterize MDA, we conducted a double-blind placebo-controlled study administering MDA to 12 healthy volunteers. We compared effects to those from our studies of MDMA. MDA altered attention to emotional stimuli, consistent with decreased threat vigilance, a hypothesized mechanism of MDMA effects. Changes also included significant increases in closed-eye visuals (CEVs). Magnitude of CEVs after MDA was associated with lower performance on measures of contour integration and object recognition, supporting a hypothesized link between hallucinations and impairments in sensory or perceptual processing. Overall, MDA produced changes that were similar those of MDMA as well as effects expected from LSD-like hallucinogens. **C7**

2.12 Neural synchrony and binding

139 **How are Synchrony and Suppression Related to Conscious Experience?** Eric Larock <larock@oakland.edu> (Philosophy, Oakland University, Rochester, MI)

Over the past few decades research in neuroscience has exploded in the area of visual consciousness. Neuroscientists have begun to unravel considerably more details about some of the functions and possible causes that underlie visual consciousness. What is fascinating about our current knowledge of the brain's visual system is that consciousness of an object's properties involves the activity of neurons distributed throughout the visual cortex. Specialized subassemblies of neurons have been identified in different areas of the visual cortex that respond to specific properties of objects, such as shape, color, motion, and location. From a biological point of view, the evolution of these specialized neuronal areas has enabled the brain to represent the particular properties of an object more economically. But the advantages of functional specialization have led to apparent gaps in our attempts to provide a thoroughgoing neural story of the unity of consciousness: thus far, there is no known central processing mechanism, or convergence site in the brain, where perceptual information about an object's properties could coalesce to form a unified object of consciousness (see Crick & Koch, 1990; Singer, 1996, 1999, 2007). What binds the distributed representations of an object's properties into a unified object of consciousness? The recognition of this vision-related binding problem has motivated temporal theories of binding in neuroscience, most notably the neuronal

synchrony hypothesis (Peter Milner 1974; Crick & Koch 1990). For example, Wolf Singer (1996, 2007) contends that binding the distributed representations of an object's properties is achieved by "the synchronization of neuronal responses with high temporal precision" (2007, p. 608). Singer also alleges that conscious experience depends upon the binding activities that underlie the formation of a unified meta-representation: "If conscious experience depends on the ability to dynamically bind the results of subsystem computations into a unified meta-representation, conditions required for the formation of meta-representations ought to be the same as those required for awareness to occur" (Singer, 2007, p. 607). A philosophical upshot is that binding is necessary for conscious experience, since without binding there could be no unified meta-representation. Luck and Beach argue in favor of a neural suppression account of binding: binding is "achieved by simply suppressing information arising from unattended locations", thereby allowing the neurons that remain active to "reflect features of a single object" (1998, p. 461). Neural suppression operates to filter out unattended information so that the neurons which remain active can render explicit the representational properties of an object. I elaborate and provide a critique of Singer's view, and then examine Luck and Beach's neural suppression account. I argue (1) that neuronal synchrony is not sufficient for binding the distributed representations of an object's properties into a unified object of consciousness; (2) that binding is not necessary for conscious experience; and (3) that although synchrony and suppression might play the role of tagging the distributed representations of an object's properties when competition arises within the cortical neural network, this does not explain the more difficult question about the unity of consciousness. **C17**

140 **No Syncrony Below N+1: The Sum of the (Parent and Daughter Particles As) Members of a Self-Inclusive Set** Francis Schwanauer <franz@usm.maine.edu>
(Philosophy, University of Southern Maine, Portland, ME)

Aristotle's predicate logic, which classified any '1' substance with its simultaneous 'n' characteristics an early symbolic version of our practical present day accelerators or atom smashers of '1' parent particle into its 'n' synchronous daughter particles – was eventually elaborated upon by set theory, which allowed for a fitting inclusion of the '1' among the 'n', for the 'n+1' members of a self-inclusive set, by such as Russell. This self-inclusion by way of 'n+1' was paralleled in physics by subsuming the synchronously moving 'n', such as the two ends of the lever (cp. Archimedes), or 'action and reaction' (cp. Newton), under the '1' transformation and/or chain reaction a la E=mc2 (cp. Einstein). With the given synchrony of the 'n+1' as a spatial relation still short of its plausibility as a temporal relation, however, science was forced into a non-linear dynamical face-lift of our linear dynamical image of causality by means of a selective representational apparatus (RA), to cope with the more complex transformational wake of 'n+1'. This historical, useful, and apparently harmless improvement on the merely 'mechanical' and no longer adequate classical approach with a 'conscious and decisive', RA, as culminating in the postulate of some 'free' agent in super-positional charge of natura naturans, however, not only smacked of a metaphysical admixture to research and methodology, but also split the world of serious science into two opposing camps at a ratio of roughly 88/12 between proponents of upward and downward causation, respectively. Nevertheless, this split among otherwise likeminded colleagues is fortunately premature and largely unwarranted, since neither of the opposing camps has as yet demonstrated to the other, how one and the same RA can or cannot be two such absolutely divergent items as 1: 'a symbol' of a myriad of representational possibilities to choose from, and also 2: a 'concisely comparing or even whimsically preferring judge' deliberately choosing among them. Yet a more intensive study of synchrony in self-organization - such as the human body - shows that the RA cannot be both a representational possibility and its comparing judge at one and the same time, since (demonstrable) synchrony as confined to such as attraction and repulsion, action and reaction, the two ends of the lever, etc., is not an internal or local property but an external non-local condition of any 'n', and thus is not deducible from the synchronously moving 'n', but their simultaneously transforming '1' in 'n+1' as a self-inclusive set. As I try to show in my paper, synchrony among the local emanates from the non-local, as is evidenced by its local tracks in any RA and the observation of the shadows of the Higgs boson in Cern. **P8**

141 **Beyond the Binding Problem: Toward an Experiential Model of Nested Binding Levels to Integrate the Components of Experience** James Clement Van Pelt <james.vanpelt@yale.edu> (Initiative In Religion/Science, Yale University, New Haven, CT)

If the binding of sensory components into a single sense (e.g. vision) is mysterious, an incalculably greater mystery is the means by which all the senses bind together into a unified sensory totality, i.e. the sensorium – "the array of senses, feelings, and bodily orientations" through which sentient beings experience the world and themselves. The transformation between those two binding levels – from sensory components to senses, and from senses to sensorium – implies a succession of such transformations and levels, each extended from the previous level and nested within the next. In that progression, the level beyond the binding that produces the sensorium is the occasion at which the sensorium is bound with its mental equivalent comprising memories and other associations, thoughts and concepts, and mental (not physical) sensations. The sensorium and its mental equivalent interact to produce, and are bound together with, their affective equivalent, i.e. the unified experiential sphere of emotional and other "feelings' that are neither purely physical nor purely mental, including states sometimes called subtle for which no names may exist. The parallel processing of sensory, mental, and affective components into a unified appearance may suggests that the distinction usually made between physical/neural binding and metaphysical/ experiential binding may be false, since (for example) the binding of a shape, a color, and a texture together to present a single image requires some degree of recognition, and hence experience, to move the process to the next cognitive step. Likewise, the metaphor of a progression of levels from physical substrate to experienced appearance could be misleading, since the binding of the senses, feelings, and mental contents happens simultaneously, interactively, and in parallel such that patterns and meanings are identified along the full continuum of emerging experience. For example, the sensation of burning, the feeling of alarm, and the intention of withdrawing one's hand from the stove are developed as discrete yet interwoven strands, allowing the protective reaction to occur prior to the final production of the integrated appearance. This may contradict the representation model of consciousness asserting that the sensorium must present its appearance prior to affective or mental responses. Certain questions present themselves. Is there a "common sense" (sensus communi) into which the discrete senses are translated, as implied by synesthesia? Is the binding process at each level partly telic, i.e. is the causal direction entirely "bottom up" or is the binding constrained by prehension of how the components are related as much as by the components themselves? How many steps altogether compose the entire binding progression? Is basic sensory binding (e.g. vision) the fundamental level in the process, or is there an even more fundamental binding prior to that? What does the experience of unbinding, by volition or fatigue, and the effort required to "hold things together" between sleep periods, indicate about the separability of experience from the experiencer? This presentation explores such issues and the first-person techniques that can be employed to trace the experiential correlates of the underlying neurology toward the development of an experiential model of the multilevel binding process. **P2**

2.13 Emotion

142 **A Computational Model of Emotions: Anxiety and Fear** Peter Raulefs <pr@qiqcs.com> (QIQCS, Santa Clara, CA)

In studying emotions, we consider [1,2,3]: (1) The phenomenology as described by cognitive, behavioral, and physiological manifestations of emotional experiences. (2) Mental states established by neurobiological processes that relate to emotional experiences. (3) Neurobiological processes that instantiate emotional experiences. We propose a computational framework used to construct models of emotion to explain what emotions are, how they evolve, and how they result in observable manifestations. We show how such models provide testable theories of emotion, and enable simulations of emotional processes with testable predictions of behavioral responses to sensory and cognitive stimuli evoking emotions. The computational framework provides (a) Computational primitives that include an abstract state space, operators to implement state transitions, and combinators to aggregate operators into pro-

cesses on state spaces. (b) A mapping that interprets the computational framework in terms of Global Workspace Theory (GWT) [4]. (c) Realizations of the computational primitives in a probabilistic setting where states range over random variables and operators are probabilistic functions that also absorb and pass continuations. (d) A continuation mechanism, developed for denotational semantics of programming languages, enables us to link a current state of processing into particular contexts. The utility of the framework is shown by realizing computational primitives with deterministic functions, neural networks, as well as quantum computations. Using this framework, we develop a computational model where emotions are transformations that bind to cognitive states, and transform cognitive states formed from coded and assessed sensory and cognitive stimuli into states with attitudinal and tendential components that change the probability of evoking behavioral responses. State transformations are aggregated into concurrent processes that are (1) triggered by sensory and cognitive stimuli, (2) create appraisals and integrate with associated information (incl. relational and situational content), and (3) produce attitudes and core affects. Attitudes, core affects, and the various types of content are integrated into affect objects that exhibit emotional states and attitudinal behaviors, and together execute processes resulting in observable behavior. We apply this approach to construct a computational model of the emotions of anxiety and fear. Anxiety and fear are emotional experiences characterized by feelings of apprehension, distress, and uneasiness. In our computational model, such feelings are represented as content-rich objects carrying degrees-of-pleasure/displeasure tags, and continuations that incorporate changes in attention levels and behavioral tendencies. This approach accounts for the distinction between fear being directed towards particular objects, and anxiety being vague and objectless. This model is consistent with experimental findings in [5,6,7], and demonstrates how Global Workspace Theory (GWT) provides a high-level conceptual framework instantiated in this model. Conscious and unconscious mental states are differentiated by an awareness metric that also accounts for "fringe" phenomena [8]. We show how critical aspects of anxiety and fear are addressed, but missed in the H-CogAff architecture [9], and propose experiments to help verify or modify the model as abstraction of as yet unknown neurochemical activities. **P8**

2.14 Sleep and waking

143 **Quantifying the Richness of Phenomenal Experience** Tomer Fekete, Tomer Fekete, Itamar Pitowsky, Amiram Grinvald, David B Omer <tomer.fekete@mail.huji.ac.il> (Biomedical Engineering, Stony Brook University, NYC, NY)

As arousal waxes and wanes, the richness of our experience alters profoundly - from the near oblivion of dreamless sleep to the exquisite detail of full-fledged alertness. How is this mirrored in the underlying brain activity? The key to this puzzle is to be found in the following observations: 1) To support increasingly rich experience the underlying activity - the vessel of content - must rise to the challenge by matching complexity of experience with complexity of structure. The complementary point is that richness of experience in a given state is in a sense invariant, and hence the complexity of activity must be as well; 2) The richness of experience supervenes on the ability to draw increasingly refined distinctions concerning the environment (and the content of experience itself). This entails that the structure of underlying neuronal activity space increase its complexity mirroring the myriad of relations between the contents of experience. Finally, these two sources of complexity need to be coupled as not to undermine each other. In light of these observations, representational capacity is defined as the coupling between the complexity of structure of (neuronal) activity space and the complexity of activity. Representational capacity can be given a concrete realization following the geometric framework of representation formulated in [1]: First, a state indicator function attuned to state dependent complexity is fitted to neuronal data. Next, the state indicator function is used to reconstruct the underlying neuronal activity spaces (via a level set method). Finally the complexity of the state dependent activity spaces can be measured employing the topological notion of complexity, homology, which we argue is the pertinent measure of the complexity of neuronal activity spaces: The ability of a system to make distinctions is reflected by clustered activity. Homological structure indicates not only the degree to which

underlying activity is inherently clustered but also registers the effective dimensionality of the configurations formed by such clusters. As a proof of concept the theory was applied to primate (voltage sensitive dye) imaging data collected in disparate states of arousal: under anesthesia, while the primate's eyes were closed, and in the presence of simple visual stimuli. As predicted it was found that representational capacity grew monotonically with arousal. Not only did the complexity of activity increase with arousal, but moreover, the complexity of structure of neuronal activity space as measured by multi-scale homology increased as well [2]. References: [1] Fekete T, (2009). Representational systems. In press, Minds and Machines, DOI: 10.1007/s11023-009-9166-2 [2] Fekete T, Pitowsky I, Grinvald A, Omer DB. (2009). Arousal increases the representational capacity of cortical tissue. J Comput Neurosci. 27(2):211-27. **C12**

144 **The Neurochemical Switch (GABA) That Turns Off Conscious Thought**

James Pagel <pueo34@earthlink.net> (Family Medicine - Pueblo, University of Colorado School of Medicine, Pueblo, CO)

Sleep is defined as the reversible loss of behavioral interaction with the environment. The initiation of sleep requires the turning off of conscious thought. Multiple 'neurotransmitters' have been well described as exerting control over the states of sleep, however, recent research into the neuroregulation of synaptic interaction in the central nervous system has determined that only three of these neurochemicals are actual neurotransmitters with the capacity to transmit a neural impulse across a neural synapse: one is positive (glutamate), and two are inhibitory (glycine and GABA). The larger group of compounds, including acetylcholine, serotonin, dopamine and norepinephrine, previously classified as neurotransmitters, are now classified as neuromodulators. Such neuromodulators may potentate or inhibit the transmission of nerve impulses yet these neurochemicals are unable to independently affect synaptic transfer of nerve impulses without an actual neurotransmitter being present at the synaptic interface. It is interesting that almost all medications affecting sleep exert their primary effects at one of the primary neurotransmitter receptor systems - the GABA receptor. Sleep inducing medications exerting primary effects at this inhibitory receptor include ethanol, barbiturates, barbiturate like agents, and the benzodiazepines (1). Psycho-pharmacologic effects exerted at this receptor extend beyond sleep to affect other aspects of consciousness including anxiolysis, sedation, amnesia, anesthesia, pain relief, nightmares, and disturbed dreaming (2). These various effects are modulated at specific GABA receptor sub-types with properties varying depending on subunit combinations. Full agonists induce a combination of effects with potential detrimental consequences as well as desensitization of the receptor leading to tolerance and withdrawal symptoms. Drug induced imbalance of GABA inhibition is a characteristic feature of ethanol, barbiturate and benzodiazepine addiction. GABA receptors are widespread in the CNS, however, the subunit stoichometry and specific regional distributions of various receptor sites in the CNS are still being elucidated. Sleep is a complex, global state existing independently of waking conscious thought. While the neurochemistry of this system is complex, it is remarkable that this one very important neurotransmitter system is the primary site at which neurochemicals affect and induce sleep and dreaming as well as affecting other states of conscious disconnection including anesthesia, sedation, amnesia, and addiction. Neurochemists have known of the GABA receptor for decades. Now, advances in our understanding of synaptic neuroconduction are resulting in a reassessment of its importance. It is increasingly apparent that GABA is the site at which waking consciousness switches to the non-conscious states of sleep and dreaming. – 1) Pagel JF, Sleep and Dreaming, Medication Effects and Side Effects, in Sleep Disorders ? Diagnosis and Therapeutics. SR. Pandi Perumal, Joris C. Verster, Jamie M. Monti, Malcom Lader & Salomon Z. Langer , Informa Healthcare, London, 2008, pp. 627-642. 2) Pagel JF. Kram G. Insomnia: Existing approaches and medications for treatment, in GABA and Sleep: Basic Mechanisms, Pathophysiological, Pharmacological, and therapeutic Aspects, ed. J. Monti, S.R. Pandi-Perumal, H. Mohler, Birkhauer Verlag A. C. Basel, Switzerland - in press 2009. **P8**

2.15 Specific brain areas

145 **Two Legs, Two Arms, One Head. Who am I?** H. Henrik Ehrsson <henrik.ehrsson@ki.se> (Department of Neuroscience, Karolinska Institutet, Stockholm, Sweden)

Ask any child if his hands belong to him and the answer will be "Of course!" But how does the brain actually identify its own body? In this talk I will describe how cognitive neuroscientists have recently begun to address this fundamental question. It has been known for some time that patients with damage to their premotor or parietal lobes can fail to recognize their own limbs (e.g. after stroke). This suggests that these brain regions are involved in generating a sense of body ownership, but says nothing about how this is achieved. In my presentation I will present experiments that suggest that multisensory mechanisms are crucial for how we come to experience that we 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, or, that they are outside their physical body and inside the body of other individual. 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. By clarifying how the normal brain produces a sense of body ownership, 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 ground-breaking applications in the fields of virtual reality and neuro-prosthetics. **PL3**

2.16 Miscellaneous

146 **A Systems Model for Selectivity Between Default and Task Modes** Kevin Brown, Jonathan Smallwood; Jonathan W. Schooler; Jean M. Carlson <brown@physics.ucsb.edu> (Physics, University of California Santa Barbara, Santa Barbara, CA)

Neuroimaging data suggests that the human brain has at least two attentional states - a task-focused mode in which attention is focused externally on the task at hand and a less constrained internal mode dubbed the default state. An essential step to understanding the distinct processes governed by these different states is to understand the way in which the brain divides finite cognitive resources and selects among externally- and internally-driven goal states. We present a coarse-grained, systems-level dynamical model which explores the temporal nature of the interaction between these different modes, in which we examine the role of the locus coeruleus in modulating between external events and internally generated signals. We discuss the implications of the model for understanding mindwandering and attentional failures, which we characterize as partitioning of cognitive effort away from externally-driven tasks to internally-generated ones. We also discuss the potential of directly fitting the dynamical model to multimodal dynamical measurements (surface EEG, BOLD fMRI and pupillometry data). **C3**

147 **Neurohydrodynamics: a Window for Conscious Cognition** Leon Hardy, Daniel S. Levine; Dahai Liu <leonhardy@mail.usf.edu> (ESPG, University of South Florida, St. Petersburg, FL)

Abstract: Understanding human cognition, intelligence and consciousness requires more than an algorithmic description by a formal set of rules. It must also encompass what Alan Turing called an uncomputable human 'intuition'. As a mechanism for human intuition, Turing proposed the use of an 'oracle' by an agent to instantaneously specify which of the agents choices will lead computationally to a solution in a timely manner. Such guidance by an oracle is an important but not a very well understood aspect of human cognition, intelligence or even consciousness as it indicates when a decision has occurred and halts any further unnecessary computation. In this sense, Turing anticipated the connectionist approach to artificial intelligence, where a 'program' is implicitly written using a set of rules within the realm of computability. Turing's influences do not end here. Turing's theory of morphogenesis can account for pattern formation in chemical and biological processes through a set of reaction-diffusion equations. Remarkably, this type of reaction-diffusion equations were also investigated by Turing, and his theory of morphogenesis was able to account for pattern formation and self-organization in chemical and biological processes. It should come as no surprise that the reaction-diffusion processes of real neurons have been shown to aid in pattern formation while exhibiting self-organization important to memory, learning, decision-making, emotion, cognition, and may provide a window into consciousness. We model neural pattern formation in neural network with these type of reaction-diffusion equations but described by a modified set of Cohen-Grossberg equations, which we call Neurohydrodynamics. In this approach, an 'oracle' deterministically guides the dynamics of a neural network through the neuropotential that arises biologically from the reaction-diffusion processes at the synapses of real neurons. Neurohydrodynamics incorporates a guidance mechanism into a hierarchical neural network model of learning, cognition, emotional influences, decision-making and, perhaps may provide a window into consciousness. We demonstrate that the neuropotential provides a new type of reinforcement learning useful for characterizing short-term memory and pattern formation in neural networks through a computer simulation. **P8**

148 **Wandering Minds** Malia Mason <maliamason@columbia.edu> (Management, Columbia University, New York, NY)

What does the mind do in the absence of external demands for attention? Is it essentially blank, stirred only when the sensory environment begs for action? Everyday experience challenges this account of mental life. People spend considerable time engaged in introspectively-oriented thought, yet almost all psychological explorations of attention focus on how people process the external sensory environment. Using a combination of behavioral and functional imaging (fMRI) methods, the current project seeks evidence that in the absence of an absorbing external task, attention is drawn to the endless stream of images, voices, thoughts and feelings that constitute our internal experience. After demonstrating that people have a proclivity for orienting to their internal milieu, we attempt to specify where the mind wanders and how this tendency gives rise to distraction. Although this work highlights how and when the mind wanders from the immediate environment, a more intractable question is why attention is so easily captured by endogenous information in the first place. We conclude by considering what might be adaptive about a mind with this capacity for wandering. **PL12**

149 **Network Architecture of the White Matter Pathways in the Macaque Brain** Dharmendra S. Modha <dmodha@almaden.ibm.com> (Mgr, Cognitive Computing Group, IBM Research - Almaden , San Jose, CA)

Understanding the topological structure of the white matter projection graph (``projectome'') that is mediated by long-distance, white matter communication pathways is essential for unraveling the mysteries of the brain's function, organization, and evolution. To this end, we derive a novel network incorporating 410 anatomical tracing studies of the macaque brain from the neuroinformatic database CoCoMac. Our network consists of 383 hierarchically organized regions spanning cortex, thalamus, and basal ganglia, has 6,602 directed connections,

is 3 times larger than any previous brain network, and contains sub-networks corresponding to classical corticocortical, corticosubcortical, and subcortico-subcortical white matter fiber systems. The degree distribution of the network is consistent with an exponential distribution. We discover two remarkable bridges between brain's structure and function via network-theoretic analysis. First, prefrontal cortex contains a lion's share of topologically central regions. Second, there exists a tightly integrated core circuit, spanning premotor cortex, prefrontal cortex, temporal lobe, parietal lobe, thalamus, basal ganglia, cingulate cortex, insula, and visual cortex, that contains both the task-positive and task-negative networks and may be the substrate for higher cognition and consciousness. **PL4**

150 **The Frames of Consciousness: The Role of Motivation and Emotion**
Jordan Peterson, Jacob Hirsh <jordanbpeterson@yahoo.com> (Psychology, University of Toronto, Toronto, ONTARIO Canada)

Classic theories of action in the world are predicated on the assumption that objects exist, in some simple manner, and present themselves in that manner directly to perception. These objects are then evaluated, cognitively and emotionally, and action calculated, as a consequence of such evaluation. The emergence of the frame problem, a consequence of the extreme but previously unrealized complexity of the world, poses a fatal threat to those classic theories, as does the problem of combinatorial explosion, which manifests itself as the apparent impossibility of calculating the consequences of actions over extended timeframes. The world has to be simplified radically before it can be perceived, or before actions can be successfully implemented. Some of this simplification exists as a consequence of external structure. The artifacts of human culture protect individuals from much of the complexity of the world. Social being performs a similar role, as specialized and cooperative individuals can solve different sub-elements of the frame problem independently. Embodiment also plays a role. The manner in which the human body is constructed enables certain kinds of perceptions and actions, and makes others difficult, if not impossible. The psychological consequences of embodiment also play an important limiting and enabling role. Human individuals confront the world with an array of fundamental motivations, many of which are a direct consequence of hypothalamic function. The hypothalamus frames perception, projects to motor systems, and modulates autonomic responses, governing hunger, thirst, sexual responsivity, aggression, and exploration, among other primordial motivations and values. The emotional systems of the brain, governing approach and withdrawal, operate within those frames, in an essentially cybernetic manner, informing the organism directed by hypothalamic prompting whether perception, cognition, and goal-directed action is resulting in the consequences that are currently desired. Higher order cortical centers regulate the interaction between different hypothalamic value systems, organizing those intrapsychically and socially, so that each fundamental necessity can be successfully achieved, in the social world. Thus, the archaic and deeply physiological brain centers that human beings share with other animals, far down the evolutionary hierarchy, unconsciously structure our conscious phenomenological worlds. **P8**

151 **Finding the Function of Default States** Adrienne Prettyman, Stephen Biggs <adrienne.prettyman@gmail.com> (Philosophy, University of Toronto, Toronto, Canada)

Brain scans show that subjects who lay awake and still without being given a task enter a particular type of brain state, which is commonly called the 'default state'. Evidence suggests that the default state includes a structured network of brain regions that are, perhaps surprisingly, more active in the absence than in the presence of a task. Raichle et al. (2001; 2009) suggest that default states are particularly important to neuroscience because in the default state the brain is 'active but not activated', and thus, the default state can be used as a neurological baseline. Morcom et al. (2007) counter that since little is known about the cognitive function of the default state, these claims are premature. Adjudicating this dispute has proven to be difficult: since default activity occurs in the absence of a task, one cannot investigate the default state by presenting subjects with a task, but presenting subjects with tasks and observing their subsequent brain activity is the standard method for assessing the function of brain networks. So, given standard methods in cognitive neuroscience, we have reached an

impasse. This paper enters this debate in four ways. First, we provide a critical summary of the debate, emphasizing the constraints that lead to the apparent impasse. Second, we argue that extant attempts to break the impasse invariably rely on a problematic assumption?viz. that the function of a brain region during task performance reveals its function in the absence of a task. Third, we suggest a way forward. More specifically, we suggest that by modifying an existing paradigm for studying sub-personal cognitive processes, one can use standard task-based methods to investigate the cognitive function of the default state. Fourth, we discuss the potential implications of this research for the claim that the default state is the baseline state of the brain. **PL 10**

152 **Explicit Description of the Mind-Body Problem by Autonomous Neural Signals** Anders Wallenbeck, <anders.wallenbeck@telia.com> (Independent Researcher, Vattholma, Sweden)

Either the neurons or the electrochemical flow signals may be considered as the operator (the subject) of the neural system. Acting neurons creates logical inconsistency (closed loops) as things seems to explain them selves. These closed loops fades out into autonomous signals as inversing the description. Acting signals apply the physical system to achieve its performance and this adds an extra dimension to space and time within the description. If the brain works by autonomous signals this, simple principle, allows understanding the intrinsic mysterious nature of the self-aspect. It is thinkable that this principle is a hidden piece of the puzzle, which admits us to explain a manifold of aspects as qualia and other phenomena confusing us. The knowledge on the neural system has grown enormously, since Rene Descartes found it impossible to explain how the mind affects the body. Still, the basic understanding lacks. It is thinkable that the ordinary approach don't fit; whereby the general statement, - the neuron cells 'talks' to each others by the means of electrochemical signals-, is false. Does the neural web really process information? If autonomous signals operate the brain we have an elegant explanation on the memory functionality and other phenomena. Memory (or experience) appears as activated signals instantiated by associative signals. Memory access-time is zero and information is not stored as patterns into any substrate. This implicates a huge capacity to cope with information, despite a very slow signal speed. Such a system builds relevant signal web roads to support signals to operate adequately. This process is 'learning' information, where the information signals creates signal associations to each others. Thereby a thought is activated signals routing them self ('tunneling') by their inherent signal pattern. This 'tunneling' signal flow is the mind. The two faces of information code are the signal pattern and its equivalent route and such acting signals process the information instead of the physical web.The inversed representation of the external world within the brain signal flow admits us to be conscious of an entirety and simultaneously be conscious of its parts. The language shows such a dualistic nature, when the entirety meaning of an expression is achieved with words that mutually define each other. Inversing the signals, from the qualia sensory organs, by encoding into autonomously acting signals appears as 'looking', 'listening', 'tasting' and 'smelling' etc on the external world. In the conscious window autonomous thought signals access memory promptly, excluding route traveling time, and globally within the web to instantiate associative signals. Thereby the signals are 'talking' to each others. It seems conceivable switching the contemplation frame, from neural cells to signals as the center, adds further understanding on how the neural system operate. Do the neural signals inherent information enabling signals to route themselves? Do the neurons admit autonomous signals? In meantime, detecting the answers, is it plausible developing a comprehensive theory based on the principle of autonomous neural signals? This principle states that consciousness is a flow characteristic of an amazing rendezvous within the brain. **P8**

3. Cognitive Sciences and Psychology

3.1 Attention

153 **Where Does the Mind Wander? A Quantitative Exploration of the Content of Stimulus Independent Thought** Ben Baird, Jonathan Smallwood; Michael Franklin; Jonathan Schooler <bbsloth@gmail.com> (Psychology, University of California, Santa Barbara, Santa Barbara, CA)

While stimulus independent thought is now widely recognized to be critical to models of consciousness and cognition, the content of this endogenously generated mental activity has not yet been systematically appraised. Previous research, using methods of post-hoc experimenter classification or online self-classification, has generally limited the analysis of experience sampling reports to relatively constrained sets of pre-defined categories (i.e. on/off task, past/future thought). In this study, we sought to describe in detail the experiential content of subjects' spontaneous thought processes. Experience sampling reports were obtained in the context of demanding and non-demanding sustained attention tasks. Using a combination of Linguistic Inquiry and Word Count (LIWC) text analysis and principal components analysis, systematic structural and cognitive patterns during on and off task thinking were identified. Our results indicate that social cognition is the central feature of stimulus independent thought. **P3**

154 **Music as Counterpoint to Epilepsy** Martha Curtis <martha@marthacurtis.com> (violinist; author, Pittsburgh, PA)

It is our heritable power of choice that is the gift of consciousness. With epilepsy I suffered the unpredictability of horrifying temporal lobe seizures for over thirty years until a team of doctors removed my hippocampus, amygdala and half the temporal lobe of my right brain. As a professional violinist I traveled in and out of consciousness and have an experiential understanding of the efficacy of consciousness. In seizure, I went through the same affect and physical automatisms every time. It was as though a button had been pushed in my brain and the recording played my system. With my seizure videos from the brain work-up in the hospital I will demonstrate what Damasio calls "core consciousness" and "extended consciousness" with the "here and now" responses in temporal lobe seizure and the more extensive response to my surroundings with the return of the "autobiographical self". Consciousness allows us to choose where to put our attention and, as William James wrote in the 1890s, this effort lets us "choose who we will be the next moment in a very real sense." When I seized during Beethoven's Emperor Concerto the brain's inability to "know" made it impossible to even know I wasn't playing. I knew I was back when I could hear myself say, "You can do it, Marth. I know you can do it". With consciousness comes incredible power. Because my well-trained body knew what to do, I picked up my violin, entered the third movement and communicated the passion of Beethoven with the self I call me. I had quickly restored my humanness, including the power of intelligent choice embedded in my cells, by communicating to my soul with beauty.This presentation will include violin performance. **A2**

155 **Behavioral Indices of Mind-Wandering While Reading** Michael Franklin, Jonathan Smallwood; Jonathan Schooler <franklin@psych.ucsb.edu> (Psychology, UCSB, Santa Barbara, CA)

We have all had the experience of suddenly realizing that despite our best intentions, while our eyes have continued to move across the page, our minds have been somewhere else entirely. Even though mind-wandering during reading is common, researchers have only recently begun to hone in on how mind-wandering influences the processing of the words that are being read. Typically when individuals read there is a robust relationship between the lexical properties of the words (e.g. their length, familiarity, position at the end of a clause) and the amount of time that is devoted to their processing. In a recent study using an eye tracker it was found that participants' gaze durations prior to off task reports systematically

differed from that prior to on task reports (showing less sensitivity to lexical features). In the work to be presented we will describe findings which suggest that simple reaction time measures can also discriminate periods of mindless vs. mindful reading. Here, participants read a story presented one word at a time, pressing the spacebar to advance the text. Periodically, participants are probed as to whether they are on task, tuning out, or zoning out. The results converge with the eye-tracking studies and show that it is possible to predict whether or not a participant will be mind-wandering at a probe based on the reaction times to the words leading up to that probe. **C19**

156 **Attentional Orienting - Conscious or Unconscious?** Narisa Marrett, Anthony Lambert. <n.marrett@auckland.ac.nz> (Psychology, University of Auckland, Auckland, New Zealand)

Implicit learning is used to describe learning that occurs without intention or conscious awareness. A series of three experiments are reported here, which all used a bilateral letter version of Posner's visual cueing paradigm (Posner, 1980) to explore the contributions of implicit and explicit (conscious) processes to attentional orienting. In Experiment 1 a valid letter cue was associated with the target location on 80% of trials and the effects of aging were examined. In Experiment 2 a 'split-block' design was used in which the proportion of valid trials in the first two blocks was 80%; which was reduced to 50% for the final two blocks. In Experiment 3 'implicit' and 'explicit' letter cues were randomly interspersed, in order to compare responses to the two trial types. Results indicated that the processes involved in attentional orienting using bilateral letter cues were largely explicit in nature for both older and younger adults. This contrasted with earlier findings by Lambert, Naikar, McLachlan and Aitken (1999; Experiment 1) and reasons for this empirical discrepancy were considered. **P9**

157 **Staying on Track: Mindful Breathing Reduces Mind-Wandering** Michael Mrazek, Jonathan Smallwood; Michael Franklin; Jonathan Schooler <mrazek@psych.ucsb.edu> (Psychology, University of California Santa Barbara, Santa Barbara, CA)

This study examined the usefulness of meditation as a tool for leading to short term reductions in mind-wandering. Participants either completed eight minutes of mindful breathing, passive resting, or reading before subsequently completing a ten minute sustained attention to response task commonly used to study mind-wandering. Mindful breathing resulted in significantly improved performance, indicating that this technique can lead to short term improvements in attention even among individuals without prior experience with meditation. **C10**

158 **Situation and Self: The Case of the Wandering Mind** Jules Troyer <jtroyer@deltastate.edu> (Psychology, Delta State University, Cleveland, MS)

Traditionally, mind-wandering is viewed as an undesirable decoupling of attention from a current mental task. When an individual engages in mind-wandering, without awareness, it greatly impairs the ability to construct effective situational mental models and subsequently solve problems. Does the propensity for unintentional mind-wandering impair an individual's ability to know the self, as well as the external world? This paper investigates whether people who are less aware of the external environment and the objects and situations occurring within it, also are less aware of the self and internal thoughts and emotions. The analysis of responses of 450 participants on the Troyer Level of Consciousness Inventory (Troyer, 2008) and the Situational Self-Awareness Scale (Govern & Marsch, 2001), strongly indicates that people who report difficulty in regulating attention have a low awareness of both internal thoughts and emotions, as well as a low awareness of the external environment. The implications of a prolonged tendancy of mind-wandering are discussed; including issues such as why people have a low level of self-awareness, difficulty in regulating their behavior, problems with cognitive reflection, aversion to openness with others and why certain people do not engage in empathetic or helping behaviors. **C19**

3.2 Vision

159 **The Semantics of 'Perception': A Critical Examination of D. Milner and M. Goodale's Proposal** Simone Marini <simmarini@gmail.com> (School of Philosophy, Ph.D. student at University College Dublin - Schoo, Dublin, Ireland)

In this paper, I focus on D. Milner and M. Goodale's notion of "perception" and argue: (1) that either it is not such a radical departure from the preceding tradition of visual studies (championed by L. Urgerleider and M. Mishkin) as they suppose, or it involves semantic confusion; (2) that their sharp dorsal/ventral dichotomy is not well supported by empirical findings. Milner and Goodale argue that there are two different uses of the word "perception": an ordinary one, which refers generically to any inputs conveyed through the senses and "is quite common in both visual science and in everyday language" (Milner & Goodale, 2006: 2), and a more restricted and philosophical one, "to refer to a process which allows one to assign meaning and significance to external objects and events." (Ibidem) They use "perception" in the latter sense, which basically equates perception with "visual awareness" of external stimuli, their cognitive identifications through abstract representational percepts, and their storage in long-term memory. My worry is that Milner and Goodale's clear-cut distinction between dorsal/action/automatic and ventral/perception/representational may be too simplistic and have no correspondence in the actual organization of visual processings. For instance, fMRIs performed during visual detection tasks seem to show neural activation in both dorsal and ventral areas (Beck et al., 2001). Furthermore, it seems that Milner and Goodale's narrow, 'philosophical', use of the term "perception" already presupposes a rigid and discrete dualism between action and perception at the level of their cortical substrates. They advanced this hypothesis on the assumption that perception does not have an independent evolutionary value and its ultimate scope is to facilitate action, via abstract representations of the goals we seek to pursue. Now, if this is a correct understanding of their proposal, how does it substantially differ from the "perceptual tradition" they are departing from? Milner and Goodale claim that for the previous tradition the ultimate goal of vision is perception, not action, but I fear there might be a semantic confusion here: in criticizing the "perceptual tradition", Milner and Goodale are using the term "perception" in its restricted sense; on the other hand, that tradition uses the term in a broader general sense, as referring to the processings of any sensory inputs. Thus, in the end, the difference between the "perceptual" theories of visual processings and Milner and Goodale's proposal might simply be that the first ones stress the importance of perception (in the broad sense), and the latter of action, in the overall visual processings of external stimuli to produce visuomotor outputs. Regardless, even if Milner and Goodale's criticism were efficacious, wouldn't it count against their own view? If the "perceptual non-philosophical bias" adopted by the preceding visual scientific tradition prevented it from discerning a separate cortical visual pathway (the dorsal pathway) which automatically processes visual stimuli for action, couldn't it be the case that Milner and Goodale are endorsing a different and opposite semantic "non-philosophical bias" (that vision's primary goal is action) which misleads their interpretation of the experimental data available? **P9**

3.3 Other sensory modalities

160 **The Harmonics of Hades** Kristopher Patten, Michael McBeath <ettutortilla@hotmail.com> (Psychology, ASU - PEARL Lab, Queen Creek, ARIZONA)

The 'diabolus in musica', or 'Satan Chord', is reputed to be the most unsettling combination of notes that can be played by a musical instrument. Spectral analyses of the Satan Chord, which also goes by the name of diminished fifth, reveal that the peak points of energy in megahertz are not evenly spaced, but instead appear almost haphazard in their placement. A variety of sounds from the natural world (animal calls, wind, running water, etc.) and musical instruments, along with some sounds that were synthesized from different pitches of sine tones were presented to participants. The participants were instructed to rate the sounds on a nine point scale, with one being horrendous and nine being angelic. Once the ratings were complete, each different sound was put through spectral analysis to determine the energy pattern. Preliminary results show that humans prefer sounds that have nearly equidistant energy patterns to both sounds that have no pattern to their energy signatures and sounds that have

exactly equidistant energy spikes. In fact, sounds that have perfect harmonics are consistently rated as more unnatural than sounds with unpatterned harmonics. This phenomenon may be attributed to evolutionary learning as a species: sounds with perfect harmonics almost never occur in the natural world. It is possible that humans are innately wary of sounds that could not have been created before the advent of computers. **C6**

161 **Synthetic and Natural Crossmodal Mappings Explored with Sensory Substitution** Michael Proulx <m.proulx@qmul.ac.uk> (School Of Biological And Chemi, Queen Mary University of London, London, United Kingdom)

Sensory substitution devices for blind persons provide the missing visual input by converting images into sound. Some blind expert users experience visual qualia while listening to the output of a device (The vOICe) after extensive use. Here I will discuss the perceptual and attentional attributes of the conversion from images to sounds. Although some aspects of the conversion, such as relating vertical location to pitch, rely on natural crossmodal mappings, the extensive training required suggests that synthetic mappings are required to use the device and to experience visual qualia. Here I will present new data on the effects of the conversion and training on attention that demonstrate the synthetic nature of learning the crossmodal mapping. Sensorimotor experience may be required to facilitate learning, develop expertise, and to develop synthetic synaesthesia, where the auditory output of the device evokes visual quail in users. **PL 5**

3.4 Memory and learning

162 **Autonoetic Consciousness in Episodic Recall and Simulation: An Episodic Processing Hypothesis** Gustavo Gauer, Cristina Yumi Nogueira Sediyama; Andre Madsen Da Silveira <gusgauer@gmail.com> (Developmental And Personality, Federal University of Rio Grande do Sul, Porto Alegre, Brazil, Porto Alegre, RS Brazil)

Recent studies have provided evidence for a common set of behavioral and neural bases for memory of events and simulation of future events. These results support Episodic Simulation (ES) as a counterpart of Episodic Memory (EM). EM for previously experienced specific events has been defined by the phenomenal qualities of Autonoetic Consciousness (AC): reliving, travelling back in time, belief, and remember/know judgment. The equivalence between ES and EM has yet to be explored at the phenomenal level. Our study sampled subjects' AC ratings of autobiographical event memories and simulations through a self-report questionnaire. Sixty-five Brazilian undergraduates produced four autobiographical events manipulated in two factors expected to influence the phenomenal experience that accompanies processing the episode: direction in time and remoteness. The Autobiographical Memory Questionnaire (AMQ) items provided self-reports of phenomenal qualities of four personal event memories: childhood event - Rr (Recall / remote), event in adolescence - Rp (Recall / proximal), event in adulthood - Sp (Simulation / proximal), and event in old age - Sr (simulation / remote). We analyzed two variables related to AC (senses of reliving and time travel) and four items related to imagination (visual, auditory, spatial and setting). Results showed different effects of direction and distance on AC and imagery variables. The intensity of imagination in various forms was influenced by both factors, with greater intensity for proximal, past events. Significant interactions between direction and distance were found only for visual imagery and setting. In the case of visual images, Sr events were imagined more vividly than Sp ones. Rp and Rs events were experienced with greater vividness than simulated ones. AC variables were only influenced by distance, with greater intensity for proximal events. There was no main effect of temporal direction, nor an interaction with distance. That result suggests no dissociation of AC qualities between recalling a past event and simulating a future event. The data here presented posit some intriguing problems to EM inquiry. First, episodic recollection and simulation did not differ significantly in terms of AC ratings, and only did so regarding vividness of imagery ratings. This further supports the evidence from behavioral and neural levels, against dissociation of the two domains. Whereas AC defines EM capacity, it does not seem to be an exclusive feature of it. Theoretical approaches of AC accompaning EM may profit from

accounting for a larger set of phenomena, into a broader concept such as Episodic Processing (EP). EP would be in that sense defined as involving event-like constructive, rather than past-oriented mnemonic, information. Thus, AC might be a general feature of EP, rather than a distinguishing quality of EM. That view coheres with the Episodic Buffer (EB) hypothesis of a working memory module processing dynamic, event-like representations. Representations in the EB constructed online from perceptual, short- and long-term information available to working memory. In line with these results, the EB would be the candidate cognitive module responsible for episodic processing, regardless of the pastness of the occurence to which it refers. **P9**

163 **Analysis of the Spatial-Temporal Organization of Episodic Memory Based on Irreducible Field Principle** Michael Lipkind <michael@lipkind.info> (Unit Of Molecular Virology, De, Kimron Veterinary Institute, Beit Dagan, Israel)

Spatial-temporal arrangement of molecular traces of currently memorized events within the brain intracellular continuum is unexplainable in the frame of the existing paradigm. As to the spatial arrangement, its paradox is elicited by the discrepancy between an infinite amount of potential unlimitedly different memorized events to be accumulated within the brain up to any particular moment of an individual's life-time, on one hand, and a limited (although tremendously high) potential amount of the respective inter-neuronal connections which are considered as neural correlates of memorization, on the other hand. As to the temporal arrangement of the molecular traces of the memorized events, it looks totally enigmatic, since any conception of a "time axis" is unimaginable as realized ("functioning") within the intracellular molecular substrate of living neurons, in spite of a common persuasion that in reality a normal human being during recollection initially realizes which of the memorized events occurred earlier and which occurred later. An alternative possibility is that the apprehended temporal succession of the memorized events results from their immediate mental confrontation and systematization, but not as a result of the existence of a genuine temporal arrangement of the memorized events, which, hence, is an illusion. The suggested approach to the problem is based on the notion of the autonomous field grounded on the theory of biological field by A. Gurwitsch. Accordingly, the formulated field concept is irreducible to the established physical fundamentals while strictly defined by the postulates deeply rooted in biological reality. The dynamic field concept including the time notion as an intrinsic parameter of the formulation is employed as a competent correlate of the current temporal memorization. An infinite number of potential field states cover any possible amount of any memorized events and facts. Memorization of a particular event is correlated with the respective change of the field 'configuration' as a dynamic state determined by the field parameters - values including the temporal parameter. The suggested theory describes both the episodic memory (biographical events) and semantic memory (individual's store of knowledge), which are represented by the respective molecular 'traces' (vestiges) of the current stream of the afferent to be perceived stimuli projected upon the brain's field-determined intracellular molecular continuum. M. Lipkind, Unit of Molecular Virology, Kimron Veterinary Institute, Bet Dagan, POB 12, 50258 Israel; International Institute of Biophysics, Neuss-Hombroich, D-41472 Germany **P3**

3.5 Emotion

164 **What's in a Feeling? An Argument for the Intentionality of Affect** Scott Clifton <sclifton@u.washington.edu> (Philosophy, University of Washington, Port Orchard, WA)

One supposed problem for purely affective accounts of emotion is that there is always the possibility that the physiological complex – what is called the feeling – associated with one situation be qualitatively identical to the feeling associated with another, even when the emotion experienced in the first situation differs in kind from the emotion experienced in the second. This is what I call the individuation problem. It's often argued that any account of emotion needs to incorporate intentional content, in order to guard against cases where the feelings are the same, but the emotion-types are different. Mental states are often thought then

essential to accounts of emotion, which leaves no possibility for purely affective theories. The most an affective theorist could hope for is a hybrid theory, including both feelings and mental states. Here I argue that all an affect theorist needs to do to solve the individuation problem is show that feelings can inform in some way, so that what seems to be identical feelings across situations evoking distinct emotion-types wouldn't be identical after all. My feeling in a situation evoking anger would differ from my feeling in a situation evoking fear, primarily because my feeling in the former situation informs me that I have been maliciously wronged and my feeling in the latter situation informs me that I am in immediate danger. Thus, all that needs to be shown is that feeling can inform. I then provide what I take to be the most plausible explanatory accounts of the disorder known as Capgras syndrome. Capgras syndrome is marked by a delusional belief that one's close relation has been replaced by an impostor. It's widely accepted that the Capgras delusion begins with a severe reduction or elimination of affect upon seeing the relation's face. Explanations of how this leads to the delusional belief come in two flavors: explanationist and endorsement views. Explanationist views argue that patients have the anomalous experience of reduced affect and then seek explanations for the experience. One-factor views hold that the anomalous experience is the only problem – Capgras is a perceptual, but not a cognitive disorder. Two-factor explanationist views hold that there are biases or deficits further downstream from the anomalous experience that contribute to the formation of the delusional belief. By contrast endorsement views propose that the impostorness of the relation is contained within the experience itself. Thus, a Capgras patient doesn't form the belief as a result of the anomalous experience, but by endorsing the experience as veridical. I conclude that on each of these kinds of account some evidence is provided that feeling can and does inform. Here are the three possibilities, the arrows representing the onset of the disorder: A. Informative feeling -----> non-informative lack of feeling B. Informative feeling ------> informative new feeling C. Informative feeling ------> informative lack of feeling Each view is committed, I argue, to at least one of these being the case. Thus, feeling informs at some point – either prior to or after the onset of the disorder. **P3**

165 **Some Characteristics of Feelings** Chris Heavey , Russell T. Hurlburt; Noelle L. Lefforge <chris.heavey@unlv.edu> (Psychology, University of Nevada, Las Vegas, Las Vegas, NV)

Feelings are phenomena that directly present themselves to a person. The scientific investigation of feelings therefore requires the apprehension of phenomena. Descriptive Experience Sampling (DES; Hurlburt, 1993, 1997; Hurlburt & Akhter, 2006; Hurlburt & Heavey, 2006) is a first-person method designed to produce high-fidelity accounts of inner experience, including feelings when they occur. DES subjects are given a beeper to take with them into their natural environments. When the random beeps sound (typically six times in a sampling day), subjects are to jot down notes about whatever inner experience was ongoing at the 'moment of the beep,' defined as the last undisturbed moment before the beep. The investigator interviews the subject within 24 hours about their experiences at each of these moments to develop an understanding and subsequently a faithful description of the subject's ongoing experience at each sampled moment. This process is then improved iteratively over multiple days, ideally until the subject's inner experience has been adequately apprehended. Based on our observation of thousands of moments of experience across hundreds of subjects using DES, we have made the following observations about the characteristics of feelings. First, feelings occur. People do recognize ongoing, directly present emotional experiences. Second, feelings frequently do not occur. Although we are agnostic about whether there are or are not always ongoing emotion processes, we are confident that on many and perhaps most moments, people do not have feelings as recognizable features of their ongoing, directly apprehended awareness. Interestingly, there appear to be at least several important variants of moments with no feelings in awareness where there is other evidence emotion is occurring. Third, feelings range from distinct to vague. Sometimes people experience clear, vivid feelings which they describe confidently. At other times people experience feelings which are vague, or nebulous, leaving subjects struggling to grasp their characteristics. Fourth, sometimes feelings include bodily sensations. These sensations are more often in the torso but sometimes they are in

the head. Fifth, when sensations do occur they range from barely discernable to hyper-clear. Hyper-clear sensations occurring with feelings sometimes have a precise size, sensation, and sense of movement. These sensations generally seem to be part of the feeling, or the feeling itself, rather than a separable accompaniment to the feeling. Sixth, sometimes feelings are mental in that they are experienced in the head without anything resembling a sensation. Seventh, sometimes people experience multiple feelings simultaneously. They can be happy and nervous or sad and angry, with each feeling experienced separately. Eighth, sometimes people experience one feeling that has several different aspects or emotional ingredients. People typically describe these 'blended' feelings as combinations of different emotions that are not better accounted for by more complex, existing feeling terms. Ninth, feelings are usually but not always confidently discriminated from other phenomena. In this presentation we will discuss these initial observations about the characteristics of feelings, their foundations and limitations, and argue that a mature science of consciousness should strive to more fully understand the characteristics of feelings. **C10**

3.6 Language

166 **Inner Speech: A Neglected Phenomenon** Alain Morin <amorin@mtroyal.ca> (Psychology, Mount Royal University, Calgary, Alberta Canada)

Inner speech arguably plays a central role in human consciousness, and yet, compared to other key psychological phenomena it seems to be somewhat neglected. Two studies were conducted to test the hypothesis that inner speech may be under-cited in the literature and might not have received its share of attention as a research area. Study 1 investigated how frequently inner speech and related terms were mentioned in Introductory Psychology textbooks. Only 7 out of 32 textbooks (21.8%) cited either inner speech, self-talk, private speech, or self-statements in their subject indexes. Study 2 compared citation frequency in PsycINFO for inner speech and related terms to 103 key psychological concepts and phenomena in peer-reviewed journal articles. The average citation frequency for all psychological terms was 1719; by comparison, inner speech was cited 52 times. 84.5% of all terms were cited more often than inner speech. Taken together these observations suggest that inner speech does tend to be overlooked, not so much because it is unimportant but probably because it is taken for granted. **P3**

3.7 Mental imagery

167 **Mental Imagery as Adaptive Healing Mechanisms** Gail D. Kelly <gailk@ualberta.ca> (Anthropology, University of Alberta, Edmonton, Alberta Canada)

Recent anthropological research on universals has moved beyond the study of culture to examine the psychological and neurological processes that possibly underlie different cultural phenomena (Brown 1990). This includes mental imagery such as hallucinations or visions (Lewis-Williams and Dowson 1988). Perceived visually, these perceptual originations are self-referential or auto-symbolic (Silberer 1909) phenomena that appear in the absence of external stimuli. While some percepts are only slightly salient, others are experienced as accompanied by a sense of being one with the cosmos or physical environment (Pearce 2004). The images I am interested in are those of geometric shapes, from circles to zigzags. They can appear in many contexts: trauma; migraine auras, strokes, and epilepsy; the ingestion of drugs, both prescribed and recreational; sensory deprivation, overstimulation, repetition (beating a drum 200-220 times per minute); or during trance states. Those who experience these mental images typically emphasize their novelty and the inability of words to describe them. Medical researchers tend to treat these experiences as symptoms of physical and/or mental illness. Rather, I suggest they may constitute a wordless knowing that represents a path to cognitive and spiritual healing (Mavromatis 1987:7,153; Simington 2009). The present paper discusses the similarity between these images and prehistoric art. Other than form, I focus on the prosodic, subtle details of prehistoric art: - e.g., streaming lines that connect the images, and tiny dashed lines that appear at image peripheries, such as surrounding heads of dancers. People who experience a stroke, toxic lithium levels, pain synesthesia, or induce LSD tend

to report the same images. They describe connective lines as tracing behind motion; dashed lines are often felt energy fields. Pressing on the "field" may be felt as pressing directly on the head. Critical to my paper is the debate revolving around Lewis-Williams and Dowson's 1988 paper, 'The Sign of All Times: Entoptic Phenomena in Upper Palaeolithic', where they hypothesize that the images found on cave walls and rocks are fundamentally products of our neurological system; meaning that humans today have the propensity to perceive the same mental imagery as the Palaeolithic. My position is that the images marked on prehistoric rock and cave walls expose a cognitive default mechanism that is significantly in tune with internal energy. These mechanisms, along with prosodic phenomena, are foundational to more complex symbol-based forms of human consciousness. In addition to the psychological states, I discuss human neurological structures and processes such as left/right hemisphere specialization, development of the cerebral cortex, brain wave research, and dorsal/ventral streams of consciousness. I conclude this paper by suggesting that these neurological processes are an adaptive tool for cognitive and spiritual healing. Hence, they may provide insights into possible ways of healing for people who suffer from certain forms of brain trauma. **P9**

3.8 Implicit and explicit processes

168 **A Phenomenological Model of the Moderate Richness of Conscious Experience** Chad Kidd <ckidd@uci.edu> (Philosophy, University of California, Irvine, Irvine, CA)

In this article I articulate a conceptual framework in which to understand a moderate view of the richness of conscious experience. One way to picture the two dominant positions in the current literature on the issue of the richness of consciousness is to see it as divided between those that say conscious experience is thin, that is, basically limited to that which lies at or close to the center of attention (Dennett, Mack and Rock) and those that say conscious experience is rich, extending far beyond that which occupies our attention (Searle, William James). Each has their own reasons for endorsing such a view and, more to the point for this essay, each has their own conceptual model of the differences between focal and non-focal experience bolstering up their position. Following Eric Schwitzgebel (Journal of Consciousness Studies, 2005, vol 14 no 3, pp 5-35) , I want to make room in this picture for a third view according to which conscious experience extends beyond that which occupies our attention, but that the way in which these non-focal aspects of the field of consciousness are experienced is radically different from the way in which we experience focal aspects. Unlike Schwitzgebel's investigation, however, my investigation is an a priori phenomenological investigation of the differences between focal and non-focal or 'implicit' and 'explicit' conscious experience, a kind of phenomenological investigation that is inspired by the phenomenological methods developed and employed in the work of Edmund Husserl, the father of modern phenomenology. After briefly introducing my readers to this kind of phenomenological investigation, I will use it to defend four basic claims around which I will construct my preferred model of the richness of conscious experience: (1) All conscious human experience, of whatever sort, includes a formal distinction between a figural or focal object and a ground. (2) This distinction between figural and grounding objects is founded on a formal feature of the structure of human consciousness, a structural feature that is essential to human consciousness. (3) This structural feature of consciousness in turn is founded on the essential temporality of conscious experience, and (4) this also shows how it is that the phenomenology of attention is both distinct from but essentially linked with the figure/ground structure and how it is that the objects in the background of conscious experience can be more or less 'explicitly' experienced without being completely non-experiential aspects of the background. **P9**

169 **Empirically Testing Purported Claims of Enlightenment Using Standard Psychological Methods and Instruments** Jeffrey A. Martin <jamartin@fas.harvard.edu> (Harvard University; CIIS, Quincy, MA)

Alleged non-symbolic experiences have been reported for millennia (Stace, 1960, Hanson, 1991). These experiences are often attributed to spiritual and religious contexts, however

atheists and agnostics also report them (Newberg, d'Aquili, Rause, 2001; Newberg, & Waldman, 2006; Newberg, & Waldman, 2009). They go by many names, popular ones include: nondual awareness, enlightenment, mystical experiences, peak experiences, transcendental experience, the peace that passeth understanding, unity consciousness, union with God, and so forth (Thomas & Cooper, 1980; MacDonald, 2000; Levin & Steele, 2005). Most non-symbolic experiences are temporary, but some individuals have reported that they experience persistent forms of them (Travis, Arenander, & DuBois, 2004; Maslow, 1970, 1973; Butlein, 2005; Levin & Steele, 2005). Virtually all of the information about persistent forms of these experiences comes from self report data (e.g., Stace, 1960; McGinn, 1991). No comprehensive empirical investigation of persistent forms of these alleged experiences has been undertaken and completed. This presentation focuses on the first one that is underway, and includes preliminary data as well as an overview of the inquiry and what remains to be done. The overall inquiry focuses on three phases comprising many data collection efforts, each of which are quasi- or full experiments. The first phase focuses on obtaining comprehensive psychometric profiles of individuals who self report these experiences, as well as relevant qualitative data. Examples of measures used in this phase include those covering: psychopathology, big 5 personality, anxiety, absorption, and developmental levels (such as the Washington University Sentence Completion Test). The second phase involves testing psychological claims made by people who self report these states using well validated psychological experiments. These claims are often considered untestable because they are put forth in a spiritual or religious context, and frequently used to refer to 'ultimate' truths. However, when one views these claims as psychological there are many empirical tests and measures that can be used to examine the scope of claims being made. For example, claims of 'loss of a personal self' and 'unity' can be tested from many angles. 'Self,' as these participants define it, contains racial and gender bias, so loss of this 'self' should lead to participants scoring low on covert tests for this type of bias. Claims of unbiased perception of the world and of seeing 'what is' much more accurately in every moment can likewise be tested in many ways, such as using experiments involving visual inattentional blindness. These two phases are being conducted in parallel and have been underway for approximately a year. A third will commence after the first two are completed and will focus on brain imaging based on the data collected in phases one and two. Individuals self-reporting persistent forms of this experience are rare, and data is collected as they are encountered recruited as participants. Strong efforts are being made to attempt a sample that is as diverse as possible. **PL7**

3.9 Unconscious/conscious processes

170 **Unconscious Processes in Visual Word Recognition: Evaluating Visual Masking** Anastasia Gorbunova, Forster, Kenneth I. <gorbunov@email.arizona.edu> (Psychology, University of Arizona, Tucson, AZ)

The present set of studies aim to evaluate the phenomenon of visual masking as a tool for studying visual awareness focusing on two-alternative forced choice (2AFC) discrimination tasks. Two existing theories of masking - Bachmann's (1984) perceptual retouch theory and Marcel's (1983) recovery theory - are discussed along with the global neuronal workspace theory of awareness (Baars, 1989; Dehaene, Kerszberg, & Changeux, 1998). Performance accuracy on Semantic discrimination is compared to that on Orthographic discrimination as an indication of a potential difference between semantic and orthographic processing of masked word stimuli presented for 40 ms and 50 ms. Orthographic and Identity discrimination tasks are used to investigate the relationship between task difficulty and task order. This is further compared to an e-detection task previously used as an indicator of awareness in some masked priming experiments. Together, these tasks are further evaluated in terms of their relationship with participants? subjective reports collected in the form of confidence ratings. The implications and predictions drawn from the theories of masking and visual awareness as well as the notion of partial awareness (Kouider & Dupoux, 2001) are assessed taking into account the data obtained in the current experiments. Furthermore, a binding account of visual awareness with special attention paid to visual masking is proposed and compared to the three existing

theories. **C4**

171 **Why Make It Conscious? The Function of Consciousness in Therapeutic Change** Ida Hallgren Carlson <idahallgren@hotmail.com> (Psychology, University of Gothenburg, Gothenburg, Sweden)

When discussed within a cognitive/neuroscientific framework, consciousness has been suggested to have an integrative function, to play a crucial role in the comprehension of new information and to allow for flexible and non-automatic behavior (Baars, 2002). These suggestions call for modifications of theories about therapeutic work. Therapies stemming from psychoanalytic theories do not differentiate between conscious and self-conscious processes and hence give little attention to the role of the conscious information-processing that is never verbalized or made self-conscious. Further, unconscious processes must not necessarily be made conscious for change to occur. The behaviorist tradition tends to leave out the role of consciousness altogether and can not differentiate between simple fear-conditioning, that may take place without conscious processing, and the learning of complex tasks that may involve cognitive restructuring. Mindfulness-based therapies focus on conscious processing but do not explain what the functional role of "being present" or conscious might be. This paper suggests that the seemingly contradictory anxiety-based and mindfulness-based therapies have a common aim: to give rise to conscious processing that provides a unique capacity for integrating information in relearning. **P9**

172 **Creative Problem Solving with Possible Facilitation of Nonconscious Thought** Arthur Hastings <ahastings@itp.edu> (Ph.D. Program, Institute of Transpersonal Psychology, Palo Alto, CA)

This presentation reports a creative problem-solving research protocol that appears to access nonconscious thought as well as conscious cognitive processes. Method. A structured procedure (2-3 hours) was developed consisting of 7 steps. (1) Volunteer participants were asked to identify a question, or problem in their lives. (2) A prequestionnaire measured the intensity of the problem with self report Likert scales on 14 subjective reactions of the problem. (3) The participant was interviewed to clarify and focus the problem. (4) The participant was given 45 minutes in a quiet, dimly lit, sensory isolation booth to reflect on the situation. (5) A post interview asked about answers or changes in the problem or question. (6) A post questionnaire repeated the Likert measures. (7) A follow up assessment was given a week later. The assumptions were that the questionnaires and interviews would activate motivation, preparation, and priming at conscious and nonconscious levels of thinking, and that the sensory isolation condition (similar to the Restricted Sensory Environment Technique which has been shown to enhance creativity), would facilitate progress on the problem, as shown by the participant reports and repeated measures. Each step was expected to contribute to the process. Life Problems. Problems and questions that were brought in the first study (n=30) included work and career matters, existential issues, relationships, and personal development. These problems involved needs for decisions, understanding, clarity, resolution, and personal change. Time frames of the problems ranged from a month to many years. Statistical Results. In the post questionnaire, 29 participants reported that their problems were solved or had shifted in positive ways. A Wilcoxon signed rank analysis of the pre-post Likert scores showed statistically significant reductions of negative feelings such as agitation, overwhelm, frustration, fear, and helplessness, with probability values of < 0.001). Significant positive changes occurred for productive, inspired, and energized. Corollary studies by Takanari Tajiri (n=35) and Laurel McCormick (n=16) showed similar significant changes. Qualitative Results. The qualitative reports suggest that some solutions may have emerged as a result of nonconscious processes as well as conscious thought, such as solutions coming when the mind was wandering, emergence of hitherto unknown possibilities, hearing an answer in the mind, solutions shown via imagery, explanations that resolved confusion and provided clarity, widening of perspectives, shifts in the question or problem itself, and transformative insights. Two participants said their problem had been with them from childhood and they reported positive changes. The follow up assessment confirmed the stability of the changes, and several

participants stated that they no longer worried about the problem. Comments. This procedure is effective and offers a possibility to facilitate nonconscious thought processes in a research setting. Real life concerns can be studied as well as constructed tasks. Assessing the intensity of a problem and its resolution by measuring its emotional impact appears to be practical. Participant interviews and self reports may provide information about the dynamics that underlie these cognitive conscious and nonconscious processes. **P3**

173 **James in the 21st Century** Bruce Mangan <mangan@cogsci.berkeley.edu> (Institute of Cognitive and Brain Studies, Oakland, CA)

William James stays forever new, but his phenomenological analysis of the "fringe" of consciousness, especially the feeling I will call "rightness", has been relatively neglected. Now various strands of experimental research – from metacognition and tacit learning to the study of intuition – have confirmed the thrust of James' account, linking a wide range of empirical findings with the most powerful, scientifically grounded phenomenology in our language. This offers a new way to integrate and extend consciousness research, and opens up what might be called a bio-engineering investigation of the mechanisms of conscious/nonconscious interaction. We can begin to explain the character and structure of our phenomenology via its function, just as we explain other aspects of our biology. This new kind of functional analysis is not hostage to functionalism in its current sense nor to the disembodied presumptions of AI. Fringe experiences are diaphanous, have no evident sensory content, and elude the "grasp" of focal attention. Yet on James' analysis they are at the heart of conscious cognition, constituting among other things feelings of meaningfulness, expectation and evaluation. The evaluative aspect is paramount: "the most important feeling in these fringes ... is the feeling of harmony or discord, of a right or wrong direction in the thought." (Psychology: The Briefer Course, 183.) James did not develop this point, but it throws light on some of our most puzzling and rewarding experiences: the intense feeling of rightness that apparently constitutes the "Aha!" of great insight, the zap of great art, the sense of universal coherence and ineffable disclosure of mystical experience. Functional analysis links James' phenomenology to two basic findings of the cognitive revolution: while the relative capacity of consciousness is miniscule, consciousness is supported by vast amounts of parallel, non-conscious processing. We argue that the fringe finesses the limited capacity of consciousness by radically condensing context information. Rightness signals the degree of integration: the more tightly our conscious/nonconscious cognitive system is integrated, the stronger the experience of rightness. **PL1**

174 **Why Did the Unconsciousness Appear in History When It Did? A Jaynesian Explanation** Brian McVeigh <bmcveigh@email.arizona.edu> (East Asian Studies, University of Arizona, Tucson, AZ)

The unconscious has arguably manifested its ghostly presence in the corners of the edifice of Western thought since the time of the classical Greeks. Nevertheless, it has not received sustained attention throughout the centuries. We must ask why, then, the idea of 'unconscious mental processes' was conceivable around 1700, topical around 1800, and widespread by around 1900 (Whyte, 1978). In order to explain why the unconscious emerged as a topical issue in the nineteenth century, I employ the theories of Julian Jaynes. Specifically, I propose three interlinked points. First, the real mystery is not the unconscious, but rather consciousness itself, since it often appears unnecessary for human activity. Therefore, in order to understand unconscious processes, we must first appreciate the nature of conscious interiorization. After all, if people throughout history did not explicitly theorize about what is introspectable (consciousness), then there was little need to consider what was not introspectable (unconsciousness). This brings us to the second point: how can conscious interiorization be described? This can be done by breaking it down into its constituent features: (1) metaphoric spatialization of psyche; (2) introception (i.e., interiorized perception); (3) excerption; (4) self-narratization; (5) self-autonomy; (6) self-authorization; (7) conciliation; (8) individuation; (9) self-reflexivity. This brings us to the final point: what exactly is the purpose of conscious interiorization? Answer: it is a cultural adaptation that has increased in intensity in

response to sociopolitical pressures over the centuries. The aforementioned constituent features have increased, especially during the 1800s, to accommodate growing social complexity (larger demographic units, more social roles, steeper hierarchies, techno-scientific advances demanding a more focused 'mind's eye,' etc.). By understanding the historical emergence of the unconscious, then, we are able to delineate the nature of consciousness. **C20**

175 **The Implications of Considering the Mind from the Inside Out** Jonathan W. Schooler <schooler@psych.ucsb.edu> (Department of Psychology, University of California, Santa Barbara, CA)

Historically science has treated minds like all other domains of inquiry- as material objects. Although the objectification of the mind has led to many important scientific advances, it has also contributed to a number of conceptual, methodological, and ontological oversights. Conceptually, the objectification of the mind has led to the ignoring of stimulus independent thought. While researchers have painstakingly documented the manner in which attention shifts between external sources, far less consideration has been given to the tendency for the mind to be drawn towards internal concerns that are independent of the current task demands. Methodologically, the objectification of the mind has encouraged a focus on observable behaviors and neurological measures while largely disregarding introspection. While self-reports are sometimes used, they are rarely given the same status as other types of measures. Ontologically, the treatment of minds as objects has led to the view that consciousness can be understood within precisely the same explanatory constructs as material things. However, treating the mind as equivalent to objects necessarily overlooks their unique capacity for first person experience. This talk will use research on the internal state of mind wandering as a springboard for illustrating the advantages of considering the mind from the inside out. When one considers thought from a first person perspective, one of the very first things that one notices is just how often thoughts have nothing to do with what is going on about us. Although the internal mental state of mind wandering has long been overlooked by mainstream researchers, recent research demonstrates that it is ubiquitous, readily amenable to rigorous investigation, a major source of error, yet also potentially critical to planning, creativity, and overcoming mental fatigue. Because mind wandering is inherently internal,its investigation necessarily relies on individuals' introspective self-reports. However, by triangulating self-reports with behavioral and neurocognitive measures, recent research has demonstrated not only the validity of such measures, but also the distinctive information that can be gleaned by varying whether self-reports are spontaneously provided or experimentally elicited through experience sampling probes. In particular, self-caught mind wandering reveals episodes that participants have explicitly noticed where as probe caught mind wandering reveals episodes that have eluded meta-awareness. Finally, the fact that the private thoughts associated with mind-wandering are as real as perceptual experiences, reveals the ontological equivalency of first person experience, and thus the need for caution in adopting a metaphysical foundation for science that leaves no room for subjective experiences. **PL12**

176 **The "Cognitive Unconscious," Biofeedback and Mindfulness** Connie Schrader, Dr. Keya Maitra <cschrade@unca.edu> (Health & Wellness, UNCA, Asheville, NC)

In arguing for an embodied mind, Lakoff and Johnson (1999) emphasize the 'Cognitive Unconscious' "that operates beneath the level of cognitive awareness, inaccessible to consciousness and operating too quickly to be focused on" (10). The embodied nature of the mental thus gets articulated by highlighting its inaccessibility to consciousness. In our two-hour long session we want to critically evaluate the centrality of the notion of cognitive unconscious to the development of an embodied mind. Our main aim is to propose that the embodied nature of the mental does not necessarily require inaccessibility to consciousness. There will be three segments to our session. In the first part we will explain the nature and function of cognitive unconscious and outline some of the main arguments offered in its support. In the second part we will use the methodologies of biofeedback and mindfulness techniques to provide a critique of the arguments for the cognitive unconscious. Both these techniques for attaining physiological shifts aim for shifts in awareness. These practices thus

enable us to reconsider the connections among awareness, cognition, behavior and physiology. The final part of our session will explore whether the notion of Cognitive Unconscious still operates with an assumption of the mind-body split. We will conclude by suggesting that both the methodologies of biofeedback and mindfulness allow us to go beyond this split without recoiling to dualism or reductionism. **V3**

177 **The Role of Consciousness, Automaticity, and Stimulus-Independent Thought in Deductive Reasoning** John Selden, Annie Selden <js9484@usit.net> (Mathematical Sciences, New Mexico State University, Las Cruces, NM)

In this paper we describe our perspective on the structure of deductive reasoning, that is, we describe the principal psychological components of that reasoning and how they interact. The components include: consciousness, the automated guiding of actions, stimulus-independent thought, and what we call local memory, a temporary, easily accessed, part of memory. In discussing deductive reasoning, we restrict our attention to the construction of mathematical arguments, and in particular, to proof construction, but no prior knowledge of mathematics will be required to understand our examples. We view proof construction as consisting of a sequence of actions that may be physical (e.g., drawing a diagram), or mental (e.g., focusing on the meaning of the conclusion). Each action arises from an inner (i.e., interpreted) situation in the partly constructed proof, and we speak of situation-action pairs. Each such pair may originally have had a conscious justification, but after occurring in several proof constructions, becomes automated, that is, the action occurs without the justification coming to mind - one just does it. Indeed, such automaticity seems to be essential in the construction of complex proofs to avoid massive divided attention and an overburdened working memory. This is the same kind of automaticity that Bargh (1997) and others have indicated plays a large role in everyday life. We call small, indivisible, automated situation-action pairs behavioral schemas, and view them as part of procedural memory. Within an appropriate context, they are always available and do not require effortful recollection. They do require consciousness of triggering situations and cannot be combined outside of consciousness. For example, a linear equation normally requiring several steps (i.e., actions) cannot be solved without the results of most of those actions coming to mind. Similarly, consciousness of one?s actions during proof construction appears to be essential. For experienced provers, such as mathematicians, a large part of proof construction is accomplished through the activation of behavioral schemas, but often there is a part of the proof construction that requires genuine problem solving, that is, novel constructions and combinations of ideas. Upon coming to such a situation, one might review the part of the argument already constructed, search for additional information, or draw a diagram. If such activities were not helpful, one could turn to stimulus-independent thought (SIT), that is, to the seemingly random ideas that come to mind when the brain is not purposefully processing information (Mason, et al., 2007). Such thought can occur when one temporarily stops attempting to complete a proof. However, ideas generated in SIT, during an impasse in proof construction, are often not random, but related to that construction. We believe that in proof construction SIT is influenced, or guided, by what we call local memory. This is an impermanent collection of related memories that are not held in consciousness, but can easily be brought to mind. Such local memory greatly aids reflection and can be maintained over hours or days. It is not degraded by brief unrelated activities, but can be degraded by other kinds of demanding reasoning. **P3**

178 **A Dissociation Between Non-Conscious Orienting and Conscious Perception of Peripheral Visual Objects** Myoung Ju Shin, Anthony J. Lambert <j.shin@auckland.ac.nz> (Psychology, University of Auckland, Auckland CBD, New Zealand)

The present study compared rapid orienting in response to peripheral visual objects with conscious perception of those objects. In the Orienting Task, participants oriented towards a target using precues of high and low luminance contrast. In the Conscious Perception Task, participants discriminated consciously between precues. Low and high contrast cues elicited rapid orienting effects that were equal in magnitude, but conscious perception of low contrast cues was much slower and less accurate. We interpret these results in terms of rapid non-

conscious processing of cues by the dorsal stream, followed by re-entrant feedback which influences slower, conscious ventral stream processing of the target. **C4**

179 **Consciousness and the Production of Voluntary Action** Richard Sieb <siebr@shaw.ca> (Independent researcher and author, Edmonton, Alberta Canada)

Consciousness does have an obvious important function. Consciousness allows us to create various types of voluntary actions. Voluntary actions are actions we choose to perform. Such actions allow us to adapt to constantly changing surrounding conditions and include various types of skeletomotor movements (performing a certain movement), oculomotor movements (scanning a location for information), language skills (speaking, writing, or reading certain words), emotional reactions (intentionally displaying anger, fear, joy), learning, memory, or thought (reasoning, planning, calculating, problem-solving). Our ability to adapt to changing conditions is necessary for our success and survival. The creation of voluntary (adaptive) actions cannot occur without consciousness. Involuntary or automatic actions are performed without consciousness. Involuntary actions may also be called programmed actions, as they are programmed into the nervous system genetically or acquired through learning (reflexes, automatic motor skills-driving, tying shoelaces, dancing and gymnastic routines, other skills). It is interesting to note that consciousness is necessary to create automatic motor skills at which time the component actions may be called voluntary actions. After automatic motor skills have been learned, consciousness is no longer involved in their performance (although consciousness is necessary to initiate the skill) and they may be termed involuntary or automatic. The purpose of consciousness therefore appears to be the production of voluntary activity. Evidence indicates that the dorsolateral prefrontal cortex mediates our production of voluntary actions. The dorsolateral prefrontal cortex has been shown to be divided into functionally separate regions each specialized for production of a type of voluntary action (skeletomotor, oculomotor, speech, writing, reading, memory, emotion, thought). Each prefrontal region has its own specific inputs and outputs and is connected to downstream brain areas for the production of a type of voluntary action. It appears like the dorsolateral prefrontal cortex is driven by consciousness to produce voluntary actions. The dorsolateral prefrontal cortex is not engaged in the performance of involuntary actions. The dorsolateral prefrontal cortex appears to be engaged by consciousness via the inferior parietal cortex. The inferior parietal cortex appears to be the highest level of sensory processing. The cortical processing of all the sensory modalities converges on the inferior parietal cortex where many of the neurons are multimodally responsive. Evidence indicates that this cortex is where sensory input is interpreted at the highest level. In other words, the inferior parietal cortex is where perception occurs and conscious experience is generated. It appears like conscious experience is generated from perception, as conscious experience is probably the highest level of sensory interpretation (the highest level of perception). Positive feedback and nonlinear emergence is a basic physical process responsible for a vast number of natural physical phenomena (flames, waves, groupings, etc.). In this process, two or more excitatory events interact resulting in the emergence of an entirely new event (nonlinear emergence). Thus perceptual output could feed back as an excitatory perceptual input in a continuing feedback loop to result in the nonlinear emergence of a new form of perception, conscious experience. Conscious experience does consequently have a subjective ephemeral quality. **P3**

180 **If You Want to Know What People Saw, Just Ask Them What They Saw** Bert Timmermans , Kristian Sandberg; Morten Overgaard; Axel Cleeremans <bert.timmermans@uk-koeln.de> (Psychiatry & Psychotherapy - I, University Hospital of Cologne, Cologne, Belgium)

A straightforward comparison of subjective measures of awareness has been long overdue. We compared three subjective measures of perceptual awareness: the perceptual awareness scale (PAS), confidence ratings (CR), and post-decision wagering (PDW). Participants were briefly presented with one of four masked geometrical shapes and had to indicate the correct shape in a forced-choice task. Following each trial, participants had to indicate their subjective awareness on a 4-point version of one of the three scales, where only the instruc-

tions and the scale anchors differed. We determined (1) which scale correlated best and most consistently with performance (indicating awareness), and (2) whether we could detect above-chance performance in the absence of awareness and how the scales differ from each other in terms of revealing such unconscious processing. Our results indicated (1) that PAS was more exhaustive than CR in detecting conscious influences on performance, and that CR in turn was more exhaustive than PDW. Furthermore, people using PDW were more inclined to give low wagers for stimulus intensities for which it was clear from PAS that they were mostly perceived consciously, which can be explained by participants being risk aversive. Crucially, the same was true for CR: even though it fared slightly better than PDW, participants claimed to be guessing for stimuli that PAS showed to be processed consciously - something that cannot be explained by risk aversion, as there is no risk involved in reporting confidence. In fact, we found little evidence for any above chance performance in the absence of awareness. One interpretation of our results is that participants perform the task exactly as instructed. When they are asked to specifically report what they experience, this is what they will do. Likewise, when asked to wager, they think about pros and cons of different bids, and when asked to report their confidence, they consider how much they trust the correctness of the report they just issued. Thus, other cognitive processes than those specifically related to the experience influence the results in these latter two cases. One could for example wager low even though one had some confidence in order to minimize loss; similarly, one could have little confidence in the correctness of one's response even though one perceived (parts of) the stimulus pretty clearly. For instance, if a person has a crystal-clear perception of some non-discriminative part of the stimulus, they will have to guess, but one would be hard pressed to conclude that the person did not see anything at all. Such states of "partial awareness" highlight the fact that which measure is most appropriate to assess awareness very much depends on what one intends to measure. The current results suggest that in cases where it is possible to ask the participant to report their conscious experience directly, such as perception, only PAS can be recommended to measure conscious experience. In other words: just ask people what they saw. **P3**

3.10 Sleep and dreaming

181 **Motor Recruitment of Mirror Neuron Areas During REM Dreams: Performing Artists, Mirror-Practiced, Limb Motions** Kristen Corman <kristencorman@mac.com> (English, Allston, MA)

This work interrelates mirror systems, biological motion, and REM sleep's correlation with dreams to explore potential links between each system's visuo-motor simulation of movement. The neural motor activation and output blockade of both mirror circuits in awake subjects and motor experience during REM dreams open the possibility of other patterns between the two brain states and their neural correlates. Are mirror neuron areas activated or recruited during REM sleep? (F5, F4, IPL, PF [BA 7b], STSp, STSa, and Broca, see Iacoboni; Rizzolatti; Calvo-Merino; Grossman. Procedural visuomotor learning, Stickgold.) Motor neurons are as active in REM sleep as in waking, and REM dreams are distinguished by movement (Hobson 2009). Though dreamers don't see a perceptual experience generated from external stimuli, they do experience "fictive" movements and visions (Porte; Grillner). REM activates parietal visual spatial attention (Antrobus).The oculomotor circuit is activated in REMs (Hong, 2009). If the F4, F5, IPL regions are activated, and if REM dreams occur, is the mirror mechanism that matches observation and action during awake perception also at play, in some form, during REM dream experience of movement? The formal features of REM sleep dreams may give us a window onto what aspects of simulation are activated or inhibited. Subjective dream-reports, preparatory to a future quantitative study, probe the dream-time motor experience of professional dancers and musicians. Do artists practice, perform, or do specific or general movements while dreaming? While mirror neuron systems facilitate simulative relations in humans (Iacoboni, 2008), performing artists practice skilled motion for hours using either a literal mirror-apparatus (dancers) or ipsilateral, "specular" (Koski, 2003) limb mimicry of the demonstrator who acts "as if a mirror" to facilitate learning (dancers, musicians). Awake, mirror neurons activate four times more strongly when adults imitate finger movement "as if in front of a mirror" (Iacoboni, 2008:68; Koski, 2003). Do artists ever

see/experience, in dreams, the one-on-one limb positioning they practice so much, awake? Do they see/experience a demonstrator? Group symmetry? Synchronicity? While biological motion's "pendular motions of the limb" are processed by the STSp, motion and object pathways (Grossman, 2002), dance kinematics are processed by mirror neuron areas related to MT/V5 and the STSp: right premotor, bilateral early visual, and parietal cortices (Calvo-Merino, 2008). Calvo-Merino's 2006 study of awake dancers supports mirror system motor simulation. She dissociates motor skill from the dancer's visual familiarity with an action. When observing motion, dancers' mirror neurons respond according to their "specific motor expertise," simulating a purely motor response over and above visual representations of action (Calvo-Merino 2006). Action observation involves the left premotor cortex, intraparietal cortex bilaterally, cerebellum bilaterally. Awake mirror motor simulation could facilitate a dancer's synchronization (Calvo-Merino, 2006). (For Antrobus, REM visual features may be interpreted as spatial form in the parietal cortex.) People recognize their face in a mirror 'mapping their own image onto the self' (Iacoboni). Dancers' mirror neurons may map motion, reinforcing motor system and mirror response. If awake mirror neurons link, through seeing, feeling to motor, might a dream-time 'matching-system' reverse-link feeling-movement-seeing? **P3**

182 **The Dreaming Brain/Mind, Dissociation and the Psychoses: Connecting States of Consciousness** Armando D'Agostino, Ivan Limosani; Silvio Scarone <arma.dagostino@gmail.com> (Università degli Studi di Milano, Milan, Italy)

In the first of his Lowell Lectures on Exceptional Mental States, William James stated: ?Sleep would be a dreadful disease but for its familiarity [?] We do not regard dreaming as morbid because it is customary, but if it were not, it would be the subject of much medical wonder.? Thus, over a century ago, sleep and dreams were recognized as highly peculiar phenomena, enigmatic and somewhat pathological. The dreaming brain/mind is the biological proof that subjective experiences are possible in absence of sensorimotor activity: the dreaming world, though internally generated, is complete with its objects, spaces and actors which interact in often quite complicated events. The study of the isolated brain during dream sleep therefore appears central to the debate on the neural underpinnings of consciousness. On the other side, the peculiar characteristics of the dream experience, lacking space and time parameters and rich in illogical and bizarre thoughts, with the absence of insight over the 'objective' dreaming experience, suggest an intriguing similarity between the cognitive organization of the physiological dreaming brain and that of psychotic mental states. In psychiatry, dreaming has long been correlated to psychoanalytic theories which are often difficult to integrate with modern conceptualizations of major disorders. To shift the attention on structural aspects of dream mentation and their relationship to underlying neurobiological phenomena seems useful in terms of applying new theories on this peculiar albeit physiological subjective experience to pathological subjective experiences observed in psychiatric practice. Converging data from independent lines of research seem to support the hypothesis of the dreaming brain/mind as a model for psychosis, independent of diagnostic categorizations. Experimental study designs that can bridge measurable aspects of the subjective experience of dreaming and acute psychosis with their neurobiological substrates are in an early stage of development. Recent neurophysiological data have begun to emerge on lucid dreams, a dissociated state of consciousness along the sleep-wakefulness continuum within which the dreamer becomes aware of the hallucinatory nature of his own experience. This type of hybrid state may prove useful in understanding the cognitive construct of insight applied to acute psychotic states as well as dissociative disorders. Research into the pharmacological induction of lucidity, which appears to be associated with cortical cholinergic modulation modifying the activity of the limbic and prefrontal cortices, may shed light on neurobiological underpinnings of consciousness and of abnormal brain/mind conditions found in schizophrenic and affective psychoses. The subjective experience of dreaming can be conceptualized as a physiological psychosis and given that neurobiological data shedding light onto this type of experience is now beginning to emerge, it seems timely to bridge this broad area of knowledge across to psychiatric research with the aim of building a solid methodological implant that may prove of use in the understanding of complex disorders. **C11**

183 **REM Network and Dream Consciousness** David Kahn
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This paper presents data suggesting that dreaming reflects a state of consciousness unique to sleep that provides the dreamer an opportunity to not only accept the implausible, but to also believe and consciously experience it. In our studies the subjects were asked if their thinking would have been different had they been awake, if they wondered what their dream characters were thinking (Kahn & Hobson, 2005, a, b) and if they noticed implausibility between a dream character and its wake life counterpart (Kahn, et al, 2002; Kahn & Hobson, 2003). The studies showed that during a dream we often wonder what our dream characters are thinking and feeling about us, and, importantly, we rarely question the plausibility of the unfolding events in the dream until we awaken, assuming we even remember them. We are not aware that we are dreaming or lying in bed, but within the dream we are aware of ourselves as thinking, feeling and acting as if we were experiencing the events in the dream. In this sense, dream consciousness, resulting from activation of the REM network when we sleep, may be regarded as useful in its own right whether the dream informs waking behavior or not. Dreaming allows us to consciously experience what may not be possible to experience in wake life. It is argued that this ability makes dream consciousness unique even if the experience does not directly affect wake behavior. REM dreaming arises when the wake state proportion of aminergic and cholinergic neurotransmitters changes to all cholinergic, and when the functional connectivity between brain regions changes such that the neural activity in the dorsal lateral prefrontal cortex (DLPFC) and the precuneus diminish compared to wake levels. On the other hand the neural activity in the medial prefrontal cortex (MPFC) and in the limbic and paralimbic areas increase. Consciousness is profoundly affected by these alterations in chemical and functional brain activation levels. For example, the minimal neural activity between the DLPFC and Precuneus changes the way the dreamer consciously experiences him or herself in space (not aware he or she is in bed). On the other hand, the continued neural activity in the MPFC and limbic system increases affect in the dreamer often within a social context. The paper will also briefly compare REM consciousness and its associated regional brain network with mind wandering and its associated default network (Raichle, et al, 2001), and with lucid dreaming consciousness and its associated hybrid network (Voss, et al, 2009). **C11**

184 **The Phenomenon of Nocturnal Cognitive Problem-Solving** Miloslava Kozmova
<kozmova@hotmail.com> (Boston, MA)

Previously, dreams and problem-solving have been linked with incubation, which focuses on posing a waking life problem prior to sleep and expecting the dream to develop an idea, contribute to a solution, or assist in resolution of the problem in some way (Barrett, 1993, 2001; Krippner, 1981). Additionally, researchers investigated the problem-solving and adaptive function of dreams connected with personal mythology (Kuper, 1983) and psychoanalytical theory (Glucksman & Kramer, 2004; Greenberg, Katz, Schwartz, & Pearlman, 1992). It is not yet known, however, how dreamers maneuver and negotiate problematic situations and difficulties that unexpectedly and sometimes importunely arise during the immediacy of dream scenario. The goal of this presentation is to report the results of the exploratory study that has been guided by the question "What is the scope of cognitive problem-solving strategies that dreamers are capable of employing for resolving situations encountered during dreaming?" To elucidate the extent of dreamer's abilities to problem-solve, the author drew on an archival collection of 1,400 cross-cultural dreams self-selected by male and female dreamers from seven different countries: Argentina, Brazil, England, Japan, two countries of former Soviet Union (Russia and Ukraine) and the United States. Operationally defined and then selected problem-solving dreams that demonstrated dreamers' problem-solving efforts were analyzed by the method of grounded theory (Glaser & Strauss, 1967; Glaser, 1978). From the constant comparative analysis of instances in which dreamers used their abilities to solve their difficulties and adjust to surprises emerged a multilayered composite description of the phenomenon of nocturnal cognitive problem-solving. The properties of the phenomenon include dreamers' strategizing in a unilateral or sequential fashion. Further, the dreamers' problem-solving attempts during challenging or curious situations comprise a spectrum rang-

ing from constructive to detrimental mental acts. Specifically, the analysis by the method of grounded theory (Glaser, 1987) showed that the tactics and maneuvers of nocturnal strategizing take place within the context of self-preservation, and in intrapersonal, interpersonal, and inter-object relationship. The phenomenon of nocturnal cognitive problem-sovling consists of three distinct modalities – direct, self-monitoring, and indirect – with unique categories and properties that represent mind and brain in a problem-solving mode during dreaming (Kozmova, 2008). The presentation focuses on offering rich, descriptive view of the extent of executive function that operates during dreaming: It displays the categories of modalities that represent the phenomenon of nocturnal cognitive problem-solving. The scope of cognitive strategies and skills individuals are capable of using when confronted with and when working toward resolving intriguing problems or threatening situations, both self-imposed or occuring during the scenario of dream then challenges the notion of proposed "severe limitation of thought" in REM sleep and dreaming (Hobson, 2009, p. 805). The evidence and the extent of executive cognitive strategies also raise the questions about the secondary consciousness in relationship to theory of protoconsiousness (Hobson, 2009). **C11**

185 **Disturbed Dreaming: How Everyday Dreams Turn into Nightmares**

Antonio Zadra , Genevieve Robert <antonio.zadra@umontreal.ca> (Psychology, University of Montreal, Montreal, Quebec Canada)

Although numerous studies have investigated different aspects of nightmares, (e.g., frequency, association to measures of psychopathology, treatment approaches), surprisingly little is known about why some dreams unfold into nightmares and very little data exist on nightmares' actual thematic content. The goal of the present study was to evaluate the content of adult nightmares using a range of objective content analysis systems. Aspects of the nightmares investigated included commonly reported nightmare themes, triggers that contribute to turning dreams into nightmares, the narrative development of nightmare reports, their emotional content, and presumed causes of awakening. Written nightmare reports containing 25 words or more were obtained from 2-4 week dream logs collected for a series of studies on dream content and personality. To avoid an overrepresentation of nightmares from individuals reporting many nightmares, a maximum of two nightmares were randomly selected from each participant's dream log. The current sample included 158 nightmares with mean length of 156 words (SD = 126) reported by 18 men and 102 women (mean age 32.0, SD = 11.2 years). The most frequently reported themes included physical aggression (30%), interpersonal conflicts (20%), being chased (6%), failure or helplessness (6%), health-related concerns (6%), presence of an evil force (5%), death of the dreamer or other character (4%), and accidents (4%). Most nightmare reports began as banal, neutral or mildly negative dreams and became distressing nightmares during the first third (65.8%), middle portion (26.6%), or final third (7.6%) of the dream narrative. Elements identified as being responsible for the dream becoming a nightmare include external events (69.6%), emotions (13.9%), cognitions (5.7%) or a combination of these factors (e.g., 7% event + emotion). As expected, a majority of nightmares (74%) contained an unfortunate ending (e.g., dreamer being injured, dreamer losing control of a key situation, death of a character), but some also ended with either partially (21%) or fully (5%) positive outcomes (e.g., dreamer takes control of the situation, dreamer becomes lucid, dreamer is saved). Finally, the most frequently reported reasons for the dreamer awakening from the nightmare were: facing a severe and imminent danger (38%), being overwhelmed by emotions (36%), and voluntary decision to wake up (8%). Striking gender differences were observed in several of content variables, most notably on the nightmares' thematic content. Taken together, the present findings show that contrary to popular belief and many clinical case reports, prospectively collected nightmares can contain a wide range of themes beyond those of pursuit and physical aggression. Significant variability also exists in the actual narrative structure of nightmare reports. These results have implications for recently proposed theoretical models of nightmare occurrence and clinical views of how nightmares unfold. **C11**

3.11 Cognitive development

3.12 Artificial intelligence & robotics

186 **When is a Robot Conscious?** Peter Ford Dominey, Stephane Lallee <peter.dominey@inserm.fr> (Robot Cognition Laboraotry, INSERM Stem Cell and Brain Research Institute, Bron, France)

In The Conscious Mind (1996) Chalmers argues that a zombie world can exist which is physically indiscernible from our world, but entirely lacking conscious experience, and that this leads to a logical inconsistency for physicalist theories of consciousness. Dennett and others have argued that the strong notion of zombies is not feasible. Today, highly articulated humanoid robots provide a new testing ground for these notions. In this context, we have developed cognitive systems that allow humanoid robots to learn to (1) recognize and describe new actions, (2) observe two humans performing coordinated cooperative tasks and then (3) step in and participate, taking the role of either observed human. The robot has a shared intentional plan that allows it to anticipate what the human will do, and help the human when necessary. Such an ability to manipulate shared intentions is considered a hallmark of human cognition (e.g. Tomasello et al. 2005). The robot can also describe what it and the others are doing, and why, and ask questions when it does not understand things. The question can then be posed, to what degree are these robots conscious? The talk will provide concrete examples of humanoid robots performing cognitive tasks that are typically considered to require consciousness in humans, and will address this question of robot consciousness in the context of current perspectives in philosophy of psychology, and cognitive neuroscience. **C5**

187 **Moving Bubbles of Attention: A Mechanism Enabling the Emergence of Self and Focused Consciousness in Embodied Artificial General Intelligences** Ben Goertzel <ben@goertzel.org> (CEO, Novamente LLC and Biomind, Rockville, MD)

A systematic conceptual and technical perspective on machine consciousness is outlined, and explored in the specific context of the OpenCog Artificial General Intelligence (AGI) system and its application to control virtual world agents and humanoid robots. Consciousness is viewed from a panpsychist vantage, as a universally present "ambient" quality which manifests itself differently in different entities, and which appears in a highly focused form in certain embodied, self-modeling intelligent systems like humans. The question of how to create AGI systems that give rise to similar forms of highly focused consciousness is posed; and a solution is hypothesized, in the form of nonlinear-dynamical attention-allocation mechanisms that give rise to a spontaneously self-organized "moving bubble of attention" correlated with the system's self-model. The specific implementation of this mechanism in the OpenCog system using artificial economics and probabilistic inference is discussed. Speculations regarding the potential underpinnings of similar phenomena in human and animal brains are also briefly considered, including dendritic webs and strange attractors. **PL4**

188 **What Could a Brain do with Quantum Algorithms?** Hartmut Neven, Vasil S. Denchev, Purdue University, Vdenchev@purdue.edu Geordie Rose And William G. Macready, D-Wave Systems, Rose,wgm@dwavesys.com <neven@google.com> (Google, Malibu, CA)

The tradition of the Tucson conferences was in part born out of the idea that quantum mechanical processes are implicated in conscious experience. Proving this conjecture poses formidable epistemological and experimental challenges. An aspect that has received less attention but is more tractable is the question to what degree quantum mechanisms can assist an intelligent system in performing key tasks. We want to contribute to the debate by reporting on a series of theoretical and experimental studies designed to show how learning from examples can benefit from employing quantum algorithms. A formulation is employed in which a binary classifier is constructed as a thresholded linear superposition of a set of weak classifiers. The weights in the superposition are optimized in a learning process that strives to minimize the

training error as well as the number of weak classifiers used. The optimization is carried out by employing quantum annealing minimizing an Ising energy. We report results from Quantum Monte Carlo simulations as well as hardware experiments using a quantum processor manufactured by D-Wave. The accuracy of the resulting classifier compares favorably with those obtained by classical algorithms. The mechanism proposed here is in not intended to faithfully model learning in the nervous system. But our demonstration that quantum annealing can be employed to advantage for learning tasks may provide motivation for experimentalists to take a closer look; in particular in light of recent findings that quantum processes are implicated in essential biological functions as well as our emerging understanding under which conditions quantum resources required for computational speedups can withstand the decohering influences of an environment. **C13**

189 **A Definition of Consciousness as Energy Carrying Information Flowing Through Control Loops in a Hierarchy Constituting the Self** Paul Storey <paulstorey@live.com> (T3M, Citrus Heights, CA)

This paper is a continuation of a definition of consciousness based upon physical dimensions, in engineering units. Over billions of years, energy interacting with matter became controlled by information, culminating in self-reproducing systems called life. Through natural selection over another billion years, these self-sustaining systems of information controlled energy evolved increasingly complex sensors, signal processors and actuators, all governed by control loops which enabled maintenance of key parameters essential for survival. The processing centers became brains and evolved to include memories, cause effect associations, executive mechanisms to decide and coordinate all activities, and action generation mechanisms to control actuators affecting the self and the external world around the self, all happening in a time frame quick enough to enable the entity to act and survive in its environment. Our ancestor?s evolved advanced signal processing including simulations which utilized models to predict future events, abstractions to succinctly represent complex phenomena, evaluation mechanisms to compare alternative predictions, followed by generation of more complex sequences of actions to attain more distant and valuable goals, all to sustain the self. Over tens of millions of years, driven by success of more sophisticated systems incorporating world models of greater variety, resolution, robustness, adaptability, which provided increased accuracy of prediction mechanisms, brains evolved into minds. Information controlled energy with the purpose of sustaining the self, flowing in real time, through networks which allow higher degrees of abstraction at each level, constitute our perceptions, our experiences, our emotions, our thoughts, our goals, our beings, our consciousness. A hierarchical control, as per James Albus of NIST, 1980, is used in the description of consciousness. Control theory is used to mathematically describe feedback systems from simple thermostats, to regulatory systems which maintain homeostasis in simple organisms, to systems essential for an insect or a robot to walk, orient, balance, coordinate, track, navigate and behave, to the most complex mental processes in the human mind. Due to the complexities of control theory and its remoteness to other disciplines, its applicability and relevance to consciousness is just being understood in the consciousness community, pioneered by Sanz 2005. State variables involved in control loops regulate position, velocity, acceleration, trajectory, posture and levels of abstraction such as fear, anger and goals, purpose and intent. Input processing loops can determine size, shape, color, smell, taste, feelings of danger, excitement, etc. Output processing loops generate actions with increasing spatial and temporal resolution toward the bottom of the hierarchy. Metrics of integration and complexity are added as per Edelman/Tononi 2000. In summary, a description from physical, engineering, information theory, control theory, evolution, robotics, AI, model based reasoning, neural nets and neuroscience perspectives provides great insights into the physical basis and the essence of consciousness, all in quantifiable units. An acronym called SPARKLES has been coined which contains the engineering units which describe consciousness. Throughout the paper, the latest updates to the work are presented in figures, charts, graphs and tables which demonstrate the concepts in greater resolution and understandability. **P3**

190 **Quantum Chalk for a Classical Blackboard** Stephen Waldon <waldon311@yahoo.com> (Evanston, IL)

In their Orch OR theory Penrose and Hameroff propose that consciousness results from sequenced interaction with the geometry of fundamental spacetime through networks of microtubule structures in the brain. These structures enable the entanglement of quantum states contained in multiple spatially separate neurons and provide a means to amplify the quantum world to the macro world. Theoretically this opens the door for the non-computational properties of orchestrated quantum wave collapse to influence the information processing activities of the brain. The implications give rise to many questions as to what role the quantum world might play (if any) in macro-level processes of decision making, creativity, and other aspects of cognition. Proponents of the theory have suggested that the information contained in the quantization of spacetime curvature is an essential element of cognitive function. Opponents have argued that the brain has evolved specifically to eliminate quantum level "noise" from its information processing mechanisms. In order to further the understanding of these questions, I propose an artificial system that has the capability to be "plugged" and "unplugged" from the influence of the underlying quantum universe. This capability provides a controlled environment for studying and thinking about the relationship between quantum phenomena and high-level cognitive behavior. Additionally, because it does not rely on distributed computation for decision making and knowledge representation the number of entangled quantum states required for implementation are significantly reduced. This puts the possibility of realizing a working system in reach with current technology. The system I propose is based on a traditional AI blackboard architecture. It utilizes a control algorithm where the evolution of a quantum system is guided by the symbolic computation of the knowledge sources and the blackboard. The overall system operates in repeated sequences of updates to the blackboard, a mapping of the blackboards symbolic state to a set of entangled quantum states, and objective reduction of the quantum system to determine the control output. One way to think of this is that the macro-level symbolic computation orchestrates the computation of a synthetic quantum system. To uncouple the system from the quantum world the quantum control algorithm is simply replaced by the traditional blackboard control algorithm. Although I focus on blackboard architectures, I also show how several other popular AI / Cognitive architectures could be augmented in similar ways. Unlike the distributed processing and storage characteristics of the microtubule networks of the brain, this system localizes the interaction between the macro and quantum worlds to a very specific interface and makes explicit the division of labor between the two. **P9**

3.13 Neural networks and connectionism

191 **The Neurons in the Myocardium of the Mammalian Heart Have Perceptive Sensory Functions Locally in the Heart Like Sensory Cortical Neurons of the Brain** Amna Alfaki <amna1952@hotmail.com> (Pediatrics, Omdurman Islamic University, Kharoutm-Omuduman, Sudan)

In the medical field at present time the heart could be considered as a sense, as well as a motor organ. In the recent past the hearts was considered as an efficient pumping hemodynamic machine that pumps and distribute blood to whole body. New scientific discoveries are now providing evidences which indicate that the heart indeed plays a significant role in emotional experience ,conscious experience modulate perceptions and is involved in intuitive perception and intention. These new discoveries are mainly based upon anatomical structure and function of the nervous system of the heart ?the intrinsic system (little brain). Recent studies have shown that the heart has an endogenous neural intrinsic system independent of central medulla in brain stem that the heart. This intrinsic system is composed of hierarchy of neurons afferent,efferent and interconnected neurons that interact to form loops of circuits within which in formations processing take place . Cardiac afferent in formations is known to connect and modulate activity in the thalamus ,hypothalamus periaquiductal gray , parabrachial complex , reticular formation and amygdala.The amygdala ,hypothalamus and thalamus all relay cardiac in formations directly to the cerebral cortex ,and it has been shown

that cardiac activity effect perception and sensory information . The neural system in the heart ?the intrinsic cardiac neurons, and cortical neurons are derived from the neural crest of the embryonic ectoderm. I postulate that some of the intrinsic cardiac neurons and cortical neurons may have similar basic functions and perception and act together in a distributed network to inform perception, body states, conscious state, emotions, intuition and consciousness. **P9**

192 **Tribal Networks and Consciousness** Henry Kennedy, Nikola T. Markov <henry.kennedy@inserm.fr> (Integrative Neurociences, INSERM U846, Bron, France)

The lack of data on the interareal network of the cortex has led to the assumption that it may be architectured according to the small world principle. Our extensive exploration reveals that, contrary to what has been previously thought, the cortical network is dense, so rejecting the possibility that it complies with small worlds. Therefore we show the crucial importance of information on weight and physical projection distance in order to understand this embedded network. An exponential distance rule is found to govern and organize the global and local properties of the network. This rule is on the basis of the heterogeneity of connection strengths that is responsible for the particular structure of the cortical network. Build of a circuit-like backbone of strong connections within a sea of low magnitude connections. The network is small scale and this along with its density and the distance rule impacts on the algorithms that it can implement. We propose, that tribal is a better adapted descriptor for the cortical network than the famous small world. In the social sciences tribal network structures have been associated with improved ability to monitor each agent's actions and ability to attain consensus. Transferring this in to the brain networks we suggest that the dense web of reciprocal weak connections is able to play a role in generation and control of synchronous activity between brain areas while the circuit of very high magnitude connections ensures efficiency of information transfer. These results have a large impact on the understanding of consciousness generation mechanisms in the brain. **P9**

193 **Connectionist Semantics, Feature Processing, and the Interpretability of Dimensions in State-Space** Ian O'Loughlin <ian-oloughlin@uiowa.edu> (Coralville, IA)

Churchland's account of the semantics of neural networks depends on distributed representation, where the content of a vector space is determined solely by topological relations to other state-space regions. Individual dimensions of the state-space are thereby not semantically interpretable. Prinz draws on the relationships between prototypes and features to argue that semantically uninterpretable dimensions are irreconcilable with empirical data (and with our apparent, basic cognitive capacities), and hence that Churchland's semantic holism is unacceptable. For Prinz, this lacuna invites a concept empiricism that grounds the semantics in feature-based dimensions. Prinz's argument, however, depends on an equivocation on decomposition: it is an unwarranted assumption that conceptual or linguistic capacity for reflective decomposition of prototypes is interdependent with the semantic decomposition of state-space content vehicles into interpretable dimensions. Prototype concepts with a holistic semantics can exhibit features, consistent with feature-prototype relationships demonstrated empirically and with Churchland's semantic holism. Furthermore, the alleged dependence of feature processing on semantic decomposition is belied by existing connectionist systems. The partitioning of activation patterns in the hidden layers of certain connectionist networks directly contravene Prinz's objection, as the resulting partitions are semantically interpretable and decomposable despite the fact that individual dimensions do not map to features. **P9**

3.14 Cognitive architectures

194 **On the Theoretical Generation of Antinomies and Paradoxes** Carlos Acosta <c_acosta@sbcglobal.net> (Nipomo, CA)

It is proposed that higher-order symbolic thought, such as mathematics, may be generated by filtering basic internal and external perceptual information through an interconnected system of increasingly enhanced spatiotemporal representations of reality, i.e., models of existence and their embedded predictive reasoning systems. It is further proposed that although

the expression of each core component of these abstract representations of reality are incrementally extended over time, each singular essence remains invariant. This latter proposition is supported by making use of Global Workspace Theory and Model Theory to conduct a theoretical analysis of four self-referential paradoxes; ultimately concluding that antinomies may be abstract versions of bistable perceptual phenomena. **P3**

195 **The Architecture of the Mind - Toward a Cognitive Model. Or, the Mind is Not the Brain, the Mind is Software Operating the Brain** Richard Blum <richblum@animationonline.com> (Animation Online, Myrtle Beach, SC)

I am developing a cognitive model, a theory of mind, that takes the form of a software architecture. The basic tenet of the theory is that the physical brain is not the mind, rather the mind is comprised of the software that operates the brain. The Architecture of the Mind is an integrative model in that it employs concepts from various fields. The model's design starts from the bottom-up with what we know of the brain's neural structure; from the top-down, by utilizing knowledge of human behavior from the field of psychology; from self-introspection and knowledge revealed by mystics who have obtained mastery of their minds; and from understanding the nature of software systems that computer science teaches. The focus of this presentation is to examine the properties that are intrinsic to software systems, and therefore form the basis for the proposed architecture. I suggest that even when a complete understanding of the brain's neural functioning is achieved in the future, it will not yield an understanding of the mind. The human brain, probably the most complex system in the universe, must like all complex systems be organized in a hierarchical manner - neurons at the bottom of the hierarchy and various levels that control the neurons above. These higher-levels of control are software in nature, and these software processes form the mind. What is software? In the case of computers, software was invented to make programming possible. Originally, programmers had to flip switches to represent long strings of binary codes. As programs became more complex this became unmanageable. This led to the development of low-level languages to represent codes. Eventually, high-level languages were developed in which each word encapsulated many low-level codes. I postulate that the following principles exist in all software systems and therefore serve as the basis for the Architecture of the Mind: Software systems are hierarchical. Language is a key component of software. High-level concepts expressed in language are compiled or translated into lower-level executions. The lowest software levels execute instructions in hardware. In computer hardware instructions are electronic circuits; in the brain these take the form of neural systems. The same software can run on different hardware architectures. Reusability. A single function is utilized by different processes. Optimization of high-level concepts into lower-level processes results in vast improvements in performance. Ultimate optimization is achieved through customized hardware that replicates software functions. Software can emulate hardware. Identical functions can be implemented in hardware or software, thus no conceptual difference between them. Intelligence is achieved through massive parallel processing tree-searches. Intelligence is hybrid; coded in software, optimized in hardware. All human experience, including sensations, thoughts, feelings, and emotions, occurs in software. Minds are not physical entities. Minds are metaphysical - software. I suggest that low-level software is built in at birth, and higher-level software develops during early childhood, especially through speech acquisition. The Architecture of the Mind attempts to not only explain mental functioning, but also how consciousness, that mysterious aspect that bestows awareness, comes into being. **P3**

196 **Human Consciousness, in Control of Human Cognition, Develops Coherently with Modified Cognitive Representation as Domain Mastery Progresses: So Elegance, Efficiency & Effectiveness Improves** Peter Burton <peter.burton@acu.edu.au> (Quality of Life & Social Justi, Australian Catholic University - Canberra, Canberra, ACT Australia)

Human consciousness, the relationship between the mind and the brain, and the basic nature of knowledge all await fundamental new insight before a scientific account of human cognition can be settled. Diverse evidence converges to a single unequivocal conclusion about the nature and role of consciousness in human cognition. Consciousness in its richly varied

forms invariably is directly and intimately engaged in cognitive processes, because such processes invariably require some means of control: consciousness provides the means of that control; consciousness is that control. This paper will outline the functional contribution of consciousness to cognitive processing, and provide an operational elucidation, together with supporting mechanisms linked to specific brain activity, to explain how cognitive processing itself develops through major transitional phases as each individual matures. In particular, basic human cognition, at first similar to the processing of other mammals, is shown to respond to an exogenous form of control vehicle whose remarkable efficacy leads to the introduction of new kinds of cognition. The major survival benefit of this elaborated cognitive competence is to catalyse the introduction of deliberate navigational tasking to exadaptively complement a default and reactively instrumental form of challenge response. At each stage of advanced cognitive processing, it is the emerging flexibility of new kinds of conscious control over cognition that lead each transition. Empowered by a syntactically sequence-oriented cognitive phase catalysed by linguistic symbolism, the ultimate transition to self-conscious control is formulated upon a previously un-described form of internal perspective-taking over many forms of knowledge, which serves in the case of the self-model to afford a particular two-dimensional field of control over navigational tasking which subsumes simpler forms of conscious control. The process-oriented ratio-cognitive mode of sequence control thus gives over to a more target-oriented 2d-balance-board ('intuitive') form of control. Unable to be repudiated once acquired, the operational self-model, characteristic of navigational tasking, systematically invests in the (forgone) behavioral repertoire which increasingly subserves intelligent performance. Seeing cognitive work, cognitive progress and cognitive control as three separate analytical dimensions of the higher-order percept-action cycle, one can trace the mammalian episodic unit of behaviour (stimulus control, via cues) into a quad-template, sequence-management framework of phrasic instrumental competences (sequence control, via symbol-pointers). Extensive experience and automation of stereotyped sequence-management foreshadows a redirection of attentive focus towards external objectives, where a vector-oriented target-choice system of control (self control) capable of training expectations towards achievability begins to take over. Three major phases of cognitive advance delineate cognitive development, themselves predicated upon variously five (capabilities), three (levels) and two (stances) principal components of cognition. Consciousness as control, cognitive processing itself and cognitive representation thus continue to morph coherently from less- into ever more-elegant, efficient and effective forms of cognition as domain mastery progresses. It is precisely the experience of this progress that eventually yields the personal conviction that so much remains to be known. **P3**

197 **Imagination and the Psychology of Mind-Wandering** Peter Langland-Hassan <phassan@artsci.wustl.edu> (Washington University in St. Louis, St. Louis, MO)

Imagining is an important form of "mind-wandering" or "stimulus-independent" thought. Are the mental states that constitute imaginings (and "conceivings") sui generis in their basic nature, or can they be identified with better understood mental states, such as perceptions and beliefs? By what principles do imaginative mental states causally interact with other mental states? How precise can we be about their functional role? In seeking traction on these questions, I set out a number of desiderata for a psychological theory of imagination. These include features such as imagination?s creativity, its usefulness in practical reasoning, its link to judgments of possibility, its active nature, and its occasional limits. I then outline an account of both "propositional" and "sensory" imagination aimed at satisfying these desiderata. According to this account, both propositional and sensory imagining consist in forming or retrieving beliefs in conditional probabilities. To (propositionally) imagine that it is raining is (roughly) to infer or retrieve beliefs in conditionals of the form: "Probably, if it were raining, then x, y, and z." To (sensorily) imagine a blue apple is to infer or retrieve a believed conditional of the form: "Probably, if there were a blue apple it would look roughly like: A," where A represents the contribution of a mental image to the imagining. While such view allows for an attractive explanatory reduction of imagination to belief, many will find it counterintuitive. I indicate how certain features of imagination?e.g., its creativity and freedom?that seem to clash with

the account can nevertheless be accommodated. I also argue that such a theory is better poised than alternatives to simultaneously explain imagination's usefulness and limits. Finally, a reduction of imagining (and of conceiving) to processes of inference among beliefs provides path by which cognitive science may fruitfully explore the role of otherwise elusive mental phenomena; we begin to see what it would take to create artificial mind-wandering. **C19**

198 **Sonification in Cosmos and Consciousness ~ the Ontology of Resonant Properties: How sound Gives Rise to Phenomena, Transforms, Evolves and Heals** Kala Perkins, <quasar9@mac.com> (Pacific Palisades, CA)

The Uni-verse, or "Bhagavd Gita", may be translated "Divine Song"; "Nada Brahma", is translated from the Sanskrit as "God is sound". An entire field of astrophysics, stellar seismology, conveys and seeks information about the unique resonant properties of each and every star, and we are exploring resonance throughout spatial dynamics. A present there is extensive work being done on both discerning and generating the sonification of cosmic, as well as terrestrial phenomena. A remarkable research project at UCSB is literally researching and then generating in a massive 3-D audio-visual laboratory, the resonant properties from single atomic particles, such as hydrogen, to neural dynamics, entire human organs and the higher dimensional fabric of mathematical space. Since 2003, we have been gathering accurate data on the acoustic oscillations that have given rise to the structure and fabric of our known universe; other possible patterns are being explored that could generate diverse universes with or without varying life emergent potentials. How specific sound properties and harmonics give rise to the emergence of particular phenomena in consciousness and form is at the frontier of scientific inquiry, an ancient science spoken of by Taoists, and richly exploited by both commercial and aesthetic fields. Ancient Aboriginal wisdom states that the world was created by song lines; Navaho insights tell that the Elders sang us into existence and will sing us back home. In science we are discerning the collective resonant properties of unique living organisms, of the planet, stars and our universe, and the healing properties of tuning and retuning the consciousness factors in living systems. One scientist offers us the experience of listening to the first 10 million years of cosmic evolution in less than a moment. This presentation will explore many of these sonar dynamics, in both ancient and frontier sciences, on the role and dynamics of sound in generative, emergent and healing properties and consciousness. **A2**

199 **A Metacognitive Architecture That Supports Human-Like Learning** Alexei Samsonovich <samsonovich@cox.net> (Krasnow Institute For Advanced, George Mason University, Fairfax, VA)

Elements of human subjective experience are private and unique to each subject, and so are their detailed correlates: patterns of neuronal activity and other processes in the brain. However, the semantic content and functional characteristics of subjective experiences appear to be universal across individuals and can be described by mathematical constructs called "schemas" and "mental states" (Samsonovich & Nadel, Cortex, 2005; Samsonovich et al., Int. J. Machine Consciousness, 2009). Here a mental state is interpreted as a functional model of an instance of the subject-self; its content includes instances of schemas understood as elements of awareness of the subject. These and other building blocks underlie the design of a cognitive-metacognitive architecture (CMA) currently under development at George Mason University (GMU). In recent years, a powerful new approach toward gaining an understanding of how natural intelligent systems develop their cognitive and learning functions emerged based on biologically inspired cognitive architectures (BICA: http://members.cox.net/bica2009/). The main distinguishing feature of CMA, a successor of GMU BICA (Samsonovich & De Jong, 2005) is its ability to model various forms of metacognition and self-regulated learning (SRL) that are found only in humans. SRL is a complex of techniques and strategies employed by learners during deliberate regulation of their learning process, involving elements and strategies like setting own goals, self-monitoring, self-instruction, self-control, self-reflection, self-evaluation, self-rewarding, etc., many of which have to do with the human concept of agency (self) applied to the learner from a metacognitive perspective. A demonstration of these cognitive functions in the form of a computational model will bridge

the gap between human and machine learning, which is arguably the main obstacle on the roadmap to human-level artificial intelligence. CMA includes five memory systems (iconic, working, episodic, procedural, semantic) and a value system. To illustrate the generality of the approach, two different learning domains are selected: (1) autonomous navigation and (2) mathematical problem solving. In (1), a virtual robot is exploring an apartment in order to be able to find objects in it when requested. The task for the robot is to learn how to explore environments: the performance should increase in a sequence of sessions with different virtual apartments of approximately equal complexity. In (2), CMA operates in a symbolic learning environment, where mathematical facts, rules and strategies are represented as objects that can be manipulated. Examples of tasks are: to assign digits 1-6 to 6 locations in a triangle so that the sum of the three numbers along each side of the triangle is 12; to solve for x the equation ax+b=c. Hard-coded SRL strategies will include: "Guess and test", "Look for a pattern", "Work backward", "Consider special cases", etc. In conclusion, in spite of the rapid progress in cognitive psychology following the cognitive revolution, the problem of semantic correlates of brain representations remains unresolved. The idea of treating subjective experiences as elements of reality expressed in the form of CMA could be a key to machine consciousness and human-like cognitive growth in artifacts. Supported by GMU Center for Consciousness and Transformation. **C5**

200 **Cognitive Architecture for Pranic Practices as Applied to Conscious** Vicky Suri, Prof. Sunita Singh Sengupta, Dr. Monika Grover, Dr. Rajni Suri (Nee Arora), <vickysuri@gmail.com> (Intelligence Studies Group, Sushil Suri Consortium, New Delhi, India)

In recent times various vedic indic processes like Pranayama has got lot of importance in world. But Medically Pranayama is not a very healthy practice. Oxygen is the most important component of respiration process. If we willfully reduce the intake of oxygen, it causes self induced apnea. This process medically causes damage to the human body.But there are Yogies like Swami Yogananda Pramhansa, Swami Rama, Swami Vivekanand and many others who could show extreme benefits of Pranayama in health which includes physical, mental, social and even moral health. In this paper, an attempt has been made to develop a systemic model to explain the efficacy of pranayama and it's effect on purification of mind-conscious comples called soul. This model will provide a theoratical infrastructure on which unified fundamentals of Ayurveda, Yoga, Pranayama and Modern Western Medical Fundamentals can be grounded. First of all, the fundamental differences between Modern Western Medicine, Yoga and Ayurveda are discussed. Pranayama is one of the component of Ashtanga Yoga developed by great Indian Saint Pitanjali. In Ayurveda, which is the healing component of Yogic Practices, human body has five sheaths. Three of them are physical body, pranic body and mental body. They are roughly considered by Modern Medicine as physical body, breathing & respiration process and brain. This can be considered a very rough and partial overlapping between modern medicine and ayurveda. But, Ayurveda has also two components which are not considered as part of human entity. These two part are "Unattached Rationale Persona" called "Vigyanmaya Kosh" and "Unattached Blissful Persona" called "Anandmaya Kosh". The understanding of these components of human persona explains the efficacy of Pranayama in a scientific manner. Reality v/s Instrumentation Problem Doubts are usually raised about the presence of energy body and reality of conscious. Usually scientists consider conscious as effect of electro-chemical activity in Brain, Central Nervous System and endocrine system. Usually energy body is associted with psychiatric disorders, paranorman experience, superstitions and in worst of the cases ghosts and spirits. Science usually discard such beliefs overwhelmly. But there are some scientist who propogate the belief of energy body or aura. Dr. Korotkof has devised a "Gas Dischrge Visualization" technique to calculate and plot human aura with various parameters like aura strength. These technique are highly refuted as medical Truths and aura is considered more of belief based phenomenons. In this paper, the proposed theoratical infrastructure has various blocks which can not be verified by present day instrumentation. But in future, these instruments can be developed. I call this aspect as instrumentation problem rather than "Unscientific or Untrue". **P3**

3.15 Ethology

3.16 Self-consciousness and metacognition

201 **The Effects of a Self-Evaluation Task on the P300 Event Related Potential** Joel Alexander, Kimber Saville, Justin Karr, Tyler Grindstaff and Ronald Alexander <alexanj@wou.edu> (Psychology, Western Oregon University, Monmouth, OR)

It has been demonstrated that self-identity stimuli (e.g., name, date of birth) produce an increase in P300 amplitude. Additionally, it has been shown that P300 amplitude is highly sensitive to emotional self-evaluation (Alexander, et al., 2005). The present study is a replication of the Alexander et al. 2005 study with more subjects and more electrode recording locations. The study was designed to capture an introspective moment during a task that required emotional self-evaluation related to an infrequent, random stimulus void of self-identity qualities. The design of the study was different from previous stimulus-driven self-identity stimulus studies in that the base sensory discrimination task was constant across all three conditions. All subjects started with a standard tone discrimination task (oddball) during condition 1. In conditions 2 and 3 the subjects were required complete a secondary cognitive task in addition to the standard sensory discrimination task where they would be required to make a second stimulus-related judgment after their initial response. Condition 2 required subjects to index a mental count if the tone was a target, in addition to tone discrimination. Condition 3 required subjects to self evaluated it they were surprised by the occurrence of the target tone given the random and infrequent nature of the target tone presentation. During these conditions ERPs were recorded across 32 electrode sites. Similar to the self-identity stimulus studies, results indicated a large increase in P300 amplitude during the condition with the self-evaluation component compared to the other conditions. These results imply that self-evaluation may utilize more cortical resources than non-self related cognitive-discrimination tasks. **P9**

202 **Empirical Investigation of Scales on Self-Consciousness and its Related Constructs in Brazil and in the United States** Amanda DaSilveira, William B. Gomes, Stephen M. Fiore <amandadacosta@gmail.com> (UFRGS/UCF Universidade Federal Do Rio Grande Do Sul/University of Central Florid, Porto Alegre, RS Brazil)

Progresses in the cognitive science and its relation to phenomenology are associated to a current interest in the development of measures of self-consciousness. More than thirty years have passed by since Fenigstein, Scheier and Buss (1975) proposed a scale to evaluate individual self-consciousness variations. After that, a host of new scales have been developed in this century, and these scales concern associated constructs such as reflection, rumination, self-absorption, and mindfulness. Due to this return in the production of instruments, it is observed a necessity to evaluate the objects of measure that some of these new scales claim to work with. The self-consciousness phenomenon in human being has traditionally been defined as a state experienced while attention is directed to self, or 'the capacity to become the object of one's own attention' (Morin, 2005, p. 117). According to James (1950/1890), the circumstance where the thought can be focused on itself requires a duality, i.e., the subject (I) who looks to himself as an object (me), or, say, a look into one's past.On the other hand, although the German philosopher Edmund Husserl has been somehow influenced by William James' ideas, he defended the idea that self-consciousness is inherent to experience. Thus, Husserl believed that consciousness is possible without one necessarily being self-aware of him or herself. The practical implications of a wider self-consciousness concept, which contemplates not only the self as a past experience or a content, but also the present circumstances of experience and its future thinking and plans, are seem in the concept of meta-consciousness by Jonathan Schooler (2002), or in the concept of agency as used by the sociologists Margareth Archer or Norbert Wiley. Yet, it is believed that some instruments that claim to measure self-consciousness and its related constructs are based on James' idea of consciousness (or thought), which oriented exclusively to the past experience as a static content. In order to evaluate which orientation the constructs measured in the scales have, 400 undergradu-

ate students in Brazil and 406 undergraduate students in the United States of America were requested to answer a series of traditional and current scales that claim to measure dimensions of self-consciousness. The instruments used were the following: 1) Self-Consciousness Scale, 2) Rumination and Reflection Questionnaire; 3) Self-Reflection and Insight Scale; 4) Self-Absorption Scale; and 5) Philadelphia Mindfulness Scale. According to these scales' descriptions, it seems that only the Philadelphia Mindfulness Scale claims to understand a present dimension of the consciousness experience. Yet, according to the observed results in the samples from both countries the self-consciousness concept measured in such scales restrict the self-consciousness concept as a content observed in a past instance. Particular comparisons and associations among public self-consciousness, social anxiety, and public self-absorption; and associations among private self-consciousness, self-reflection, private self-absorption, and self-rumination from both countries were also reported in this work. **P9**

203 **The Role of Affect in Self-Attribution** Mark Engelbert <marke@umd.edu>
(Department Of Philosophy, University of Maryland, Berwyn Heights, MD)

Recent work in cognitive science has emphasized the role of affect in judgment and decision making, memory, and moral judgments. This paper argues for a similarly important role for affect in the process of making self-attributions of propositional attitude states. I take 'affect' to encompass a wide range of valenced states with varying levels of intensity, and argue that such states are very often implicated in our self-attributions of attitude states. Furthermore, I argue that this role for affect in self-attributions should be acknowledged and emphasized whether or not one believes that there is any special mode of direct first person access to propositional attitude states. However, I point out that the emphasis on affect in self-knowledge is fully consistent with a self-interpretive model of mental state attribution, of the sort advocated (in various degrees of strength and precision) by theorists like Carruthers, Gazzaniga, Gopnik, and Wegner. I begin with the assumption that few, if any, self-attributions are made purely on the basis of some introspective faculty that provides direct, extremely reliable access to our own first-order states. I take this point to be established by the prevalence of confabulation described in the psychological literature, where subjects make reports on their own mental states that seem to be influenced by a variety of behavioral and contextual factors. I suggest that there is little reason to believe that our everyday processes of self-attribution are significantly different from those observed in these experimental settings. This leads to a pluralistic picture of self-attribution, on which conclusions about the state one is in are reached by drawing on whatever evidence can be found. Given that our self-attributions seem to be abductions over wide ranges of evidence, I suggest that affective states should be considered a major source of such evidence. This suggestion is rooted in the observation that the information carried by affective states often seems to be quite rich and detailed. Evidence from research in recognition memory, as well as phenomena like Capgras Syndrome and work with split-brain subjects, suggest that affective states can give rise to beliefs that are highly specific, rather than mere yes/no judgments or good/bad feelings. Thus, I speculate that there may be particular affective 'signatures' that probabilistically accompany particular types of attitudes: one for hoping, one for doubting, one for expecting, and so on. Such signatures need not be perfectly correlated with particular states, nor does their recognition need to be infallible in order to provide useful (though occasionally misleading) evidence as to one's present attitude state(s). Finally, I address the implications of this proposal for recent suggestions that all self-attributions are made interpretively. In particular, Carruthers has argued that self-attributions of attitudes are interpretations abductively generated by a mindreading faculty that takes as input information about one's own behavior and situation, as well as globally-broadcast perceptual, imagistic, proprioceptive, and (crucially), somatosensory information. Such an 'interpretivist' model fits well with an emphasis on the role of affect in self-attribution, provided that affective states are characterized non-attitudinally. **P3**

204 **Metacognitive Schemes Applied to Social Problems Structuring** Marcos Estellita Lins, Angela Cristina Moreira Da Silva; Daniel Braga Areas; Manuel Doria; Milena Estanislau Diniz; Leonardo Pessoa; Renato Fernandes <estellita@pep.ufrj.br> (Production Engineering/Operati, Federal University of Rio de Janeiro, Rio De Janeiro, Rio De Janeiro Brazil)

This work is motivated by the difficulty of applying formal methods to support decision making in problem structuring (Rosenhead, Mingers, 2001). In particular the emphasis is on complex approaches to societal problems (De Tombe, 2001), such as planning and management of public policies in health, education, energy, transportation and safety. This kind of approach is not constrained by the privileged perspective of a problem owner. It is also motivated by the challenging development of methodologies to incorporate contents belonging to the individual subject, in the object of study, aiming at formal representations. Individuals use adaptive schemas (Young, 2003, Thagard, 2005) to support decision making, but they are subject to perception biases such as self deceiving (Smith, 2006), personality traits (McCrae & Costa 2005) and inadequate negative emotions (Eckman, 2003). These factors are in the core of unresolved conflicts between planning and organizational management. Our objective is contribute to consolidate several developments on cognitive aspects in the modeling of complex societal problems, and to integrate them to the methods for structuring problems, comprised in operations research models. We provide some empirical applications, mainly in the health and other public services, making use of cognitive maps to elicit and represent knowledge of experts and decision makers' judgment. The taxonomy of values from positive psychology has been applied to support Theory of Mind (Malle, 2004) - inferring about values behind different perspectives of the several stakeholders. Cognitive mapping (Eden, 1988) helps overcoming linear communication in talked and written language, given its networked nature. Moreover, it allows for constructive communication, since each participant can focus on the issues he is more concerned about. Finally, it is important to represent conflicts intra and inter individuals, taking into account the multiplicity and dialogical developments that arose from ego states theory (Watkins, and Watkins, 1997). This is done by retaining different though conflicting views of a given problem, which should be alternated with a consolidated multiobjective and multiperspective consensus, whenever actions need to be performed. Bibliography: 1.DeTombe DJ (2001). Complex Societal Problems in Operational Research. European Journal of Operational Research 140 (2002) 232-240. 2.Eckman, P (2003) Emotions Revealed - Recognizing Faces and Feelings to Improve Communication and Emotional Life. Times Books. 3.Eden, C (1988) Cognitive mapping. European Journal of Operational Research, v. 36, p. 1-13. 4.McCrae, RR & Costa. PT (2003). Personality in Adulthood: A Five-Factor Perspective. The Guilford Press. 5.Malle, BF (2004) How the Mind Explains Behavior. The MIT Press. 6.Rosenhead, J & Mingers, J (eds.). 2001. Rational Analysis for a Problematic World Revisited. 7.Smith, DL (2006). Why We Lie: The Evolutionary Roots of Deception and the Unconscious Mind 8.Thagard, P (2005) Mind: Introduction to Cognitive Science. The MIT Press. 9.Watkins, JG e Watkins, HH (1997) Ego States: Theory and Therapy. WW Norton and Company. New York. 10.Young , JE, Klosko, JS, Weishar, ME (2003). Schema Therapy: a practitioner's guide. The Guilford Press **P9**

205 **Evidence for Two Conscious Entities in the Human Brain** Frank Heile <frank@heile.org> (Retired, Santa Clara, CA)

I will present evidence supporting the hypothesis that two conscious entities simultaneously exist in the human brain - the primary conscious (based on the sensory representational systems) and the symbolic consciousness (based on the language/symbolic representational systems). The experiments and phenomenon that can be interpreted as arguing in favor of this hypothesis will include: the theory of mind, split-brain experiments, blindsight, the priming effects of non-conscious sensory experiences, emotions in general, Libet's results on the time delays in the intention to act and the top down versus bottom up attention system differences. In fact the evolutionary development of the God concept and of spirituality in general will be interpreted as evidence for these two separate conscious entities. The very different characteristics of these two conscious entities will be described. These different characteristics

make it possible to determine which conscious entity is active at any given time. Although the two conscious entities have different characteristics and may be active at different times, the symbolic consciousness almost always thinks it is the only conscious entity and the symbolic consciousness will almost always take all the credit for any activity performed by either entity. The hypothesis of the two conscious entities is a consequence of the hypothesis that consciousness results whenever a model making system includes a detailed and accurate model of itself (the model maker) in the world model. By this hypothesis, whenever a model maker has a representational system with enough accuracy and detail so that it is capable of making a model of the world and of itself in that world, consciousness will occur. Thus, since the sensory representational system and the language representational system are two radically different systems with the required degree of accuracy and detail, the result will be two radically different conscious entities with radically different characteristics in one human brain. Since language is at least partially a cultural artifact that we learn from our parents, and since language developed relatively recently in human evolution, the symbolic consciousness will also be a recent evolutionary development. At the time when the symbolic consciousness was first developing in humans, the symbolic consciousness would have been much weaker than it is today and therefore the primary consciousness would have seemed even stronger to the weak symbolic consciousness. This is when the God concept would have developed - when the weaker symbolic consciousness was aware of the existence of a more powerful entity that had more control in the world than it had. Thus the primary consciousness would represent God to the weak symbolic consciousness and the symbolic consciousness would represent Man. In fact many of the spiritual practices such as prayer and meditation can be seen as attempts to unify these two separate conscious entities. This hypothesis will make it possible to interpret some of the diverse spiritual practices and spiritual texts that have developed around the world as further evidence in favor of the two conscious entities hypothesis. **P3**

206 **Immunity to Error Through Misidentification and Non-Ascriptive Reference to Self** Ted Lougheed <tloughe2@connect.carleton.ca> (Cognitive Science, Carleton University, Ottawa, Ontario Canada)

Recent research into illusions of body ownership (Mizumoto & Ishikawa, 2005) and self-attribution of actions (Jeannerod & Pacherie, 2004) has challenged the thesis that certain forms of self-awareness are immune to error through misidentification (the immunity thesis). The immunity thesis has been the basis for making a fundamental distinction between our sense of self as an object of reflection, and our sense of self as the subject of experience, a distinction recently articulated in Legrand (2007). My paper examines challenges to the immunity thesis, and argues that while the research does challenge some claims about certain types of immunity, there are still kinds of experience that cannot be ascribed to oneself erroneously. Nevertheless, there is good reason to suggest that the immunity thesis does not fully capture what is distinctive about our sense of self as the subject of experience. In particular, it does not capture the non-experience-dividing quality of awareness of self as subject. I argue that the thesis of non-ascriptive reference to self (Brook, 2001) explains whatever immunity may exist and, because it also explains the non-experience-dividing feature just mentioned, tells a more complete story about what is special about awareness of self as subject than bare immunity to error does by itself. **P3**

207 **Hypnotic Alterations of the Sense of Agency** Vince Polito, Barnier, Amanda <vpolito@maccs.mq.edu.au> (Macquarie Centre For Cognitive, Macquarie University, Macquarie University, NSW Australia)

An understanding of ourselves as active agents in the world is a key component of consciousness. Certain clinical disorders, such as anarchic hand syndrome and passivity phenomena in schizophrenia, seem to have as a focal characteristic a breakdown in the normal sense of agency. According to the comparator model of motor control (Frith, Blakemore & Wolpert, 2000b) a subjective sense of agency over our actions develops when self-generated

body movements match internal predictions of these movements. When such matches occur, the sensory response to self-generated movements is attenuated; for example, we are not able to tickle ourselves. Blakemore, Wolpert, and Frith (2000) found that when they artificially delayed self-generated movements to make them seem less self-generated, sensory response increased; that is, self-generated tickle movements felt more tickly. In a series of experiments, I attempted to manipulate participants' subjective sense of agency by using hypnotic suggestions. Hypnotic subjects were given either an alien control suggestion or an anesthesia suggestion to alter their experience of self-generated tickling movements. Individuals given the alien control suggestion were told that they would experience their self-tickling actions as caused by someone else, whereas individuals given the anesthesia suggestion were told that they would not feel any sensation in the arm making self-tickling actions. Both before and after these suggestions, participants tickled themselves and were tickled by the hypnotist. On each occasion they rated the intensity, tickliness, pleasantness and irritation of the tickle sensations. Three experiments were undertaken to examine the effect of hypnotic suggestions for altered experience of agency. Experiment 1 compared high and low hypnotisable participants' responses during hypnosis. Experiment 2 compared high hypnotisable participants? responses in hypnotic and nonhypnotic conditions. Experiment 3 compared high hypnotisable participants with low hypnotisable participants instructed to 'fake' hypnosis. I discuss the results and implications of this task for understanding shifts in sense of agency as seen in clinical conditions, and the application of the comparator model in hypnosis. **C4**

208 **Is Reflexive Inner Awareness a Form of Representation?** David Woodruff Smith <dwsmith@uci.edu> (Philosophy, University of California, Irvine, Irvine, CA)

According to my long-simmering modal model of consciousness: An act of consciousness, or conscious mental activity, characteristically includes a reflexive inner awareness of that act, a form of awareness ascribed thus (by the underscored phrase) for a simple act of perception: "Phenomenally in this very experience I now here see that jumping frog." That form of inner awareness, I've held, is part of the 'modality' of presentation in the experience, part of the way the activity is executed, rather than part of the 'mode' of presentation of the object of consciousness, the way the object is presented or represented in the experience. The question has been raised (e.g. by Uriah Kriegel): Is that form of awareness a form of representation, i.e. of the base mental act? If so, the modal model joins the self-representational approach to the structure of consciousness, where inner awareness is a very specific form of same-order monitoring. (Cf. Kriegel and Williford eds 2006.) I shall argue that inner awareness is not a form of representation as commonly conceived (involving some descriptive content characterizing the experience in a way that might be mistaken). On my view, inner awareness is: 1) modal - and so not involved in representation (of some object, viz. the act); 2) reflexive - and so indicating the act itself ('herein'), rather than representing the act; 3) indexical - and so indicating the act in a way that is not descriptive at all. If inner awareness in this form is counted as representing the act albeit in this very specific way, I'm happy to call it a very special form of self-representation. However, we must not be misled. The problematic features of representation do not then arise. For this form of inner awareness ('in this very experience', or 'herein') does not characterize (describe) the experience at all, and so cannot misrepresent or mischaracterize or indeed misidentify the act itself. Nor can this reflexive awareness fail to hit is target, viz. the act itself, which 'self-indicates' by virtue of its occurring. Background: Higher-order monitoring models of consciousness propose that awareness of one's experience occurs in a higher-order representation of the base mental activity. Some critics point to problems that arise from the assumption that this monitoring is a form of representation. Same-order monitoring models build the monitoring into the base mental act, where a part of the act is a form of representation of the act. Should the reflexive inner awareness I've articulated be considered a form of representation, or is that understanding misleading? **C15**

3.17 Temporal consciousness

209 **Why Consciousness Doesn't Sleep: An Information Theory of Continuity in Consciousness** Francesco Giorlando, Gorbunova, Anastasia <conference@greenant.net> (Neuroscience, University of Melbourne - Ph.D Candidate, Cambridge, Cambridgeshire United Kingdom)

The default mode has been primarily described as a functional network (e.g., Raichle & Snyder, 2007). This paper explores the question of the raison d'etre of the default mode network from a neuro-informatical perspective. The primary position presented is that the default mode is a signal pattern found in neuroimaging studies that reflects an underlying constituent activity. This activity arises from the continuity of the conscious self in all states, including sleep. Self-consciousness is defined here with reference to the (P)synamic theory (Gorbunova & Giorlando, TSC 2008). In light of this theory, information fluxes bridging the external and internal worlds (here, the brain system is viewed as a type of internal model with specific comparator functions) require the type of continuous activity seen in the default mode network. The question of why the correlated areas change under cognitive and sensory load is also addressed. This is achieved by relating information to energy with reference to Landauer's principle and to modern information theoretical approaches to consciousness (e.g., Tononi, 2008). The theory is supported by an integration of experimental data, particularly relating to the role of timekeeping as a function of default mode activity and to aberrations of temporal continuity as demonstrated clinically and experimentally. **P9**

210 **In Defense of Diachronic Perceptual Atomism** Enrico Grube <grube@mail.utexas.edu> (Philosophy, University of Texas at Austin, Austin, TX)

Diachronic perceptual atomism is the view that temporal experiences such as seeing a car move or hearing a melody can be reduced to successions of non-temporal, momentary experiences. This view has been rejected by virtually all thinkers about time consciousness ever since William James famously asserted that "a succession of feelings, in and of itself, is not a feeling of succession" (1890: 629). Subsequently it has often been assumed without much further argument that atomism must be mistaken and that an adequate theory of temporal experience will have to involve either the doctrine of the specious present (cf. James 1890, Broad 1923, Dainton 2000, Tye 2003) or some special sort of "retentional" memory (cf. Husserl 1905, LePoidevin 2007). In this paper, I evaluate the phenomenological objection underlying James' dictum, as well as other related arguments that have been raised against atomism: the argument from the continuity of experience, which claims that if atomism were true, experiences would not be continuous or diachronically unified in the way they in fact are; the argument from slow motion, which claims that atomism cannot explain the distinction between directly seeing an object move and merely seeing that it is moving; and the argument from the metaphysics of experience, which claims that atomism involves commitment to an implausible "cinematic" or "snapshot" view of experience. I argue that none of these arguments are persuasive, and that atomism should be seen as a viable alternative to both specious present theory and memory theory. **C 16**

211 **Mind-Wandering in Daily Life: An Experience-Sampling Study** Xiao-Lan Song, Wang Xiao <xlsong79@gmail.com> (College of Education, Zhejiang Normal University, China, Jinhua, Zhejiang China)

Mind wandering is a too common personal experience to draw attention. We always fall into our internal mental world constantly no matter what we are doing and where we are. The ebb and flow of thought, episodic,or images make up great part of 'the stream of consciousness' out of our intention, and we sometimes notice it and sometimes not. Different from a large number of experimental studies about TUT(task unrelated thought) , we are interested in the mindwandering experience in our real life. We use experience-sampling method to collect the online experience and its psychological and physical backgroud. 120 participants were signaled in random time point during 3 days and requested to fill in the questionare

about there immediate conscious experience passing through their mind just at that moment, which investigate the characteristic of mind-wandering experience and its context. The key results are as follows: 1) Mind-wandering is an extremly widespread and common phenomenon, whether or not individuals have goal-directed task at hand, the internal personal events may pop out into mind. The overall occurrence probability is about 30% , but there are large individual difference; 2) The main components of mind-wandering , if we classified them by its repersentation manner, include episodic thinking, inner speech and visual imagery. They each have their own characteristics and account for nearly 90% of mind-wandering contents. Plenty of time was spent on episodic thinking, which occupies about 60% of this experience. Among them episodic future thinking is the most common cases, and has a closer relationship with self and personal planning; 3) Mind-wandering is not an absolutely spontaneous processing , but can be induced by cues. The majority of mind-wandering is induced by cues from external setting or internal thought. 4) The physical and psychological context will influence the feature of mind-wandering. The nature of task , the source of cues, the attention orientation and individuals' emotion just before mind-wandering will influence the probability of mind-wandering or change its experiential characteristics, such as its relation to self and to personal past or future , or its content's emotional color. 5) About half of Mind-wandering can be aware of by their own and individuals will deliberately make it going on at nearly 50% of situations, especially when individuals feel its content is self-related. The results above suggests that mind-wandering is not random emerge of unconscious information processing behind, and it will be influenced by individuals psychological state and other environmental factors seriously. Acting as an important component of stream of consiousness, mind-wandering is as an induced unintentional internal process, and has its own laws and particular functional significance. **C19**

3.18 Intelligence and creativity

212 **You Teach What! Where? A University Course on Psychedelics** Thomas Roberts <troberts38@comcast.net> (Educational Psychology, Northern Illinois University, DeKalb, IL)

Drawing on his 30 years of teaching Foundations of Psychedelic Research at Northern Illinois University currently an Honors Program Seminar and in hopes that others will offering similar courses, Dr. Roberts will describe some of his experiences, syllabus, hints, AV, websites, colleague relations, and tactics. PowerPoint. A question and discussion period follows. No credit for lab experiences. **C7**

3.19 Miscellaneous

213 **Seeing Absence** Anya Farennikova <anya.farennikova@gmail.com> (Philosophy, Grad. Student; UNC Chapel Hill, Philosophy, Chapel Hill, NC)

Intuitively, we often see absences. For example, if someone steals your computer from a cafe, you may see its absence from your table. But absence perception presents a paradox. On prevailing models of perception, we see only present objects and scenes. So, we cannot literally see an object that is not present. This suggests that we never literally perceive absences, but merely infer that something is absent cognitively on the basis of what we do perceive. But this cognitive explanation does not do justice to the phenomenology. In this paper, I argue that we can literally see absences. I present a model of absence perception based on visual expectations and a matching process. I then reply to two pressing objections. **P9**

214 **Sensory Awareness and Unsymbolized Thinking: Videos from Descriptive Experience Sampling** Russell Hurlburt <russ@unlv.nevada.edu> (Psychology, University of Nevada, Las Vegas, Las Vegas, NV)

I've been describing the findings of Descriptive Experience Sampling (DES) for 25 years, and two features of inner experience are the most widely misunderstood: sensory awareness (Hurlburt, Heavey, & Bensaheb, 2009) and unsymbolized thinking (Hurlburt & Akhter, 2008).

Many consciousness scientists apparently think they already know what the experience of sensory awareness is and so pay little attention to the DES descriptions of it; as a result, they overlook that the sensory awareness phenomenon as discovered by DES is very different from their expectation. Many consciousness scientists apparently believe that unsymbolized thinking is impossible and so disbelieve the DES descriptions of it. In this Art & Technology Experiential Presentation I will focus primarily on sensory awareness. I will display a series of videotaped excerpts from DES interviews, some which do and some do not describe sensory awareness. My aim will be to make sensory awareness come alive in ways that is not possible in a written format. If we have time, I will do the same for unsymbolized thinking. Sensory awareness is the direct focus on some specific sensory aspect of the body or outer or inner environment without particular regard for the instrumental aim or perceptually complete-objectness. For example, Andrew is dialing his cell phone. At the moment, he is "zeroed in" on the shiny blueness of the brushed aluminum phone case. He is not, at that moment, paying attention to the number he is dialing; his experience has momentarily left that task (which continues as if on autopilot) to be absorbed in the shiny blueness. Andrew's experienced interest at that moment is not instrumental: he's dialing but he's attending to the shiny-blueness, not the dialing. And his interest at that moment is not in the complete object: he is drawn not to the phone, which happens to be shiny-blue, but to the shiny-blueness, which happens to be of the phone. Therefore, we call Andrew's experience a sensory awareness. By contrast, if Andrew had been dialing his phone, which happened to be shiny blue, but his attention was aimed at the number he was dialing, then we would not call this a sensory awareness. Note that the retinal images of the phone are the same in both cases. Heavey and Hurlburt (2008) used DES to show that sensory awareness occurs frequently – it is a feature of roughly one quarter of all apprehended moments of waking experience, and thus appears to be one of the five most common features of everyday inner experience (the other four: inner speech, inner seeing, feelings, and unsymbolized thinking). Despite the prevalence of sensory awareness it remains little discussed within the consciousness literature. Sensory awareness is certainly nothing new or unusual: almost everyone can notice a shiny blueness. What is extraordinary, and needs to be taken seriously by consciousness science, is that some people may experience such sensory awareness at nearly all their waking moments (Heavey & Hurlburt, 2008), others may experience it at almost none, and others may experience it frequently but not always. **A2**

4. Physical and Biological Sciences

4.1 Quantum theory

215 **Quantum-Exit From Materialistic Confinement** Gerard Blommestijn <gblomm@gmail.com> (Amstelveen, Netherlands)

Mainstream science seems to confine itself to the idea that everything that exists is material or objective, even the sense of 'I', the principle of consciousness, the essence of experience, the conscious I. Now, since quantum mechanics, this self-imposed confinement to materialism-only is no longer necessary, because the main argument against a ('dualistic') non-material 'I-ness' is no longer valid. This main argument was, that the flow of choices/decisions from this I-ness, from this subjective mind, to the brain would need some energy transfer from this 'mental' mind to the material brain, but that this energy flow was never measured experimentally and never would be measured. (The same applies to the perceptions: from the material world to the 'mental' I.) But since the advent of quantum mechanics the communication between such a non-objective, personal I and the objective, material world needs no transfer of energy, if it is performed by the quantum mechanical reduction process. Before quantum mechanics (qm) philosophers and scientists thought that such a thing as I-ness ('mind') could not exist in an ontological independent sense (not consisting of or emerging from matter) as something on its own. But now, with qm, we know that there exists this strange and unpredictable qm reduction process that does not involve energy transfer, but the outcome of which may give rise to quite different courses of action by the physical world, for instance by the brain and thereby by the whole organism. So since the advent of qm we can

at the same time have an essentially subjective, non-material I-ness and an objective material world without any contradictions and connected by the qm reduction processes. These qm reduction processes are the perceptions that the I-ness has (inward direction) and the choices/decisions that the I-ness makes (outward direction). (All this without any processes going on inside the I-ness.) So now we are no longer imprisoned by the disadvantages of materialism-only. These disadvantages were: a) strict determinism without free will, even for humans, b) no solution for the hard problem of consciousness: how to explain subjective awareness from only objective components, c) the disappearance of causality from physics since qm, d) no satisfying interpretation of qm, e) no suitable candidate process to explain the principle of 'binding' and the unity of consciousness in the brain (in qm this binding may be mediated by qm entanglement over subsets of neurons, probably by means of qm tunneling via gap-junctions), f) unnecessary and unrealistic mechanistic and deterministic understanding of living beings, which tends to lower our view and behavior in the direction of competing, wealth consuming robots, while the view that is more realistic and in better agreement with modern quantum physics, raises our image of living beings to free, responsible examples of the same essence of consciousness, embedded in a wild variety of organisms, that might recognize their own I-ness in the others. These above described ideas and issues will be discussed in my presentation. **P10**

216 **Quantum Mechanics Implies Consciousness is Not Based in the Physical Brain**
Casey Blood <caseyblood@gmail.com> (Physics, Rutgers Univ, Retired, Sarasota, FL)

A careful analysis of the basic principles of quantum mechanics shows the odds are considerably better than even that consciousness originates outside the physical universe rather than in the physical brain. Quantum mechanics has two peculiarities. One is that it gives several simultaneously existing versions of reality 'Schroedinger's cat' is both dead an alive at the same time. And the other is that the version we perceive is chosen at random in accord with a probability law. Conceptual pictures that attempt to explain these peculiarities are called interpretations. The three major interpretations are: the existence of particles (usually taken for granted, but it shouldn't be!); collapse of the wave function; and Everett's many-worlds interpretation, where there are many versions of each of us!? There are a number of principles relating to our perceptions that can either be derived from the basic mathematics of quantum mechanics, or they can be deduced from experiment. When these principles are applied to the three interpretations, one finds, remarkably, that none of them is viable. First, they imply the particle-like properties of mass, energy, momentum, spin, charge, and locality are actually properties of the wave function, and this in turn implies there is no evidence for the existence of particles. Second, there is currently no experimental evidence for collapse, and theoretically, collapse encounters significant hurdles. And finally, the probability law is found to rule out Everett's many-worlds interpretation. Thus the chance of there being a physical or mathematical explanation of the peculiarities of quantum mechanics is quite small. This implies that, as physics currently stands, the theory of the physical universe is incomplete; it cannot properly account for our perceptions. There is essentially only one way to complete it. Associated with each individual is a non-physical Mind that perceives the state of the individual brain. This Mind concentrates on one quantum version of reality and that is the version we physically perceive. The Mind can freely choose our thoughts through some not-yet-understood quantum mechanism (Calcium ions? Microtubule vibrations?). The Mind in this picture is the ultimate source of conscious awareness and intelligence, with the brain serving as a very sophisticated information-processing interface between the non-physical Mind and the physical universe. This dualistic view 'physical wave function, non-physical Mind' avoids the mind-controlling-matter pitfall of Cartesian dualism because the Mind only perceives; it does not affect the physical world in any way. The Mind interpretation, which implies that a study of the brain can only give information about neural correlates of conscious rather than consciousness itself, suggests that more effort should be put into researching the quantum mechanisms by which the Mind freely selects our brain-based thoughts. For the detailed justification of these claims, go to arXiv:quant-ph/0912.2985, http://arxiv.org/ftp/arxiv/papers/0912/0912.2985.pdf **P10**

217 **Quantum Interpretation of Vedic theory of Mind: An Epistemological Path and Objective Reduction of Thoughts** Michele Caponigro , Ram Lakhan Pandey Vimal <michele.caponigro@unibg.it> (Epistemology of Complexity, Department of Epistemology of Complexity, Bergamo, Italy)

This brief paper argue about a possible quantum interpretation of Vedic Theory of Mind. Chitta, Manas, Buddhi and Ahamkara, in our quantum approach will be considered respectively as: common ground, quantum superpositions, observer (quantum collapsing) and measurement outcomes eingvalues,Povm. We suggest that through the continue interactions between these four components, we are able to understand the formation of Ahamkara (Ego). Chitta (by vrittis) is linked to Manas via entanglement. The unsolved problem is the nature of Buddhi component and his right collocation in this process. Moreover, we argue that our approach can be supported by Zeilinger's interpretations of quantum mechanics. Finally, we will speculate about possible analogy between Chitta and Bohm's Holomovement. **P10**

218 **Quantum Computation and the Physical Computation Level of Consciousness** Giuseppe Castagnoli <giuseppe.castagnoli@gmail.com> (Elsag Spa, Pieve Ligure (Genova), Genova Italy)

On the basis of introspective analysis, we establish a crucial requirement for the physical computation basis of consciousness. In this moment I see the meeting room, the audience, the chairs, a lot of things "together at the same time". Seeing implies recognizing, thus processing. Therefore the physical computation basis of consciousness should allow processing a significant amount of information together at the same time. This requirement is satisfied by quantum computation, not classical computation. At the fundamental physical level, classical computation is represented by a network of two body interactions, each the input-output transformation of a universal Boolean gate. The maximum amount of information processed together at the same time - during an instantaneous two body interaction - is the three bit input of this gate. Many such gates in parallel do not count since the information is not processed together. Quantum computation is examined at the light of our recent explanation of the "quantum speed up" (quantum algorithms requiring a lower number of operations than classical algorithms). Because of retrocausation, 50% of the information about the solution of the problem, acquired by measuring the content of the computer register at the end of the algorithm, goes back in time to before running the algorithm. The quantum algorithm uses this information to compute the solution with a lower number of operations. It is a superposition of causal/local computation histories, each corresponding to a possible way of getting in advance 50% of the information about the solution. This retrocausation mechanism has an idealized classical analog, useful to compare quantum computation with the requirement. The quantum measurement that produces the solution is analogous to a many body interaction between the parts of a perfect classical machine (the classical representation of quantum nonlocality requires perfect rigidity, accuracy, and reversibility). The mechanical constraints of this machine represent the logical constraints of the problem to be solved. The many body interaction senses and satisfies all the constraints together at the same time, producing the solution in one shot. In contrast, classical computation, processing at most three bits at the same time, cannot take into account all the problem constraints at the same time; this leads to trial and error and to the relative zero of the quantum speed up. Summing up, quantum computation satisfies the requirement of the physical computation basis of consciousness, which turns out to be the prerequisite of the quantum speed up. This shades light on the physical computation level of the theories that place consciousness in quantum measurement and explains how information coming from disparate sensorial channels come together in the unity of subjective experience. The fact that the fundamental mechanism of consciousness is the same of the quantum speed up gives quantum consciousness a potentially enormous evolutionary advantage. **C13**

219 **Self Observing Quantum System Models of Body, Mind and Soul** Alex Hankey, HR Nagendra PhD <alexhankey@gmail.com> (Yoga & Physical Science, SVYASA, Vivekananda Yoga University, Bangalore, Karnataka India)

This paper concerns a highly sophisticated quantum model of how consciousness and matter interact, constructed by applying quantum theory to elementary physical excitations at Norbert Wiener's original cybernetic singulariities, When applied to neural nets, particularly the hierarchical sequence of networks of neurons and cortices found in the human nervous system, models of Yoga's fivefold structure of mind and soul can be constructed. These are also applicable in simplified form to earlier branches on the tree of life. At Tucson 2008, one of us (AH) presented a theory of mind-body coupling using self-observing quantum systems (SOQSs), defined at critical feedback instability singularities. The theory provides a compact physical basis for David Chalmers's dual aspect information spaces of consciousness, offering a non-trivial solution to the mind-matter problem. The theory has now been extended in several directions by establishing many attractive additional properties, notably: (1) The critical feedback condition agrees with Stuart Kauffman's accounts of complexity in biological systems, now experimentally established. (2) In competitive ecosystems, regulatory systems of biological organisms will, as complex adaptive agents, be driven to develop higher order critical points, in nested, fractal structures. (3) Neural nets and nervous systems can support such complex SOQSs. As Jonathan Shear has stated, the resulting models of mind start to seem realistic. We shall present a version of Yoga's panchamayokosha model of the human soul, as a nested structure of SOQSs on neural networks, with the following tentative correspondences: anandamayokosha and neocortex, vijnanamayokosha and palaeocortex, manomayokosha and visceral nervous system, pranamayokosha and the (pranic) energy body, the annamayokosha and genetic networks and their cytokine mediated tissue regulation systems. Such complex, sophisticated models may account for biological, psychological, and spiritual modalities of human consciousness. Even behaviours of single cells become comprehensible, e.g., astonishing phenomena recounted by Ford, where amoebae use pseudopoda to construct waterproof shells from selected materials. They too possess dual aspect information spaces. Is a valid account of biological 'mind' beginning to emerge? **P4**

220 **Mind Field, Active Information, and Zero-Energy Tachyons** Syamala Hari <murty_hari@yahoo.com> (Edison, NJ)

In an earlier paper it was suggested that mental units called psychons by Eccles could be zero-energy tachyons. Although experiments to detect faster-than-light particles have not been successful so far, recently, there has been renewed interest in tachyon theories in various branches of physics. We suggest that tachyon theory may be applicable to brain physics as well. The present paper describes how the zero-energy tachyon field (ZETF) has several features of mind-fields which have been postulated or anticipated by some well known mind-matter researchers. Some features of ZETF are as follows: (1) ZETF contributes to the active information (defined by Bohm and Hiley), which acts on Schrodinger particles. Like the Conscious Mental Field proposed by Libet, ZETF could act on certain neural activities that take place in willed actions. (Specifically, its role in exocytosis is described in this paper.) (2) ZETF maintains conservation of energy while interacting with the particles. (3) It changes the probability density of finding the particles in a given state. (4) It generates the back-action term in the continuity equation of the particles. (Back-action is considered by Sarfatti to be a necessary condition for describing any form of living matter using quantum theory.) (5) It can account for the unity of a subjective experience, because ZETF is strictly non-local and can be produced/absorbed/detected only by multitudes of nerve cells rather than a single one. (6) ZETF is associated with electromagnetic scalar and vector potentials which generate zero electric and magnetic fields. Just as electromagnetic potentials cannot be observed directly but only indirectly through their effects, it is possible that ZETF could not be directly observed by any external physical device but only indirectly by any effects it introduces on neural activities. (7) ZETF may be said to be non-material because the mass of a tachyon is purely imaginary (in our laboratory frames of reference and all physically realizable frames moving with speeds less than the speed of light). However, ZETF fits well into quantum theory and at

least some techniques of theoretical physics are available for studying ZETF. Hence it fits into both dualistic and materialistic approaches to the study of consciousness. We propose that the relation between the tachyon field and the change it produces in the quantum potential of the system with which the tachyon interacts is similar to the relation between an algorithm and its repre- sentation stored in a computer (digital or quantum). The quantum potential which is software-like, and the holographic memory which is database-like, both provide codes in the hardware-like physical brain, for the "real information" or the "meaning" which consists of zero-energy tachyon fields. **P10**

221 **Consciousness Functioning with Potentiality Systems Partially Isomorphic to Quantum Mechanics** Franz Klaus Jansen <jansen.franz@wanadoo.fr> (Retired, ASSAS, France)

Superposition of physical states in the wave function of quantum mechanics is difficult to transpose to the macrocosm, as illustrated by Schrodingers cat thought experiment. Nevertheless, as evaluated from a biological viewpoint, this example did not include all functions of human consciousness. Although consciousness uses reality systems, it also needs potentiality systems, which are essentially consisting in superposition of most probable situations. A mother anxious of her son fighting in a dangerous war in a far distant country and without recent news necessarily envisages at a certain moment all possibilities in superposition: her son might be in good health, or wounded or even dead. But new most recent information of the actual situation will induce the collapse of her superposed potential situations to only one, which seems to resemble the wave function collapse during an experiment. Other examples of superposition in consciousness describe the absolute requirement of potentiality systems for the prediction of situations in the future. If different possible actions are envisaged for tomorrow, fore instance to have a walk, to play tennis or to read a book, several potentialities are simultaneously imagined and therefore superposed for a precise time period. The same is true for an incomplete past, such as dating traces form dinosaurs, since different specialists will propose different dates, which are also potentialities in superposition for the same event. Therefore superposition, well established for quantum mechanics seems to resemble superposition of potentialities in consciousness for the evaluation of the present, the past and the future, so that quantum mechanics are not so strange as often imagined. Potentiality systems in human consciousness also show the characteristics of Heisenberg?s uncertainty principle. A ball of fire turned rapidly by a juggler in the night gives the impression of a circle. The circle is not a reality system but only a potentiality system of possible location of the ball, due to the inability of the human eye to follow rapid movements. But the exact location of the ball within the circle remains uncertain due to insufficient information. Reality systems are only present in consciousness, when complete observations with exact time and space coordinates can be obtained, whereas incomplete observations, with lacking time or space coordinates automatically induce potentiality systems in consciousness, in order to complete lacking real coordinates by only potential but probable coordinates. This can induce a feeling of non-locality, for instance when a plane is lost somewhere in the ocean. Superposition in potentiality systems is an essential function of consciousness and represents the only way in the present to perceive far distant and unverifiable events, as well as several imagined future or only approximate past situations. In the larger sense of Douglas Hofstadter the basic concept of superposition, but without the corresponding mathematical formalism, shows partial isomorphism between consciousness and quantum mechanics. **P10**

222 **Buddhism and Quantum Physics: The Space Between Two Things** Christian Thomas Kohl <christianthomaskohl@gmail.com> (Freiburg, Germany)

What is reality? The mindsets of the modern world provide four answers to that question and oscillate between these answers: 1. The traditional Jewish, Islamic and Christian religions speak about a creator that holds the world together. He represents the fundamental reality. If He were separated only for one moment from the world, the world would disappear immediately. The world can only exist because He is maintaining and guarding it. This mindset is so fundamental that even many modern scientists cannot deviate from it. The laws

of nature and elementary particles now supersede the role of the creator. 2. Rene Descartes takes into considering a second mindset, where the subject or the subjective model of thought is fundamental. Everything else is nothing but derived from it. 3. According to a third holistic mindset, the fundamental reality should consist of both, subject and object. Everything should be one. Everything should be connected with everything. 4. A fourth and very modern mindset neglects reality. We could call it instrumentalism. According to this way of thinking, our concepts do not reflect a single reality in any one way. Our concepts have nothing to do with reality but only with information. Buddhism refuses these four concepts of reality. Therefore it was confronted with the reproach of nihilism. If you don?t believe in a creator, nor in the laws of nature, nor in a permanent object, nor in an absolute subject, nor in both, nor in none of it, in what do you believe then? What remains that you can consider a fundamental reality? The answer is simple: it is so simple that we barely consider it being a philosophical statement: things depend on other things. For instance: a thing is dependent on its cause. There is no effect without a cause and no cause without an effect. There is no fire without a fuel, no action without an actor and vice versa. Things are dependent on other things; they are not identical with each other, nor do they break up into objective and subjective parts. This Buddhist concept of reality is often met with disapproval and considered incomprehensible. But there are modern modes of thought with points of contact. For instance: there is a discussion in quantum physics about fundamental reality. The concepts of reality in Buddhism surprisingly parallel quantum physics. More: http://ctkohl.googlepages.com **P10**

223 **Retroactive Event Determination In Consistent Histories And Relational Quantum Mechanics, Leading To Macroscopic Quantum Effects and Synchronicity** Sky Nelson <theskyband@gmail.com> (Santa Rosa, CA)

We suggest a pair of practical postulates which unify two current models of quantum theory (Relational Quantum Mechanics and Consistent Histories) into a broader picture of reality. By dropping the assumption that unobserved macroscopic events are “in a definite state” independent of an observer, we arrive at a surprising but consistent theory of quantum macroscopic reality (with fewer fundamental assumptions about everyday reality) that does not contradict experiment or everyday experience. As a result, we suggest a concept termed “retroactive event determination”, and extend it from a quantum principle (in CH) to a macroscopic principle. The implications of this on the phenomena of synchronicity and the question of fate versus free will are discussed. Finally, we look at how these concepts are already used in the design of multiplayer online video games in order to create an efficient and consistent model of “reality”. **P10**

224 **Quantum Computing: The First 540 Million Years** David Pearce <dave@hedweb.com> (Neuroethics Study Group, Brighton, East Sussex United Kingdom)

Is the mind/brain best modelled as a classical computer or a quantum computer? No classical computer can solve the binding problem - the creation of a unified percept from widely distributed neural processing of individual object characteristics. Hence even the most sophisticated silicon robots are lame in a real-world setting. By contrast, evidence that the mind/brain is a quantum computer lies right before one’s eyes in the form of the unity of perception - an unfakeable signature of quantum coherence. The evolutionary success of organic robots depends on the ability of our central nervous system to generate dynamic simulations of fitness-relevant patterns in the environment. Unlike classical computers, organic quantum computers can “bind” multiple features (edges, colours, motion, etc) into unitary objects and unitary world-simulations with a “refresh rate” of many billions per second (cf. the persistence of vision as experienced watching a movie run at 30 frames per second). These almost real-time simulations take the guise of what we call the macroscopic world: a spectacular egocentric simulation run by every vertebrate CNS that taps into the world’s fundamental quantum substrate. Our highly adaptive capacity to generate data-driven unitary world-simulations is strongly conserved across the vertebrate line and beyond - a capacity attested by the massively parallel neural architecture of the CNS. Unitary world-simulation enables organic robots effortlessly to solve the computational challenges of navigating a hostile environment

that would leave the fastest classical supercomputer grinding away until Doomsday. By contrast, the capacity for serial linguistic thought and formal logico-mathematical reasoning is a late evolutionary novelty executed by a slow, brittle virtual machine running on top of its quantum parent. Contra Tegmark, the existence of ultra-rapid thermally-induced decoherence in the mind/brain doesn't refute the case for naturally-evolved quantum computing. For just as a few cubic millimeters of neocortical tissue can encode an arbitrarily large immensity of phenomenal space, likewise each ultra-short quantum-coherent "frame" can encode hundreds of milliseconds of phenomenal time. Contra the Penrose-Hameroff "Orch OR" model of consciousness, quantum mechanics can't explain the Hard Problem as posed by materialist metaphysics: i.e. how a brain supposedly composed of insentient matter could generate consciousness. But macroscopic quantum coherence can explain how a unitary experiential field is constructed from what would otherwise be a mere aggregate of mind-dust (cf. Galen Strawson's "Does physicalism entail panpsychism?") The theory presented predicts that digital computers - and all inorganic robots with a classical computational architecture - will 1) never be able efficiently to perform complex real-world tasks that require that the binding problem be solved; and 2) never be interestingly conscious since they are endowed with no unity of consciousness beyond their constituent microqualia - here hypothesized to be the stuff of the world as described by the field-theoretic formalism of physics. By contrast, tomorrow's artificial quantum computers may manifest modes of unitary consciousness unknown to contemporary organic life. **C5**

225 **Visual Quantum Information, Teleportation and Consciousness** Majid Rahnama, Vahid Salari, University of Salzburg, Austria; Jack Tuszynski, University of Alberta, Canada <rahnama.majid2@gmail.com> (Associate Professor, Physics, University of Kerman, Islamic Republic of Iran)

The feasibility of quantum states collapse in the human brain via consciousness has been the subject of vigorous scientific debates since the advent of quantum theory. Scientists like Von Neumann, London, Bauer and Wigner (initially) believed that quantum state collapse occurs in the brain or is caused by the mind of the observer. Experimentally, first Hall et al. performed an experiment to investigate wave function collapse caused by the mind of the observer. Their experiment did not detect any trace of wave function collapse as a result of human intentionality. A refined version of Hall et al.'s experiment was performed by Bierman in which a different result was obtained from what Hall et al. reported. On the basis of evoked potential diagrams, Bierman has concluded that brain can cause a collapse of external quantum states. It is a legitimate question to ask how human brain can receive subtle external visual quantum information intact when it must pass through very noisy and complex pathways from the eye to the brain? There are several approaches to investigate information processing in the brain, each of which presents a different set of conclusions. Penrose and Hameroff have hypothesized that there is quantum information processing inside the human brain whose material substrate involves microtubules and consciousness is the result of a collective wave-function collapse occurring in these structures. Conversely, Tegmark stated that owing to thermal decoherence there cannot be any quantum processing in neurons of the brain and processing in the brain must be classical for cognitive processes. However, Rosa and Faber presented an argument for a middle way which shows that none of the previous authors are completely right and despite the presence of decoherence, it is still possible to consider the brain to be a quantum system. Additionally, Thaheld, has concluded that quantum states of photons do collapse in the human eye and there is no possibility for collapse of visual quantum states in the brain and thus there is no possibility for the quantum state reduction in the brain. In our work we conclude that if we accept the main essence of the above approaches taken together, each of them can provide a different part of a teleportation mechanism. Here, we propose a new model based on the premise that there exists a quantum teleportation mechanism between the eye and the brain. Specific assumptions used to build the model involve both classical and quantum mechanical elements. Our approach can combine the above seemingly contradictory conclusions in a compact and coherent model. This model revives this hypothesis that human brain can cause a collapse of quantum states, because in this model external quantum information can penetrate into the brain as an intact state. **P10**

226 **Quantum Calculation of Probability from Complex Probability Amplitudes Using the Metabrain Model** Thomas Schumann <tschuman@calpoly.edu> (Physics, California Polytechnic State University, San Luis Obispo, CA)

From the metabrain model which provides nonlocal hidden variables to determine observed events, it is shown that the usual quantum theoretical method of calculating probabilities with complex amplitudes follows as a consequence. It is assumed that the metabrain, like an ordinary brain, has pathways for complex currents and synapses. The "firing" of a synapse corresponds to a conscious experience. The model will be also be applied to quantum statistics, the Schroedinger cat paradox and to the anthropic principle. **P4**

227 **Nanoneuroscience and Neuropharmacology: Implications for Quantum Mind Theories** Nancy Woolf <nwoolf@ucla.edu> (Psychology, University of California, Los Angeles, Los Angeles, CA)

Current pharmaceutical agents for psychiatric disorders block specific neuroreceptors (e.g., antipsychotic agents), modulate neuroreceptors (e.g., anxiolytics), block reuptake of neurotransmitters (e.g., antidepressants), inhibit breakdown (e.g., cognitive enhancers), or interact with signal transduction cascades (e.g., mood stabilizers). Across the board, these drugs interact with neurotransmitter systems. As a result, their efficacy has for many years been interpreted in a narrow framework of synaptic neurotransmission. More and more evidence is accumulating showing that neuropharmacological interventions enhance neuroplasticity of neural networks. Moreover, the delay in therapeutic benefit (or of full therapeutic benefit) is consistent with neuropharmaceutical agents exerting their beneficial effects by impacting on neuroplasticity. Animal models further support that certain behavioral and cognitive improvements are a result of induced neuroplasticity by these neuropharmaceutical agents. Neuroplasticity, as mediated by the neuronal cytoskeleton, is fundamental to higher cognitive processes (Priel et al., J Biol Phys. 36:3-21, 2010), mental capabilities that are compromised in psychiatric disorders. Neuroplasticity consists of changes in the connectivity within neural networks, as well as to an equally critical component involving changes to the fine structure of the intraneuronal compartment. The internal structure of neurons consists largely of the cytoskeleton, composed of microtubules, actin filaments, and neurofilaments. These proteins represent a potential target for therapeutic interventions, with the most typical action being phosphorylation of a cytoskeletal protein mediated by a protein kinase triggered by neuroreceptor activation. That neuropharmaceutical agents exert actions on the cytoskeleton has implications for nanoneuroscience and quantum models of mind. Nanoneuroscience is a new field that offers a subcellular perspective on neural function (Woolf NJ, Priel A, Tuszynski JA. Nanoneuroscience: The Role of the Cytoskeleton in Health and Disease, 2010). According to this nanotechnology-based approach, new treatments for mental illness, such as genetic engineering of stabilized microtubules, may be developed in years to come (Woolf, J Nanoneurosci. 1:85-94, 2009). Quantum models of mind that are based on microtubule computations are consistent with neuroplasticity being important to higher cognitive function and with effects on neuroplasticity being critical to the efficacy of neuropharmaceutical agents. **C13**

228 **Is There a Room for Free Will in Many-Worlds?** Li-An Yu <uranus-you@yahoo.com.tw> (Institute Of Philosophy Of Min, Taipei, Taiwan)

Quantum mind, mainly developed by Roger Penrose and Stuart Hameroff, has become a quite promising approach to consciousness. Mind is non-computable, as several examples Penrose has eagerly raised. Therefore, aiming at dealing with the problems of mind, a way in which people construct a non-computable theory in the ?computable? world is needed. Through this line of thinking, consciousness might be caused by the objective reduction (OR), a physical process, which is still not theorized. Penrose et al. employ OR to describe the intuitive world we perceive after 'measurement'. Here we have to think of it little bit deeper. What happens in the small world? Or strictly speaking, what really happens in the world, if the events in the small world play an important role in the problem of consciousness? Having held Penrose's view, we have accepted some ontological assumption in quantum theory, the only Universe. How come? In the book the Large, the Small and the Human Mind, Penrose

does not explain his premise very clearly but it seems so straightforward in his all argument. Is it the only way the small world works? Of course not. I do not mean that the world would work in many ways to which people look forward at the same time, or want to advocate any interpretation. What I would like to point out here is the way in which we treat the events happening in the small world will effect how we understand consciousness, especially free will I want to discuss in the essay. Many-Worlds Interpretation of quantum mechanics (MWI) raised by Hugh Everett III holds that the universe splits while we measure it. The interpretation does not assume the existence of OR, but the splitting universes instead. In this interpretation, Schrodinger's Cat may be alive and dead at the same time in the different universes splitting after we open the box! How about our human free will? I will first attempt to examine whether or not there are some reasons for MWI to lead to determinism. **P10**

4.2 Space and time

229 **Microtubule Coherence in the Brain: The Electromagnetic Source of Memory**
James Beichler <jebco1st@aol.com> (Research Institute for Paraphysics, Belpre, OH)

The major problem for any physical model of consciousness based on Microtubules (MTs) in the neurons rests squarely on finding the physical mechanism that translates individual MT 'firings' into the coherent patterns of MT interaction in the brain that are needed to establish thought processes. To date, this problem has not been solved in a manner that has wide support by scientists. Yet a simple semi-classical model of electromagnetism not only solves the coherence problem, it can also solve the corresponding problems of memory storage, recall and recognition. The electromagnetic model used is not completely classical because it utilizes a four-dimensional space that is implied by the concept of electromagnetic vector potential. The commonly known and accepted vector potential of electromagnetism is the cross product of two three-dimensional vectors, which places the resultant in a fourth direction of space. Since each MT in the brain functions as a small LRC circuit, the MTs transmit and receive normal transverse EM waves that are coupled to four-dimensional longitudinal EM waves. The normal transverse waves establish coherence between various MTs in the brain giving rise to thought patterns and streams of thought while the longitudinal waves establish the stored patterns that we call memories. **P4**

230 **Disparate Heart Rate Changes Precede Correct vs. Incorrect Guesses**
Julia Mossbridge, Marcia Grabowecky; Satoru Suzuki <jmossbridge@gmail.com> (Dept. of Psychology, Northwestern University, Evanston, IL)

Physiological responses to arousing (vs. calm) stimuli arriving 3-7 seconds in the future have been described in peer-reviewed journals using five different physiological measures (skin conductance, heart rate, blood volume, EEG, fMRI) in at least four different laboratories (D. Radin, 1997; D. Bierman and H. Scholte, 2002; S. Spottiswoode and E. May, 2003; R. McCraty et al., 2004a, b; D. Radin, 2004; E. C. May et al., 2005). Here we show, in two complete experiments and a third preliminary experiment, that seemingly related changes in heart rate can also be observed preceding correct (vs. incorrect) responses while performing a guessing task. The task for all three experiments was to select which of four unemotional photographs would be the target image on each trial. Immediately after a participant selected an image, one of the four images was chosen by a hardware-based random-number generator and this target was displayed. The experimenter was in another room during data acquisition. Heart rate and skin conductance were recorded throughout each session. The 10-second period before image selection was arbitrarily defined as the observation period, and each physiology data point during the observation period was normalized to the mean of the 1-second period preceding the observation period. In the first experiment, average data from 39 undergraduates revealed behavioral performance no better than chance. However, on average, normalized heart rates were significantly lower before correct responses than before incorrect responses, though the effect size was small ($t(38)=2.15$, $p=0.038$, $d=0.34$). This effect occurred between 3 to 9 seconds before the target was displayed. There was no similar effect for skin conductance. In the second experiment, there were also no significant behavioral results based on

data from fifteen women who first performed a biofeedback program designed to produce a state of calm, but their normalized heart rates were again significantly lower before correct than incorrect responses ($t(14)=3.26$, $p=0.005$, $d=0.84$). Again, there was no skin conductance effect. Finally, a training experiment with author JM as the participant showed a potentially related observation. In this experiment, in order to help determine whether anticipatory physiological changes were temporally related to selecting a potential target or viewing the actual target, a delay was inserted between the decision and target display times. Preliminary results from six sessions with a 3-second delay revealed the same differences in normalized heart rate preceding correct vs. incorrect trials ($t(5)=3.12$, $p=0.026$, $d=1.26$, with session as the random effect), and these changes were temporally tied to decision rather than target display. None of the results from the three experiments could be explained by expectation bias. Together, these results suggest one of three conclusions: 1) some kind of artifact not related to expectation bias explains these data, 2) information about the correctness or incorrectness of a future response somehow affects physiology preceding that response in a presentiment-like fashion, or 3) lowering of heart rate corresponds to a state that facilitates correct predictions of future experiences. **C12**

231 **The A Series, Time and Free Will** John Yates <uvscience@gmail.com> (Neuroscience Department, Institute for Fundamental Studies, Mumbai & London, Mumbai, Maharashtra India)

Present progress in mind science is racing away in the direction of denying the existence of human free will and animal and human sentience. This brief paper attempts to summarise a few brief reasons why areas of present work by prominent authors have departed from fact to the realms of folk psychology and summarises some of the ways in which present work can be put right. An experiment is described and carried out in an attempt to breach a little more of the present gap between experimental fact and the outmoded theory which others have tried to apply blindly. In important recent work such as that of Salti (2009) and of Banks and Isham (2009) we could be left with a source for an outline of conscious thought and the cerebral activity behind it. There is believed by some people to be a tiny period of time (often considered to be 100-500 msecs) between the registration of a visual stimulus by the unconscious mind and our conscious recognition of it. However, such current work as this seems to dispense with the idea of freewill in the McTaggart B series and if the possibility of freewill is to be retained we need an additional description of time involving the A series, which is believed to be not completely mappable to the B series. Modern physics uses the B series but some partial B series approximations to the A series have been made by the present author. The implications are briefly discussed in this presentation and the complete article will be presented at ttjohn.blogspot.com . Yates (2008) (at Philica.com, Article 146) has also produced promising experiments along these lines and further experiments are in progress, which will be discussed. **P4**

4.3 Integrative models

232 **Can General Rules Observed in Our Universe Help Us to Understand the Nature of Consciousness?** Nyles Bauer <nyles@email.arizona.edu> (Immunological Researcher, Olympia, WA)

While consciousness is certainly enigmatic and inadequately defined, this limitation does not necessarily prevent us from understanding the likely nature of this phenomenon based on other scientifically accepted observations regarding the nature our universe. If memory can be separated from consciousness, then a theory of consciousness emerges which has both elegance and simplicity, and fits very well with observations seen experimentally, clinically, and subjectively experienced. This revised model has direct relevance on free will, individuality, and our perceptions of death, and may indeed be the simplest model proposed for the dynamics of consciousness to date. This intuitive model parallels our generally accepted view of the conservative nature of the Universe. For example, when hypothesizing, it would be adding superfluous factors to suppose that gravity is the primary force of attraction between the planets and the Sun within our solar system, but that another force was responsible for

this attraction in other solar systems. We intuitively understand that the universe conserves, and so an observed phenomenon in our solar system usually has the same cause, under similar circumstances, in another solar system or galaxy. Why should consciousness be any different? Consciousness should be one "thing" whether viewed from a monist or duelist perspective. It is therefore logical to conclude that the only difference between individuals, and the only way to define an individual, is the uniqueness of accessible memories and the inaccessibility of memories from other individuals. We must ask ourselves why we generally accept the conservative notion that there are only four known forces in our Universe, yet readily suppose that there are approximately 6.5 billion unique humans on this planet? This only gets more ludicrous when we consider other forms of life. **P4**

233 **Mathematical Theory of Human Consciousness and its Three Forms of Thinking: Psychological, Physical, Spiritual** Matti Bergstrom, Pia I. Ikonen
<juliasbrain@kolumbus.fi> (Brain Science, Helsinki University, Helsinki, Finland)

In San Rafael 2009 we presented a mathematical theory of the 'nonduality thinking'. It was based on the fact that mathematical number theory could be applied on the function of the limbic Self in brain. In this Self the imaginary brain stem effect (i) and the real number cortical effect (r) meet (Bergstrom 1964), forming neural contents with subjective Euclidean-Pythagorean structure, circulating in this fractal complex number space of Mandelbrot type (c)=(i,r). It was the psycho-physical theory of Yrjo Reenpaa (1947) that gave the fundament to apply the Mathematical number theory to the solution of what consciousness is. According the Number theory the dual functions, in this case the psychological i-function and the physical r-function, both representing a form of thinking, have to be considered as 'One-sided Special cases'. This makes problems, as 'dance' of particles in quantum-physics, as well as the Heisenberg Uncertainty Principle, understandable. In the nondual form of spiritual thinking (c) these problems can be solved, since the influence of an additional dimension (i) is taken care of. The special forms of psychological and physical thinking are melted together to a Virtual intelligence VQ and spiritual thinking. It makes possible to handle all possibilities of different situations of the individual in his/her environment. This, because the brain being of the same ectodermal origin as the skin, represents the border between the inner and outer environment of the individual. On the other hand, a border is always mathematically empty and thus filled with a tremendous amount of possibilities. It is these possibilities the spiritual thinking - represented already in the 'Child brain', our third brain (Bergstrom 2009) is specialized to handle. So we have a third form of thinking, that we have called the Spiritual form, the object of which is not a 'one-sided physical or psychological' one, but a possibility (p)! This highest form of abstract thinking is used in philosophy, which would be good for philosophers to know! The complex number space, where the three forms of thinking occure, can be considered as forming the 3-dimensional space (p,i,r). It is the state, or better 'spiritual force', of this (p,i,r)-space that we are calling consciousness. In this fractal, limbic Mandelbrot space, the Self, the thinking dynamics is represented by the iterating Julia-equation (Bergstrom and Ikonen 2005). A computer program was developed for a semantic representation of thoughts appearing as a response to a proposition or a stimulus, invading into the pir-space of the machine (Bergstrom and Ikonen, Hong Kong 2009). This, and all the other mathematical characteristics of consciousness and thinking, presented here, point to the possibility that our brain was created with a mathematical design and architecture. **P10**

234 **Mechanism for Transcendence in Consciousness** Siegfried Bleher
<sbleher@msn.com> (Inner Life Yoga Studio LLC, Morgantown, WV)

In this paper we present a nonlinear dynamical model of consciousness that describes how consciousness transforms over time in response to a specific eastern contemplative practice. Although the practice considered, yoga, represents a specific paradigm for understanding conscious experience and its transformation, the model presented in this paper is a general dynamical model that can serve to address current questions about the nature and science of consciousness. In particular, the model presents consciousness as occurring on levels that are determined by its 'degree of embodiment.' What is experienced in each moment is dependent

upon the nature of the phenomenal environment (both internal and external), by the level the self identifies with, and by the depth of the consciousness. The depth of consciousness is the deepest level the self is practically capable of identifying with. The levels, depth and degree of embodiment of consciousness are all quantified in measurable ways. These concepts are then used to present a mechanism for transcendence that tracks the changes consciousness undergoes through contemplative practices (both locally in the course of a single contemplative session, and over many years of steady practice). Some of these changes correspond to well-understood phenomena in cognitive psychology, whereas others suggest what may be considered unusual or anomalous properties of consciousness. In particular, we show that the model predicts consciousness is capable of undergoing a transformation from the experience of duality to the experience of non-duality. That is, the experience of non-duality may emerge in the mind of the practitioner if certain necessary conditions are met. This experience corresponds subjectively to the state of samadhi in yoga, the state of absorption wherein object and subject become undistinguishable. According to the model presented here, the category of states collectively called samadhi, have externally measurable properties (e.g. using fMRI), and constitutes transcendence of the mode of consciousness characterized by duality. The final section of the paper considers the implications the model has for a quantum theory of consciousness. Specifically, we ask (1) whether non-ordinary states of consciousness such as samadhi constitute states of entanglement between what is considered the subject of awareness and what is considered the object of awareness, and (2) can the measurable properties of the brain that correspond with non-ordinary states of consciousness such as samadhi be characterized by large scale quantum coherence in the brain. **P4**

235 **Topology of the Mereological Infinite: Modeling Human Resonance as Social Networks** Jeannine Davies, PhD , Zachary Jones <j_davies@shaw.ca> (Saybrook University, Vancouver, B.C. Canada)

This paper presents resonance as a measure within systems that structure the evolution of consciousness. Rather than providing a merely informal measure, resonance quantifies axiomatic formulae so that the part-whole relations within a designed system accord to the ontological structure of conscious experience. The use of these formalisms derives a mereological model with application to real life. Mereology, the theory of part-whole relations, gives foundation to ontological modeling, and offers a bridge between essential Buddhist principles, contemporary science, and disparate cultural languages. In particular, we will introduce a software model with real benefits to the study of learning, inquiry on the nature of mind, and as a means toward the acceleration of collective intelligence and higher human potentials. Mereology maps coherence across processes of change, acting as the blueprint in a 'fluid architecture.' That which is old and decaying and that which is new and emerging flow to and from and in and through a 'thing', yet its nature remains intact in so far as memory and meaning forms an ontological coherence. Thus exists the tide of evolution. In these mixing waters, the composition of properties, or a single moment, quantize as the site of resonance. This site acts as a channel for mereological connection between areas of the broader ontological terrain that were previously without conscious association. The principle of resonance lies within a heightened feeling of significance, often intuitive, that phenomenologically occurs within experience. A word or phrase, a person's voice, a stanza of music, a movement, may evoke the sensation of resonance. It is that electrifying and often mysterious moment of connection that accompanies elevated psychological or somatic arousal. Anyone who takes notes has a common experience with resonance. One may feel provoked to quote verbatim, circle or underline something. Within a person's expressions, regardless of written, spoken or other medium of communication, lies the composition that forms the structure for their potential insight and transformation. Our software seeks to model this specific structure through the feeling of resonance that occurs within intersubjective space - that dimension of realization that arises in confluence with another, even when one is not aware of the other, or is physically or otherwise absent. Though functional in the virtual space of mind, mereological modeling most often finds use by academics and philosophers. Yet people have practiced this model since pre-history through forms such as mystical practices, meditation, dowsing, leadership

and medicine. In resonance, the master transmits their art to the apprentice through something conspicuously more transparent than storytelling. By defining resonance as a measure we introduce a self-defined, human element into the methods of predicate logic that underlie databases and machine learning. In doing so, mereological space moves from the abstract and conjoins directly with experience. We believe this integration allows for a novel implementation as web software. In building upon mereological aspects of consciousness, this software documents, and forms a map of the fine structure of intersubjectivity, personal insight, change, and evolution. **P4**

236 **Pattern Recognition Principle of Mind Functioning** Gilberto De Paiva <gilbertodpaiva@gmail.com> (LSI - Integrated Systems Labor, Sao Paulo, Sao Paulo Brazil)

I propose the concepts of pattern-recognition, pattern-processing and pattern-learning as necessary and sufficient principles to build a complete theoretical model of the mind functioning. Supporting arguments are: 1- The equivalence of the neural or computational mechanisms of pattern recognition in performing logical, sensory, memory, learning and processing functions as the basis of the cognitive phenomena which are here demonstrated; 2- A descriptive modeling building theory giving unambiguous definitions and developments of most key cognitive concepts like consciousness is available and presented, together with an overall mathematical, physical and functional analysis of the related cognitive process. The proposed contribution of the model presented here is to be a candidate as a basis for a solid theoretical foundation for the cognitive sciences. This encloses: a- A general body-mind, physical, psychological, neural, functional and computing reductionist explanation of the mind cognitive phenomena; b- With the promising applied pattern recognition technology development possibilities, this model could help to give some directions to Artificial Intelligence and also neurobiology and psychology-sociology research; c- A new discussion of the science foundations. d- A possible simplification of the evolutionist, animal-human gap and other explanation scenarios; **P10**

237 **Fundamental Principles all of the Solutions of Creative Mental Process in Visual and Aural Energies** Borut Ljubec <borut.ljubec@glasbena-kp.net> (Koper, Slovenia)

I investigate the Creative Mind or more specifically the creative and cognitive features of light energy and sound energy - both represent Creative Mental Energy - and their influences on our creativity, thought, perception, consciousness and operations of verbal energy and other symbolic systems. Differences between process (implicate order)and manifestation (explicate order) must be taken into account. This is completely empirical and experimental approach of investigation of the Creative Mind realizing in the forms of light and sound energies operations on Double Mind Screen Projection by introspective perception. Tesla's Phenomenon of Double Mind Screen is equal to Double Mind Screen Projection in my theory. In only one case can we get immediate informations about how does Creative Mental Process emerge and that is in introspective perception of light energy transformations on Double Mind Screen Projection including consciouss and uconsciouss operations, including operations of Self-organized Stochastic System of light and sound energies and Body-Mind Catalytic System. Introspective perception tell us about the evolution of Visual Creative Mental Process on Double Mind Screen Projection. This is space where all Creative Mental Processes and Creative Problem Solvings are happening. Introspective perception discovers Phases of the Authentic Developmental Flow of Creative Mental Process. The light and sound energies are the creative mental energies of our mind influencing and structuring it. All basic characteristics of our mind are involved in formes and operations of light and sound energies. Therefore without a knowledge of the states and processes of light and sound energies and their influences on the other regions of the brain it couldn't be possible to understand what are cognitive processes, creative processes,processes of consciousness and processes of verbal energy as a whole. Investigation of Fundamental Principles of Creative Mental Process in the forms of light and sound energies operations could become a veer in the science of the Creative Mind Investigation including the investigation of synergism(prevailing operations)and dissipation

(changing operations) with all modes, levels, dimensiones of the Classical Mixing Process of light and sound energetic forms, which are the fundamental operations of the Creative Mind. The most important thing is to be aware of the fact that light and sound energies are not only the energies which passively transmit some information from the outside into the inside but they include within themselves the latent Laws of Creative Mental Processes. Why are the questions about Creative, Cognitive, Consciousness and Verbal processes staying out without final answers? Why are forms of light and sound energies unconditional important for verbal energy operations? Some demonstrations of Light energy transformation on Double Mind Screen Projection in Subconscious Creative Process can represent that Light Transformation originates transitions from one visual mental state to another visual mental state. Every phase of development of light transformation could become one of many creative thoughts. **P10**

238 **An Exploratory Approach to Higgs-Boson Entanglement for Understanding Ultimate Reality** Chitta Ranjan Sarker <sarkercrs@rediffmail.com> (Dept. of Agriculture, Ramjankathi Technical & Agriculture College/Dept of Agriculture, Barisal, Bangladesh)

It is very difficult to conceive the ideas on Ultimate Reality through the spiritual messages , the knowledge of sub- atomic particles and the neuro-chemicals in all ages of human evolution. The scientists, the philosophers and the spiritual personalities are searching the fundamental energy or particles which would explain cosmic consciousness or ultimate reality. Among more than 200 sub- atomic particles exist, more specially the Higgs-boson(Peter Higgs, 1964 and S.N.Bose, 1924, India) the mass less elementary particles cause matter to have mass would be the an integral and pervasive component of the phenomenal World which would prove mathematically for deepest understanding of Ultimate Reality if the Higgs boson exists experimentally. **P10**

239 **On Luminal and Superluminal Conscious Entities: An Imagination** Marta Sananes <martasananes@gmail.com> (BARCELONA, BARCELONA Spain)

Some current physical theories postulate the existence of tachyons -superluminal, faster than light particles- before and at the Big-Bang that generated the Universe. These theories will be put to test with the functioning of the LHC/CERN in Geneve, Switzerland. [Michio Kaku, Physics of the Impossible, 2008, 2009]. Let us imagine that before the Big-Bang what existed was an entity complex and superluminal, comprising infinity superluminal conscious elements and that this superluminal entity induced the Big-Bang when a portion of its elements reduced their velocity in order to generate the two classes of substances of the Universe: the class of subluminal elements of matter and the class of luminal elements, like photons. Let us imagine that some of the luminal elements kept some capacity of consciousness and will. Let God be the realm of superluminal substance and let Spirit be each conscious element of superluminal substance. Let the Universe be the realm of luminal and subluminal substances. Let Soul be each conscious element of the class of luminal substance and Matter each element of the class of subluminal substance. The substances of the Universe would have evolved in parallel, with the life arising and evolving from the subluminal substance due to the action and evolution of companion luminal souls. Every soul would have as characteristics a spiritual heaviness, being so much heavy the more loaded with destructive experiences and associated feelings of hate, being lighter when full of constructive experiences and associated feelings of love. Let us imagine that the soul in freed state -when isolated from matter- dreams, that its natural way of being is to dream. The very light soul would enjoy delightful dream, the very heavy soul would suffer nightmares. The soul might achieve to recover sufficient lightness as for awakening to the state of spiritual consciousness and to recapture its original spiritual nature -its superluminality- integrating itself again into God's being. In this imagination, we all would have been a part of God and we all might be again. We all would have been makers of the Universe. We all might get connected with the spirits in God to beg for and to receive inspiration. In Tucson II Conference [1996] I presented the poster "The World of Light" with the first idea that a parallel world made of tachyons could be the "Other World". **P4**

240 **A Theory of Consciousness Based on the Standard Model of Particle Physics and Neuroscience Concepts, and Embodies Interactionism, Dualism and Physicalism** Richard Shank <richardshank@comcast.net> (Center for Frontier Sciences, Temple University, Blue Bell, PA)

This theory draws upon established concepts from neuroscience and The Standard Model of particle physics. The theory postulates that consciousness arises from an interaction of two of fundamental particles, and the interaction occurs as the result of a convergence of two physical processes. One process is the initiation and propagation of action potentials (nerve impulses), and their electromagnetic fields (EMF). Positive charged quarks within protons of three cations (Na+, Ca2+, K+) provide the major source of energy required to initiate and propagate action potentials. In this capacity quarks are postulated to serve an essential role in forming consciousness. The second physical process involves a hypothetical class of fundamental particles similar in several respects to photons. These particles (termed mentons), are postulated to function as force carriers (bosons). The postulated force carried by mentons is 'protoconsciousness'. The interaction is postulated to occur between mentons and the positive charged quarks, but it can occur only when an electromagnetic field has been established by the positive charged quarks involved in initiating or propagating action potentials. This implies that a neural network must be active prior to the appearance of consciousness. Once the conditions are met, an interaction between mentons and quarks is initiated, in which there is an exchange of energy that includes the transfer of 'protoconsciousness' from mentons to quarks. The energy associated with protoconsciousness is postulated to be integrated into the EMF generated by the positive charged quarks, thereby modifying the EMF in a way that enables consciousness to be expressed. Consciousness is postulated to arise within a few msec after energy derived from protococonsciousness is added to the quarks (the velocity of quarks, and the EMF they generate are dependent on the velocity of Na+, Ca2+, and K+). This theory postulates a dynamic bi-directional interaction between the biological activity of the brain and mental activity. The brain is postulated to function primarily as an organ that processes information (e.g., receiving, organizing, storing, accessing) and either distributes information (e.g., muscle and endocrine control) or provides the pre-existing informational component contributing to complex mental activity. According to this theory, various forms of conscious mental activity take place during a sequential series of interactions that subtly alter existing neural networks or establish new ones. Assuming that the unexpected delays of ~0.5s in Libet's stimulus response experiments are valid, this theory provides a plausible explanation for his observations. This is because neural networks must be activated before mentons can interact with, and transfer 'protoconsciousness' onto quarks actively contributing to the generation of action potentials. **P4**

241 **Consciousness, and the Foundations of Reality** Jagdish Srivastava <jsrivas@lamar.colostate.edu> (Colorado State University (Emeritus), Cupertino, CA)

This paper offers a succinct presentation of the author's theory in this broad field. The theory accepts the Pythagoras-Plato assertion that Nature consists of ideas; the theory asserts that these ideas are logical-mathematical objects alone, which interact according to the rules of logic and mathematics. This changes the subject from Philosophy to Science. Using the fact that Consciousness is self-referring, employing Goedel type reasoning, the author has shown heuristically that Consciousness is related to The Void (The Toatally Empty Set), and is (in a sense)an experience of emptiness in logical space. This result ties with the Buddhist experience of 'Shoonyat' (Void) that they reached through meditation. The result shows, for example, that human consciousness survives the human body, and becomes the engine that moves the next body that it enters. The brain is a mechanism that converts the forms into the experience of physical objects. The theory widely agrees with important experiences of man. **P10**

242 **The Living Nonlocal Quantum Hologram: The Recording and the Viewing of Nonlocal QH Explained, and Focuses on the Relationships and Dynamic Exchanges Between Consciousness and Awareness** Hasmukh Taylor <hasmukh_taylor@hotmail.

com> (Liberal Arts, University of Central Florida, Lake Mary, FL)

A Yogi'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. Intuition, Telepathy, Synchronicity, Kundalini, Karma, Gunas, the Source, OBE's and many similar information phenomena seem to be easily explained by means of the nonlocal Quantum Hologram. This is true, not because of insufficient evidence for a particular phenomena's existence, but rather for lack of a theoretical construct, which could fit within the prevailing paradigms of science.It is further postulated that from the point of view of evolution, quantum nonlocality is the basis from which self-organizing cosmological processes have produced the common phenomenon of perception in living organisms. The existence of a Quantum Hologram associated with each physical object provides each physical object with the non-local waveform predicted by quantum theory's wave/particle duality and extends quantum theory to all physical matter. It allows, for the first time, a possible approach for understanding the mysterious world of consciousness and awareness. Postulating that this is true, we inhabit a quantum world where non-local effects should be expected at all levels of functioning, not just as a curious artifact of the subatomic level of reality. Furthermore, we shall look at what the Quantum Hologram is actually made up of, how it was formed in the first place, and how we view this hologram both at micro and macro level with a reference signal. What do Yin and Yang diagrams actually represent and is there a hidden Code behind it? What does Sleeping Kundalini and Awakened Kundalini actually mean and how does it fit into the Quantum Hologram? What does the Third Eye open or shut mean? How can the principle of Einstein's photoelectric effect help us understand the higher and altered states of Consciousness? How can de Broglie's principle of assigning a frequency to a wavepacket, which accompanied the particle through space and time, resulting in group and phase velocities, help us achieve higher states of awareness. How cool is that! Finally, how the Source witnesses all of the above by a fact established by Marcer (1997) and Schempp (functional MRI, 1992). Hameroff (1994) and Penrose (1991) have presented data on microtubules in the brain supporting quantum processes."In reality nothing happens. Onto the screen of the mind destiny forever projects its pictures, memories of former projections and thus illusion constantly renews itself. The pictures come and go - light intercepted by ignorance. See the light and disregard the picture" Nisargadatta Maharaj. "A figure on the screen in the cinema show appears to watch the whole world. You and the world are as real as the cinema figure and the cinema world". Ramana Maharashi. These visionary sages have seen the world as it really is from the reference point of the Source. It is this vision that Nonlocal Quantum Hologram offers to the seekers of the Ultimate Reality. **A1**

4.4 Emergent and hierarchical systems

243 **Imagine Consciousness and Qualia as a Single Internal Analog Language Made of Ordered Water Forged During Respiration in Concert with Experience** Ralph Frost <ralph.frost@gmail.com> (magtet.com, Brookston, IN)

Energy flow in the local region moves through tetrahedral-like compression of four hydrogen atoms in the nearby solar fusion flux, through tetrahedral-like photosynthesis processes which support tetrahedral-like processes in respiration. In human respiration, 260 kg of molecular oxygen (O2) per year combines with organics to form carbon dioxide, some energy flow and about 10^20 water molecules per second. Since the charge separation encourages a plus, plus, minus, minus tetrahedral-like artifact, each of these water molecules can form or orient within an enfolding field in one of at least six ways. A sequence of n-molecules, then, can form in 6^n ways providing a simple means of structurally coding persistent reflections of our surroundings into an active internal analog language. This structural coding process occurs prior to, and supplies energy flow to the secondary, down-gradient neuronal processes. Implementing structural coding in the ordered water layer, surprisingly, allows direct interconnections via hydrogen-bonding, with essentially all replication steps, protein folding and thus the full range of sensory input, motility and emotional and creative expressions. Any

advantage gained from the structurally coded hydrogen-bonding packets, naturally, would yield a synergetic help in optimizing the life-sustaining energy harvesting occurring in the respiration reaction. This simplified analog math trial theory supports an interesting and growing array of visualizations. The words fit. The imagery fits. The trial theory carries the load. The persistent formation of wave after wave of slightly varying structurally coded ordered water layers nestle nicely to fill the so-called mind-body gap. Minimally, hydrogen-bonding ties the feel of things together. To implement longer term memory, structurally coded stacks of water molecules that would be in high concentration within an active cell would naturally become incorporated in bound water layers in newly forming protein matrices, which research shows does occur during in memory formation and strengthening, and which (the protein formation) may be disrupted by certain anesthetics. As one may naturally suspect, all quales and qualia turn out to be place-holding synonyms for the replicating stacks and sequences persistently forming in the internal analog math. The reader can likely already use this novel trial theory as a tool to visualize and rationalize other scenarios and so-called problem areas in the emerging science of consciousness. Kinesthetic and visually challenged learners may benefit by exploring and using a simple, hand-held quantum gravitational learning tool available at www.magtet.com The author would like to express his gratitude and appreciation for the contributions and the leadership roles of Stuart Hameroff and Roger Penrose, David Chalmers, Gary Pollack, and also of all the many participants of jcs-online@yahoogroups.com. Given in memory of Wandsqueen, Karen Gilbert. **P10**

244 **Consciousness in Evolution – Sketch for a New Model** Donald Padelford <dfp07@dfpnet.net> (Integral Review, Seattle, WA)

It is hypothesized that hierarchically negentropic systems (defined herein), including organisms, are associated with partially non-local information/probability fields which, a) entail or express interiority, b) engender "entangled learning" with similar negentropic systems, and c) cause otherwise random processes, including mutation in biotic systems, to become somewhat non-random. These effects, which are believed to be driven by quantum interactions, modify those identified with the Modern Evolutionary Synthesis. A series of tenets, or broad organizing principles related to such systems and their associated fields, are enumerated. An empirical test which could potentially falsify certain aspects of the hypothesis is given. --- (1. Evolution is a phenomenon that takes place in hierarchically negentropic systems in general, and in life forms in particular. (2. Hierarchically negentropic systems are negentropic systems made up of, or constituted from, negentropic sub-systems, which themselves are made up of negentropic sub-sub-systems, etc. (3. Hierarchically negentropic systems are characterized by interiority. (4. Interiority is that aspect of hierarchically negentropic systems which, if concentrated sufficiently, results in consciousness. (5. Thus matter doesn't create consciousness. Rather highly evolved hierarchically negentropic systems (ie advanced life forms) manifest consciousness. (6. The tendency of hierarchically negentropic systems to become more negentropic, with more layers of hierarchy over time constitutes evolution as seen from "outside." (7. As seen from "inside," interiority seeks to increase itself, which is to say, to become conscious, or more conscious. (8. Interiority is, to some extent, non-local. (9. In particular similar (or identical) hierarchically negentropic systems share a degree of interiority. This is the view from "inside" such systems. (10. The view from "outside" is that hierarchically negentropic systems probabilistically tend to adopt, or conform to, solutions found or chanced upon by similar systems. (11. The partial non-locality of hierarchically negentropic systems exists in terms of both time and space. (12. The deeper the hierarchy in hierarchically negentropic systems, the more non-locality is evident. (13. Lower levels of the hierarchy in hierarchically negentropic systems have causal affects on higher levels and vice versa. (14. Also, causal affects operate from exterior to interior and interior to exterior. (15. As reductionism only fully recognizes the former affects (lower to higher and exterior to interior), it is wrong, or at least incomplete. (16. Idealism, while not a major force in today's world, makes the opposite mistake. (17. Up-to-down and in-to-out causality are, to some extent, the same thing, since systems with deeper levels of hierarchical negentropy embody greater degrees of interiority. (18. Likewise down-to-up causality is, to some extent, the same thing as out-to-in

causality. (19. Taken to its logical end point, the ultimate hierarchically negentropic system would theoretically be totally non-local as to time and space and share an interiority common to all such systems lower in the hierarchy, including all life forms. The overlap between such an ultimate hierarchically negentropic system and what the religiously inclined call "God" is reasonably evident. (20. Because life continues to evolve, such an ultimate hierarchically negentropic system would logically also continue to evolve. – see http://www.integral-review.org/current_issue/index.asp **P4**

4.5 Nonlinear dynamics

245 **Dynamical Correlates of Consciousness During Evolution, and Emergence from General Anesthesia: An Explanation of the "Conscious Moment"** Peter Walling, Mr Kenneth N. Hicks <peterwalling@gmail.com> (Anesthesia And Pain Management, Baylor University Medical Center. Dallas, Texas, Bartonville, TEXAS)

The emergence of consciousness has been studied in the anesthetized patient, and indirectly, in animal studies. We used awake, existing species, as surrogates for their ancestors, Electroencephalogaphic (EEG) attractors and frequencies were measured. We found a dimensional increase of about 1 dimension every 200,000,000 years, with 3 dimensions appearing between the appearance of the fishes and amphibians about 375,000,000 years ago. 2 dimensional attractors represent too little information to support consciousness (Poincare-Bendixson Theorem). The appearance of 3 dimensional attractors corresponded with vertebrate movement onto land and an increase in Earth's atmospheric oxygen levels to about 20%. We therefore suggest that sufficient neuronal equipment evolved for consciousness to emerge at about the time of the appearance of the amphibians. Emergence from anesthesia is associated with the appearance of 3 dimensional attractors. There is a similar increase in EEG frequency and power during both types of emergence which we have called the "Gamma Ascent'. At sufficient power and frequency, synchronous gamma waves may form "slices" of information which are stacked to produce a "rolling" conscious moment in multidimensional phase space (Hyperspace) about 300 ms in duration. An allegory for this technique would be the 2 dimensional Square in Flatland "seeing" a sphere by stacking and holding round discs in his "mind's eye" as the sphere created an enlarging, then decreasing circle while passing through Flatland. This theory is in agreement with the cinematographic idea of consciousness. We argue that consciousness is a derivative of brain activity. However, the percept and perceptual space are non physical. If the brain exists in physical space and the percept exists in non physical space, it is illogical to claim that perception is either inside or outside of the brain. The two spaces, physical and perceptual, have completely different natures. They coexist, but they do not overlap. **C4**

4.6 Logic and computational theory

4.7 Bioelectromagnetics/resonance effects

246 **Systems and Methods for Analyzing and Affecting Subtle Energy [Patent Pending]** Stanley Jungleib <stanley@jungleib.com> (Stanley Jungleib Laboratories LLC, Portola Valley, CA)

Novel electronic devices were originally offered for consumer EMF protection, then became subject to extraordinary claims. They were reported able to store the intentions of meditation teams to later and elsewhere influence physical, chemical, and biological processes, and food quality. Moreover the devices exhibited unusual properties in communicating their intentional imprints by simple proximate exposure, by evading electromagnetic shielding, and by apparent continent-spanning entanglement with other devices. That research encountered continuous difficulties controlling leakage of intentional imprints between even shielded devices and-though the devices were switched off-preventing devices from commingling intentions, reportedly over thousands of miles. Fascinating persistent 'conditioning' of space was also reported. A later study reported a monk-imprinted device enhancing chocolate's mood effects

better than monks imprinting chocolate alone. Intriguing as these meditator-based studies were, replication and expansion of the field has been practically impossible due to the highly variable prerequisites of powerful meditators and specially-conditioned spaces. As well, there have been no standardized objective instruments and methods. The more extraordinary the claim, the greater the need for freedom to replicate and verify it. Accordingly, here we show how to emancipate psychoenergetic research from its esoteric traditions and gatekeepers to the humble environment of the standard electronics workbench. Since 2005 we have evolved this technology to peer-reviewed leading edge status, culminating in pending patents for the resulting psychoenergetic computing system. New instrumentation and methodology removes the need for meditators and so-called conditioned space. Entanglement between devices, or space conditioning effects can be quantified and studied objectively by anyone. Initially, these new tools and methods offer unprecedented statistical evidence for semiconductor device entanglement that is far more precise than generally yet expected or understood. The experimental results display the first serious conversion of spatial and intentional psychoenergetic research from qualitative idiosyncratic ritual into quantitative industrial rigor. This may be most plainly demonstrated by the coincidental emergence of a new, parsimonious theoretical model unifying the historic lore of crystals with the contemporary fabrication of complex semiconductor arrays. An informed review of the electronics seems to render unnecessary prior insistence upon elaborate and controversial quantum theories. From the validation of imprinting technology may emerge new processing tools such as healing machines and food enhancers. A new science of space conditioning may create verifiable EMF protection; also applications ranging from inducing psychological effects to potential nanoprocessing opportunities through programmable gauge state modulation. The robust device data entanglement demonstrated here could be recast over thousands of miles to create a new ultra-low power communication system alternative to the profoundly increasing toxicity of wireless upon the biosphere. SJL's alternative theory offers unifying and testable support for a broad array of fascinating theoretical and experimental work emerging worldwide. **P4**

247 **Microtubule as a Universal Fourth Circuit Element** Satyajit Sahu, Anirban Bandyopadhyay, Daisuke Fujita <satyaphy@gmail.com> (Advanced Nano Characterization, National Institute for Materials Science, Tsukuba, IBARAKI Japan)

The charge, voltage, current and magnetic flux vary in pairs to define resistor (R), capacitor (C) and inductor (L). Since a change in magnetic flux generates a voltage, thus far, magnetic flux and charge have been correlated as the fourth element in pristine electrical devices (H) that are incapable of generating magnetic flux. Major problem with this approach is that all properties of H could be generated using combinations of L, C, R; obviously, H thus defined is not an essential element. Here, we define an essential fourth element H that includes all aspects of symmetry argument and experimental evidence shows that microtubules (MT) follow these criteria. Our H is a helical nanotube/nanowire that stores/releases charge like C and a spiral current generates magnetic flux like L. Even though L and C grows/decays together inside, an ideal H is remarkably linear in dc output. For purely geometric reason, an accurate magnetic flux regulator and co-existence of L and C turns an input ac signal out of phase. H may initiate a ballistic transport as its conductance increases by 10^10 orders in magnitude, and complete architecture may become a coherent system under particular field. Recently, helical/rossette nanotubes, which look like H, are under rigorous investigations and our H features resemble their properties. MTs tune electromagnetic energy storage/transport by changing its length and provide essential out-of-phase signal conversion capabilities to bio-systems. Advanced Scanning Probe Microscopy Group, Advanced Nano Characterization Center, National Institute for Materials Science 1-2-1 Sengen, Tsukuba, Ibaraki, 305-0047 Japan, **C13**

4.8 Biophysics and living processes

4.9 Evolution of consciousness

248 **Towards a Unified Field Theory of Human Behavior - Global Cultural Evolution** Marcus Abundis, <55mrcs@gmail.com> (GFTP, Stanford Graduate School of Business (GFTP), Santa Cruz, CA)

This paper develops a new structural psychology, and therein proposes a specific model for the scientific study of consciousness. The presented model uses Earth's geologic history of mass-extinction & recovery (evolutionary dynamics) in determining humanity's adaptive response (conscious and non-conscious traits). It argues humanity adaptively mirrors Earth's basic evolutionary dynamics, in a "mythologizing of natural adversity" as foundation for all human knowledge - a process that continues well into the modern era. The intellectual lineage used to develop this model includes: Evolutionary biology - offers a context for this study answering Chalmers' "hard question"; Paleoanthropology - defines the circumstance of human emergence from Gaia; Environmental forces - on a dexterous human neurophysiology derive an ambiguous but instructive narrative logic (mythic sensibility); Psychology tracks humanity's shift from animal-self to modern creative-self, using work of Hegel > Freud > Jung > Rank > Joseph Campbell > Arnold Mindell as a new structural psychology; Fractal geometry offers a holographic design for modeling consciousness, in a form consistent with Quantum Theory; Memetics presents a tool for measuring conscious traits, in a variation of the Hall-Tonna values inventory; Finally, Structured Opportunistic Thinking, a hybrid of NTL's T-group, and Pierce's Power Equity Group Theory, suggests a developmental methodology. This work presents a "general hypothesizing model" of human consciousness, in attempting a science of consciousness. Additional info available at: http://vimeo.com/evolv and http://philpapers.org/profile/4404 **P10**

249 **If Birds Have Conscious Experiences, Do Fish Too?** James Beran <jimberan@earthlink.net> (Richmond, VA)

Although brains of birds are much different than ours, there is evidence that birds have conscious experience similar in ways to ours. [1] It has also been suggested that human conscious experiences correspond to features of rhythmic electromagnetic (EM) waveforms measurable by electroencephalography (EEG) and magnetoencephalography (MEG). [2] Although human brain mechanisms that produce EM waveforms are not fully understood, extracranially measurable waveforms are believed to result from synchronized electrical currents in apical dendrites of pyramidal neurons. [3] This work compares features of pyramidal neuron formations in mammalian and avian brains, and finds evidence of some similar EM-waveform systems. [4] If EM waveform features indeed correspond to conscious experiences, simple EM-interactive neural structures that learn to have conscious experience could have arisen in primitive EM-waveform systems; then, development of more advanced EM-waveform systems could have led to complex consciousness. [5] Therefore, this work also considers features of brains of primitive, jawless fish, e.g. hagfish, and advanced, pretetrapod fish, e.g. lungfish, with attention to precursors of pyramidal neuron formations. If EM-waveform systems in fish brains led to formations that learn to have conscious experience in mammalian and avian brains, do fish also have conscious experience? We propose a three-stage model based on dendritic interaction with EM waveforms: Under the proposed model, evolving structures within EM-waveform systems could learn to have conscious experience; the model's stages resemble certain analog signal processing techniques. [1] See, e.g., Pepperberg, I.M., Alex & Me, Collins, 2008, at pp. 202-205 and 219-222. [2] See, e.g., Lewine, J.D. and Orrison, W.W., Jr., "Magnetoencephalography and Magnetic Source Imaging" in Orrison et al., Eds., Functional Brain Imaging, Mosby, 1995, pp. 369 et seq., at pp. 411-412. [3] Id. at pp. 375-382; see also Kirchstein, T., and Koehling, R., "What is the Source of the EEG?" Clinical EEG and Neuroscience, July 2009, pp. 146-149. [4] Compare, e.g., ten Donkelaar, H.J., "Reptiles", in Nieuwenhuys et al., Eds., The Central Nervous System of Vertebrates, Springer, 1998, pp. 1315 et seq., at 1480. [5] Compare Buzsaki, G., Rhythms of the Brain, Oxford, 2006, p. 115. **C20**

250 **Evolutionary and Social Constraints on First Person Phenomenology** Brad Buhr <buhrb@northernlakescollege.ca> (Community Learning Centres, Northern Lakes College, Valleyview, Alberta Canada)

Human consciousness supervenes on an evolutionary heritage that constrains our subjectivity and our cognition. Because of these constraints, certain individual and social patterns of behavior have emerged consistently throughout human history. These patterns have been seen as evidence for memes, a cultural replicator that is often seen as 'infecting' brains. This presentation will first demonstrate that our phylogenetic inheritance renders memes unlikely, as common cultural and individual behavioral traits attributed to memes by Dennett et al can be demonstrated to have primate precursors. Particular attention will be paid to the gestural (De Waal) and genetic (FOXP-2 gene) roots of human language, and to patterns of hierarchical behavior in humans and other primate species. It will be argued that human consciousness and culture build upon evident non-human patterns of behavior and recent genetic mutation. The second thrust of this presentation will examine what it is like, phenomenologically, to be an individual processing the myriad and conflicting signals of modern technological societies with an evolved and evolving brain. I will use Thomas Metzinger's Self-Model Theory of subjectivity as a framework to explore how first person phenomenology is often overwhelmed by the cues, imperatives, and propaganda of modern technocracies. I will also demonstrate congruence between Metzinger's concerns regarding this phenomenon and the writings of sociologists such as Herbert Marcuse. My concern is that it is becoming increasingly difficult for unique expressions of human consciousness to develop. This discussion will examine individual, perspectival experience, but will remain grounded in objective evolutionary and neurobiological research. Finally, I will suggest ways by which individual subjectivity can be protected and nurtured through social and educational policies. **P4**

251 **Evolutionary Psychology, or How Not to Explain the Human Mind** Alex Gamma <gamma@bli.uzh.ch> (Research, Federal Institute of Technology (ETH), Zurich, Switzerland)

Evolutionary Psychology (EP) is an ambitious enterprise to explain the structure of the human mind based on "evolutionary thinking". EP's basic idea is that the human mind consists of specialized mental modules that evolved in our hunter-gatherer ancestors as adaptations to their stone-age environments. Since (genetic) evolution operates too slowly to have significantly changed these psychological adaptations, modern man faces a particular predicament: while his mind is still largely adapted to living conditions prevalent 100'000 years ago, modern environments are so radically different from those ancient conditions that his mind will often fail to produce adaptive behavior (e.g. producing fear of snakes instead of fear of electric sockets). Thus, we must try to cope with the modern world using woefully inadequate stone-age mental equipment. * While this explanation may sometimes be the right one to account for the mental causes of our behavior, it will often enough be wrong because it is systematically incomplete. This follows from two extensive blind-spots in EP's theorizing: * 1. EP completely ignores development (ontogeny) * 2. EP has a radically impoverished view of evolutionary inheritance, and, a fortiori, of evolution itself. * 1. Every trait of every organism develops. Individual development (ontogeny) is a complex process of multiple interacting causes that jointly determine both the bodily and the psychological traits of an organism. In modern human beings, this process alone could be able to create a mental architecture that adapts our behavior to our social and technological environments - beyond any consideration of evolution. * 2. Inheritance of traits is one of the core mechanisms driving the evolution by natural selection as envisaged by Darwin. However, nothing in the Darwinian account of natural selection requires inheritance to be exclusively a matter of the physical transfer of genes from parents to offspring. In fact, all that is required by "inheritance" in the Darwinian sense is an increased resemblance between parents and offspring relative to unrelated individuals. As a consequence, every causal factor internal and external to a child that makes it become similar to its parents will subserve evolution by natural selection. Among these factors are not only genes, but also reliably recurring or stable features of the physical and social environment, including those countless features of human cultural transmission that characterize

our modern environments. Cultural items that recur or are reconstructed in every generation meet the requirements for being heritable resources just as well as genes do. And since they can and often do change on a much smaller time scale than genes, they are able to affect the evolution of traits - such as our cognitive endowment - in fractions of the time needed by purely genetic evolution. This means that human mental structure may often be much better adapted to our current living conditions than EP would have us believe. * In short, Evolutionary Psychology is wrong-headed for (among other things) its myopia with regard to the power of a) individual development (ontogeny) and b) evolution by non-genetic, especially cultural, inheritance. **P10**

252 **Self-Transcendence, Conceptualization, and Methodology: State of the Science** Albert Garcia-Romeu <paper_tiger77@yahoo.com> (Institute of Transpersonal Psychology, Los Altos, CA)

Self-transcendence has been studied and conceptualized in a number of ways. In psychology and religious studies, self-transcendence has been characterized as a particular class of experience, loosely related to other anomalous phenomena such as peak-experiences, flow, mystical experiences, depersonalization, and psychedelic experiences. From a sociological perspective, self-transcendence has been examined as a set of social values, such as universalism and benevolence, which emphasize the wellbeing of others. In nursing and personality theory, self-transcendence has been approached as a measurable trait of the individual, and has been found to be correlated with several genetic, neurological, and psychological factors. Finally, self-transcendence has been regarded developmentally, as a process that may play a key role in human growth and transformation. In accordance with this wide variety of conceptualizations, numerous research methods have been employed in the study of self-transcendence, running the gamut from quantitative to qualitative to theoretical. The author's purpose here is to present a concise, comprehensive analysis of multidisciplinary self-transcendence research to date, and to suggest fruitful avenues for future research through the integration of current approaches. This work ultimately seeks to promote the societal implementation of self-transcendent experiences for widespread social and psychological transformation in contemporary Western cultures towards more sustainable worldviews, taking into account the plight of developing nations, ecological systems, and the cosmos at large. **P10**

253 **Primal Neuroanthropology- The Study of Archetypal Postures, Movements and Behavior in Sports and Related Activity that Connect us to our Evolution, Infancy, Neurodegeneration and Primordial Selves** Kenneth Van Gross <vangrossmd@aol.com> (Fusion Clinical Multimedia, Inc., North Miami, FL)

Primal Neuroanthropology is a new hypothesis involving evolutionary neurology, psychology and psychiatry. It speaks of the unconsciousness of sports. We are aware of the athlete's individual motives and the larger structure of games and leagues. Ignoring Jung, Freud and Nietzsche, we have missed the totemism if not the Total Outline of the neurological, psychosocial and evolutionary aspects of the numerous unconscious actions of those participating in athletics and related activities. It is contended that sports gestures, postures, movements and expressions are critical to what represents the primitive consciousness if not unconsciousness of the sports performer. With sports, in adopting the exaggerated movements of certain genetic and neurodegenerative diseases, the "devil may care" self injurious actions of the star shooting guard, the freezing in Parkinson disease to steady the tourney winning golfer before a winning putt, or the involuntary dance like movement of Huntington disease simulated by the jittery running back eluding a tackler, we are doing a replay of many of these basal ganglia mediated gestures, postures, habits and behavioral actions, as unconsciously as have been the very evolutionary, ontological and involutional processes such movements reflect. The neurodegenerative processes at play in such conditions specifically target the most phylogenetically ancient components of the brain, including the substantia nigra and the striatum. The marked involution of these brain structures is accompanied by severe motor and cognitive deficits. Studies of neural mechanisms involved in these akinetic and hyperkinetic disorders have led to a re-evaluation of the current model of the functional organization of the basal ganglia in

both health and disease. So we evolve, we grow, we involute, we exhibit these phenomena that link all these processes. The basal ganglia contains this primordial motor circuitry that reveals an ancient phylogeny and link to automatic behavior hovering below our consciousness. **P10**

254 **Primordial Influence of Unequal on Evolution of Consciousness** Andy Kuniyuki <andy.kuniyuki@nsc.nevada.edu> (School of Liberal Arts and Sci, Nevada State College, Henderson, NV)

Life came into existence and evolved based on unequal. This starts with properties of polar bonds that arise because of an unequal sharing of electrons. At this primordial level, the consequence of unequal sharing is the partial charge of polar bonds that act as mini magnets. It is on the basis of this property that nucleic acids have the ability to replicate. Reciprocity between nucleic acids and facilitator molecules ensures that these essential components are produced to work in coordination in order to continue reproduction, and as such, become the inherited basis of life. They are together self-reinforcing, a product of natural selection, the only mechanism that improves the survival and reproduction of life forms. This cycle selects characteristics that contribute to unequal in the sequestering of material and energy resources into successful organisms. Resource substrates are modified into components that contribute to behavior that leads to these organisms surviving and reproducing faster than others. Unequal capabilities drive unequal distribution that reinforces inherited characteristics that contribute to these capabilities. As evolution increases organism complexity, a key requirement becomes information discernment, coordination and processing. Consciousness emerges from networking communication selected as a consequence of unequal capabilities. This framework must begin with and include properties of specialized systems that responded to processes in an autonomic manner that reinforced reproductive success through unequal sequestering of resources. Both system structure and process are selected on the basis of their behavior. They become the tools for modification that include changes in system structure or process or both leading to what can interpret process and how processes can be represented. What starts as somewhat rigid stimulus-response becomes dynamical through the integration of the range of these possible combinations: the use of specific system structures with certain processes, properties of process representation, recruitment and responses of other system structures with varying process representations, the constitution of reward or avoidance decisions. Early behavior reinforcement selected unequal capabilities. The transition into consciousness builds on this framework. As the methodological and conceptual search for the transition into consciousness continues, an aspect that should also be of consideration is the extent to which unequal shifted from primordial properties that defined the basic mechanisms of life, became selected and reinforced as a consequence of sequestering material and energy resources that contributed to greater reproduction, to becoming a weighted filter in the integration of systems and processes contributing to decisions. If intentionality has played a causal role in human evolution exerting selective pressure on human behavior, then choosing unequal beyond being unequal is a layer in conscious motivation that should not be ignored. The extent to which unequal participates in and influences intentionality in consciousness should be explored. **P10**

255 **Cybernetics-Based Stages/Levels of Life/Consciousness: Towards an Emerging Scientific Spirituality** Walter Matreyek <waltmatr@pacbell.net> (Principal, MPSL Performance Consulting, Redwood City, CA)

This poster outlines a cybernetics-based model of Life/Consciousness. In the course of evolution of the universe, life, and consciousness, a relatively small number of cybernetic Elements can be seen to be at play in six successively emergent Stages/Levels (SL0 to SL5). The Stages mainly correlate with the emergences of transcendently inclusive Levels in one Element, Consequences-Feedback-Adaptation (CFA) algorithms. Concomitant Levels may also be observed in both other Elements as well as in Total Resulting Systems. In current scientific Timelines of evolution, usually based on major geological and biological events, we can also see the following underlying cybernetics: Some 9 billion years into the evolution of the SL0 physical universe, there was an emergence of SL1 early life, characterized by biology-based

negative/positive feedback algorithms involved in homeostasis, growth, reproduction, movement, etc., leading to genetic/somatic adaptations. After some 3+ billion years of SL1, we find the emergences of SL2 organisms, characterized by nervous system-based negative/positive feedback and compensatory/pre-emptive feed-forward algorithms. With these came capabilities for on-the-fly adjustments and basic psycho-social adaptations. After some 650 million years of top-most SL2, some 2 million years ago, there was the emergence of notable SL3 Self-Awareness, in organisms with brain structures, areas, and circuitry enabling refection/preflection and monitoring. This led to capabilities for intentional, semi-conscious change/improvement in specific experiences, performances, and techniques/tools. At present, we are some 2500 years into the emergence of SL4, Self-Control, in which we find capabilities to Reflect/Preflect on and Monitor, and to effect Changes/Improves in, not just larger-scale individual and collective existences/performances, but also our capabilities for SL3 reflections/preflections, monitorings, and changes/improvements. Interestingly, such SL4 capabilities for metacognition seem to have had their origins in philosophical and Spiritual realms, such as in admonitions to "Know Thyself" and in certain yoga and Buddhist Insight/Mindfulness meditation practices. There is also what seems like a new direction of bio-psychosocial causality, in which the continuing emergences of such memes and practices create the neurology which perpetuates and expands those memes and capabilities. Within all this, we can see a continuum of Science-based SL0 to SL3 into more "Spirituality"-based SL3 to SL5 cybernetic-based Stages/Levels, which suggest a possibility of an integration of Science and Spirituality into, as the subtitle suggests, an emerging Scientific Spirituality. The poster per se consists of five sections: 1) a centerpiece Stages/Levels Table, 2) detailed background on Cybernetics and cybernetic Elements, 3) Timelines of Evolution, Development, and Daily Life, 4) possible Research and Development priorities, and 5) Applications in such fields as Intervention Design, Astrobiology, AI /Robotics, and the above-mentioned Scientific Spirituality. There is also a short silent video featuring SL1 and early SL2 Exemplar organisms engaged in characteristic behaviors in which a variety of cybernetic Elements can be observed to be at play. The two intended take-aways from the poster are 1) a sense of the potential value in recognizing the cumulative continuities and complexities inherent in such a cybernetics-based Stages/Levels model, and 2) some basic experiences with related applications. **P4**

256 **A Dynamic, Topographic, Natural-Selection Fitness Representation and the Evolution of Conscious Awareness as a Mechanism for Rapid Plastic Adaptation** Michael McBeath, Igor Dolgov - Department of Psychology - New Mexico State University <michael.mcbeath@asu.edu> (Psychology, Arizona State University, Tempe, AZ)

Dynamic states of evolutionary fitness can be geometrically modeled as a multidimensional spatial representation akin to a dynamically-changing topographic map. Each multidimensional surface location represents an individual state at some point in time, with higher elevations being selectively more advantageous. Invariant natural principles produce stable fitness elevations while changing world conditions manifest as elevation oscillations. Different types of natural selection mechanisms have evolved that allow organisms to differentially adapt to the time-scale and plasticity level of fitness level oscillations. Traditional biological evolution mechanisms allow organisms to adapt to stable 'higher ground' in the fitness representation landscape, while less permanent natural selection mechanisms provide a means for shorter term maneuverability and adaptation. We suggest that the phenomenon of conscious awareness evolved as a mechanism to allow organisms to plan and rapidly adapt to transitory dynamic patterns of fitness elevation change. Here conscious awareness is defined as a self-directed attentional state that allows individuals to plan and couple behavior to ephemeral fitness elevation patterns. The unreliability of rapidly changing aspects of the fitness terrain may in part explain why consciousness is so complex and historically difficult to model. In this presentation we describe the fitness representation model and elucidate how consciousness can serve as a useful and sometimes necessary tool to plan and navigate through rapidly changing environmental conditions. **C20**

257 **Evolutionary Advantages of Intersubjectivity and Self-Consciousness Through Improvements of Action Programs** Christophe Menant <christophe.menant@hotmail.fr> (Bordeaux, France)

Evolutionary advantages of consciousness and intersubjectivity are part of current philosophical debates on the nature of consciousness. Both are linked and intersubjectivity is sometimes considered as a form of consciousness (1). Regarding the evolution of consciousness, studies tend to focus on phenomenal consciousness (2). We would like here to bring the focus on self-consciousness and continue the build up of a corresponding evolutionary scenario. We also propose to introduce a possible evolutionary link between self-consciousness and phenomenal consciousness. Our starting point is the evolutionary scenario based on the evolution of intersubjectivity that goes thru the identification with conspecifics at pre-human time frame (3, 4, 5). The scenario considers that such identification with conspecifics brought the non self-conscious auto-representation carried by our pre-human ancestors to merge with the representations of conspecifics. The latter transferred to the auto-representation the characteristics of an entity existing in the environment, and by this way introduced some first elements of self-consciousness in the brains or our pre-human ancestors. In addition, an anxiety increase coming from the identification with suffering or endangered conspecifics produced an evolutionary engine based on anxiety limitation. We want here to complement this evolutionary scenario by introducing the improvements of action programs as contributing to the evolutionary advantages of intersubjectivity and self-consciousness. We look at the possibility for a subject to improve the action programs that conspecifics implement. The performance of identification with conspecifics allows the subject to consider that errors made by conspecifics are potentially his own errors, and consequently allows the subject to correct the errors of conspecifics for his own benefit. We describe the process of non successful action identification from the perspective of an observer and present the synergetic action program improvements with their contribution to the evolution of self-consciousness. We add this contribution to the existing evolutionary scenario on self-consciousness and also introduce a possible evolutionary link between self-consciousness and phenomenal consciousness. We use for that the relation existing between phenomenal consciousness and pre-reflexive self-consciousness (6) and propose to link the latter to the proposed evolutionary nature of self-consciousness. We finish by summarizing the points addressed and by introducing some continuations. References: (1) Gardenfors, Peter (2007) "Evolutionary and developmental aspects of intersubjectivity", in Consciousness Transitions : Phylogenetic, Ontogenetic and Physiological Aspects, ed. by H Liljenstrom and P. Arhem, Elsevier, Amsterdam. http://project2.sol.lu.se/sedsu/publications/2006-Gardenfors-EvolIntersubj.pdf. (2) Carruthers, Peter (2000). "The Evolution of Consciousness". In Carruthers, Peter, & Chamberlain, Andrew (Eds.), Evolution and the human mind: modulatory, language, and meta-cognition . Cambridge University Press. http://cogprints.org/1205/0/Concevol.htm. (3) Menant, Christophe (2005) "Evolution and Mirror Neurons. An Introduction to the Nature of Self-Consciousness". TSC 2005. http://cogprints.org/4533/1/Charts.pdf. (4) Menant, Christophe (2006) "Evolution of Representations. From Basic Life to Self-representation and Self-consciousness". TSC 2006 poster. http://cogprints.org/4843/1/Menant_TSC_2006_Poster.pdf. (5) Menant, Christophe (2006) " Evolution of Representations and Intersubjectivity as sources of the Self. An Introduction to the Nature of Self-consciousness". ASSC 10 poster. http://cogprints.org/4957/. (6) Gallagher, Shaun and Zahavi, Dan (2006) "Phenomenological Approaches to Self-Consciousness" Stanford Encyclopedia of Philosophy http://plato.stanford.edu/entries/self-consciousness-phenomenological/ **P4**

258 **A Brief Explanation of Consciousness** M. E. Tson <micul@post.harvard.edu> (McLean, VIRGINIA)

This short paper demonstrates how subjective experience, language, and consciousness can be completely explained in terms of abilities we share with the simplest of creatures, specifically the ability to detect, react to, and associate (DRA) various aspects of the world. With these three innate abilities, an organism can begin to form de facto categories (some things

are food or a mate; some aren't), develop expectations, and learn. We can see such capabilities in numerous other animals, but there is no need to assume at this point that they have any self-awareness or are anything more than a contiguous collection of chemical reactions, which happen, by evolutionary 'selection', to all work in a coordinated way to further 'their' collective survival. Thoughts are not yet 'about,' or 'directed toward,' anything. Intentionality is an interpretation in the eye of an observer and without language there isn't one. Communication learning, associations of certain sounds with certain DRA experiences, is seen in several animal species. Human language is different in degree but not kind. A language is not shared words or syntax, it is shared or, rather, convergent, experiences which are associated with those words/syntax and which give them their meaning. Just as a vervet monkey learns what to do and emit when it detects an eagle as opposed to a snake, a child learns which detections (hunger, color) to associate with the sounds such as 'I am hungry' or 'I see red.' As previous linguistic associations are applied to new experiences, children are capable of uttering intelligible phrases which they may have never heard before. An organism's subjective experience is also explained in terms of detection, reaction, association, and language. The paper shows that consciousness – the information that an entity or monad can process about itself and the world – is a continuum with bacteria (or chemical reactions like rust) at one end and human self-awareness at the other. **P10**

259 **Mammalian Origins for Human Consciousness** Laurence J. Victor
<larryvictor@comcast.net> (Pima College - Retired, Tucson, AZ)

Might consciousness not be uniquely human, but basically mammalian - enhanced, in content, by the greater human brain and language? What can we say about the distribution of consciousness in early humans as to waking, day-dreaming, and sleep-dreaming consciousness? Were hallucinations more dominant in early consciousness? What if early humans were unable to easily distinguish these different types of consciousness? Kieran Egan's holarchy of nested levels of 'tools for understanding' (somatic, mythic, romantic, philosophical, ironic) suggests that early humans may have been unable to distinguish 'reality', 'remembrances', and 'imagination/fantasy'. Might human consciousness have first arisen in inner 'dream-like' awareness, later to be penetrated by 'content 'directly' from perception'? What would such intrusions be like: features of Autism? Human behavior may have remained in the more automatic behavioral mode of animals. Indeed, the process of projecting content to consciousness may be viewed as a behavior. The explicit consciousness of perceptual reality many not have been a primary factor of human mental evolution, but a secondary feature. Human consciousness may differ from other mammalian consciousness by content and not by anything essential to consciousness. I was motivated to re-examine this issue when reading Karen Armstrong's 'The Case for God'; who, though not explicitly talking about consciousness, reveals many significant aspects of its early emergence. For example, early consciousness had no concern about 'belief', which is embedded in complex language. For twenty centuries human youth were initiated into adulthood in the deep caves of France - where visual images fueled imagination and commitment. Yet, in India the sound feature of speech may have been their first focus. A dominant perennial canon is the existence of a better 'world' beyond perceptual reality. Might this have come from earlier experiences of such worlds in earlier dream consciousness? Some cultures today give greater 'truth value' to dream life than perceptual life. How has human consciousness been transformed by the different stages of language emergence: gestures and early speech, oral traditions & memory, early written languages for a narrow elite & listening for the rest, expanded literacy after the printing press, and the many faceted features of contemporary communication with video, computers, cell phones, texting & blogging? Given there are populations still embedded in each of these 'historical' stages, what might we learn about essential differences in consciousness? What might we lose while we gain; Egan's concern? How might the consciousness of newborns, infants and children possibly reflect, in recapitulation, the emergence of consciousness types in humankind? Why not adopt variants of 'panpsychism' which doesn't dictate that humans, alone, have consciousness? Is it because we have associated human consciousness with language? The controversy is still emotional when claiming that animals have consciousness, in spite of the effort of

Temple Grandin and others. I beg to differ with the common belief that animals have greatly inferior inner experiences. My conference presentation will discuss historical commentary and recent research related to this issue, as well as facilitating an energetic dialog on constructive speculation. Might Consciousness be a Behavior? **C20**

4.10 Medicine and healing

260 **Placebo Response and Consciousness** Daniel Beal <dmbealmd@msn.com> (Psychiatry, University of Cincinnati, Cincinnati, OHIO)

There is a hard problem of consciousness in the placebo response which is entirely similar to the general hard problem of consciousness. In this context, the placebo response exhibits aspects of consciousness representing a complex process of attention which affects underlying processes of physiology and disease. However, from the most concrete medical point of view, placebos are not a process or elaborate concept. They are simply a concrete comparison tool, a necessary evil in randomized clinical trials, an inactive-treatment benchmark for statistical analysis of "active treatment" effect. From this point of view, a high placebo response rate is something to be reduced or eliminated by better clinical trial procedures. It is not evidence that something interesting and fundamental is going on in subjects. Recent studies go much further in exploring fundamental and phenomenal aspects of placebo response. For roughly 25 years half of all antidepressant studies have included a placebo "wash-in", in which all subjects initially get placebo. Placebo responders are eliminated from the trial, non-responders continue in the trial and get active treatment or placebo. The rate of placebo response in these studies is the same as those with no placebo wash-in. This clearly shows that placebo response is an ongoing capacity, not an issue of "responders" and "non-responders". Functional neuroimaging of placebo response shows different brain regions responding to active and placebo treatments. Different treated conditions implicate unique brain areas. There is no evidence of a universal neuroanatomy or neurophysiology of placebo response. Studies of pain response post-op have compared morphine and saline solution injected into an IV line with morphine pushed into the line by computer control and unknown to the subject. The observed injected morphine is best for pain, followed by the observed saline, with the covert computer-injected morphine a distant third. Other studies have found that the level of improvement in various symptoms are correlated to the time and intensity of involvement with study clinicians. The more focus, time, and quality of interaction, the better the response. The formal quality of the relationship "meaning response" or "level of ritual" which captures attention, is an important aspect of response. A German acupuncture study found that both active and placebo acupuncture were more effective for back pain than traditional analgesia. Both groups of acupuncture subjects had more interaction with study staff than treatment-as-usual analgesia subjects. When asked, subjects in placebo controlled studies were thoughtful, hopeful and worried about whether or not they were getting active treatment. They were engaged personally in the process at a level few placebo studies document or consider. One concludes from this evidence that persistent focusing of attention in the context of disease and healing is a necessary and central element of placebo response. Either Stapp's Quantum Zeno Effect or a Lorentz-like chaotic attractor may model the nature of sustained attention in the placebo response. Considering the placebo response as a function of consciousness can enrich our understanding of the hard problem and the nature of consciousness. **C18**

261 **The Effect of Psychiatric Medication on Consciousness: A Survey of 100 Patients Who Have Started, Stopped and Restarted Medication** Ross Grumet <rfg@psychiatryatlanta.com> (Atlanta Psychiatric Specialists, PC, Atlanta, GA)

100 patients treated with psychotropic medications were selected because they had started, stopped, and restarted. This naturalistic ABA design study includes antidepressants, mood stabilizers, stimulants, anxiolytics, antipsychotics. The experience of starting and later restarting produced a clearer subjective picture. Response categories emphasized alterations in consciousness: of time (e.g.,speed, past, future); of emotional intensity (e.g.,caring or not caring); of perceptual vividness; of narrative ability; and miscellaneous categories. Interestingly, the

results were not consistent across drug categories nor across diagnoses. The strongest findings across all situations related to being more aware of opportunities and less aware of threats. Discussion covers implications for selecting drugs, and how the addition of phenomenologic research can add an important dimension to drug research. **P4**

262 **The Human Hologram** Robin Kelly <info@robinkelly.co.nz> (Auckland, New Zealand)

There is now scientific support for the theory that we live as human holograms in a holographic universe. Our 3 and 4 dimensional world may indeed be a virtual reality, a miraculous co-creation of human and universal consciousness. A consciousness that grows with every positive act of compassion we perform in our lives. Robin explains how this awareness affects his every day practice of medicine, and speculates entertainingly and tunefully on how it could impact on our lives, and on the future of our planet. **A1**

4.11 Miscellaneous

5. Experiential Approaches

5.1 Phenomenology

263 **The Discovery of Awareness - A Qualitative Study** John Astin, Cassi Vieten <john@baumanninstitute.org> (The Baumann Institute, San Francisco, CA)

This study explored the first-person accounts of individuals involved in several contemporary awareness teachings regarding the nature and qualities of awareness, the relationship of awareness and its recognition to the alleviation of human suffering, and the impact that the discovery of awareness has across multiple life domains. Methods: Purposive sampling was employed and individuals selected who were either senior students of or teachers within several contemporary awareness traditions (n = 28). In consultation with several contemplatives and teachers, a semi-structured interview protocol was developed. Interviews, which took approximately 90 minutes to complete, were then transcribed and thematic analyses subsequently carried out by two independent reviewers. Results: Despite some diversity across respondents, a number of consistent themes emerged. In general, awareness was defined as that which knows or cognizes phenomena or the conscious space within which phenomenal experience arises and subsides. Several qualities of awareness were noted including vital, wide-open, unobstructed, indivisible, and spontaneously present. The recognition of awareness as the fundamental ground or basis of all perceptions was consistently seen as crucial to the resolution of human suffering for several reasons: a) awareness is undisturbed or unaltered by phenomena; b) by itself, the recognition of awareness in any moment appears to resolve the search for well-being; c) from the vantage of awareness, one recognizes that so-called negative mind states do not require management, control or alteration because they naturally resolve themselves owing to their impermanent nature; and d) the recognition that the context of awareness is ultimately inseparable from its dynamic content leads one to view phenomena conventionally labeled as disturbing, as essentially insubstantial, empty and non-threatening in nature. Along with its role in the resolution of psychological suffering, participants noted several other ways they felt that the realization of awareness had positively impacted their lives. These included: greater intimacy, ease and openness in relationships; diminishment or loss of self-identification and self-focus; an enhanced capacity for skillful and innovative responsiveness to life situations; a movement to be of benefit and service to others; and, insight into the fundamental roots of suffering and a corresponding natural arising of compassion for self and others. Conclusions: Based on these self-reports, the discovery of awareness as the essential basis or ground of all perception and the experience that this context of awareness is ultimately inseparable from its phenomenal content appears to have important implications for our understanding of: 1) suffering, it causes and resolution; 2) the potential for human beings to realize a well-being and contentment that is not dependent upon particular circumstances or

experiences; and, 3) the qualities of equanimity and compassion, and the possibility that these are actually innate or intrinsic to awareness and life rather than being skills one necessarily develops or cultivates. Taken together, these preliminary findings merit additional follow-up by psychologists, neuroscientists, and other researchers interested in better understanding the factors that contribute to optimal human functioning and well-being. **P5**

264 **A Phenomenological Pathway to an Empirically Driven Distinction Between Survival Psi and Somatic Psi by Research Mediums** Julie Beischel, PhD, Adam J. Rock, PhD <beischel@windbridge.org> (The Windbridge Institute, Tucson, AZ)

Over the last two years, the Windbridge Institute (www.windbridge.org) has performed several studies addressing the anomalous experiences of mediums (i.e., individuals who report regular communication with the deceased) and how the examination of those experiences may lead to a better understanding of the nature of consciousness. The participants in these studies were certified research mediums (CRMs): they had been screened and trained over several months using an intensive multi-step procedure and their abilities had been documented under controlled laboratory conditions (Beischel, 2007/2008). These CRMs are able to consistently report accurate and specific information about the deceased loved ones (termed discarnates) of living people (termed sitters) during anomalous information reception (AIR); that is, without any prior knowledge about the discarnates or sitters, in the absence of sensory feedback, and without using deceptive means. However, the historical body of proof-focused mediumship research does not directly address which parapsychological mechanisms are involved in AIR by mediums. The data, in and of themselves, support multiple hypotheses including the (1) super-psi and (2) psychic reservoir models (collectively "somatic psi;" Beischel & Rock, 2009) in which mediums use clairvoyance, precognition, and/or telepathy with the living to acquire information about the deceased and (3) the survival of consciousness hypothesis in which mediums use "survival psi" (Sudduth, 2009) to communicate telepathically with the deceased. Recent Windbridge studies addressed the important phenomenological mediumship processes underlying AIR and how those processes might address the survival hypothesis. In one quantitative study (Rock & Beischel, 2008), we compared CRMs' experiences during readings for discarnates to their experiences during a control condition. The results allowed us to more fully appreciate the phenomenological processes associated with mediumship readings for discarnates. In a subsequent study (Rock, Beischel, & Cott, 2009), we qualitatively investigated CRMs' experiences of purported communication with discarnates as compared to their experiences during psychic readings for the living in which somatic psi was ostensibly used. A thematic analysis using various principles of phenomenological methodology to compare the essential aspects of the two experiences suggested that CRMs have the ability to differentiate between ostensible discarnate communication and their use of somatic psi during psychic readings. These process-focused investigations of mediums' experiences may lead to a better understanding of the source of the information mediums report during AIR and in turn address the question at the root of mediumship research: Does consciousness survive bodily death? **C21**

265 **Peacebuilders Describe the Dynamic Interplay between Consciousness and Best Practice Towards Social Transformation** Al Fuertes <afuertes@gmu.edu> (New Century College, George Ma, Center For Consciousness and Transformation, Fairfax, VA)

How does one's consciousness of phenomenological realities shape one's commitment in bringing about personal and social transformation in terms of peace building vis-a-vis community healing? My presentation, which is based on my recent field study, highlights the dynamic interplay between (human) consciousness and best practice from the perspective of peace builders from conflict affected areas in Southeast Asia. My presentation further emphasizes what peace builders describe as turning points or inner shifts, embedded in their personal narratives, which are crucial in their commitment to peace building. **P11**

266 **Self-Consciousness and Kinaesthetic Perceptual Ambiguity: A Phenomenological Analysis of the Alien-Hand Experiment** William Gomes, Thiago Gomes DeCastro <wbgomes@gmail.com> (Psychology, Federal University of Rio Grande Do Sul, Porto Alegre, RS Brazil)

The alien-hand experiment was originally developed to study an individual's conscious experience of intention and volition directed to motor behavior. The experiment establishes a condition of visual deception, in which the participant is led to believe that he envisions his hand tracking the length of a line while, in fact, he sees the researcher?s hand. Varieties of the alien-hand apparatus have been used: 1) to study the sense of agency as an ability to make attributions about the relation between motor behavior and its direct causation; 2) to assess the spatial orientation of proprioceptive perception; and 3) to explore processes such as self-recognition and body awareness. The use of the phenomenological method to analyze aspects of the experience originated by the experiment is not a novelty. However, the implication such an analysis brings to the inquiry of consciousness has not yet been addressed. For phenomenologists as Husserl and Merleau-Ponty, the relation between kinaesthetic perception and self-consciousness occurs first by a pre-reflexive movement that gradually turns into self-reflection. So, there is a polarity between two facets of consciousness: the basic structure of conscious experience (pre-reflexivity) and the attentional process (self-reflection). This study aimed at accessing the speech indicators of pre-reflexivity and self-reflection in the answers to the alien-hand apparatus and classifying the different categories of speech by association with profiles of public self-consciousness, private self-consciousness and social anxiety. Nineteen college students without organic or psychiatric dysfunction responded to three instruments: 1) A scale measuring public self-consciousness, private self-consciousness and social anxiety; 2) The Alien-Hand Experiment (purposely-induced distortion in perceptual motor task, repeated four times); and 3) a phenomenological interview focusing on subjects' perceptions about their performance on the experimental task. The interviews after each trial appear as a natural phenomenological progressive reflection: from description, to reduction, and leading to interpretation. This is to say that in the dialogue with the experimenter, subjects' speech moved from feelings of strangeness, confusion and non understanding (conscious experience); to speculations (mediation), arriving at a right-or-wrong explanation of what really occurred (experience of consciousness). The reversal between conscious experience (pre-reflexivity) and consciousness of experience (self-reflection) were gradually revealed into the task repetition: 1) description of estrangement, 2) imaginary variations on the causes of distortion (arguments), and 3) decision making between positing distortion on experiment variables or into personnel difficulty to perform the task. The analysis identified two patterns of response: 1) recognition of the distortion and attribution to the experimental apparatus, and 2) ambivalent recognition of distortion and attribution to the subject him/herself. Interestingly, the second response pattern was associated with high levels of private self-consciousness, indicating statistic significance differences ($p<0,05$) when compared to the first response pattern. The Alien-Hand experiment disclosed the inner movement of reflection in the very moment it was occurring as indicated by Husserl's triadic phenomenology: original intuition, exploration and expressed meaning. Funding: CAPES/CNPq. **C10**

267 **Uniqueness of Episodic Experience** Ivan M. Havel <havel@cts.cuni.cz> (Center For Theoretical Study, Charles University, 110 00 Prague 1, Czech Republic)

A question is explored whether human person possess something that may be called "a sense of uniqueness" (uniqueness in numerical sense). Uniqueness may be primarily related to individual experience of an episodic situation in an actual context. Only from such an experience one could derive an objective (or intersubjective) notion of uniqueness of concrete things and events. The sense of uniqueness is connected to the sense of spatiotemporal presence, sense of Self, and sense of sameness of episodes really lived through and their recollections. A question is posed of the nature of such connections. **P5**

268 **Phenomenology of decision making** Urban Kordes <urban.kordes@guest.arnes.si> (Faculty Of Education, University of Ljubljana, Ljubljana, Slovenia)

Despite growing interest in volition and related research, little attention is given to phenomenology of the phenomenon. In order to start tackling this shortfall, a pilot phenomenological inquiry of decision making was conducted between 2007 and 2009 at the University of Ljubljana. The preliminary results are presented, along with corresponding methodological and philosophical considerations. The study shows that most of the first-person reports of the phenomena in question are mentioning an 'impulse' or energetization that occurs in the moment of decision. It seems that something beyond emotions is in play here (which might indicate a need to stray from the modern view of decision making as an interplay of reason and emotion). The experience of this, so called, 'impulse' is studied in connection to different experiential decision making scenarios. Another rather interesting observation is presented: the correlation between different modalities of decision making experience and the outcome of the decision making process. It seems that the knowledge of whether the decision is to be actually executed or not is present in a sort of pre-reflexive form already at the moment of decision. The most common methodological approaches of phenomenological research are discussed in relation to their potential for study of decision making, together with some theoretical reflexions encouraged by the aforementioned results. **C10**

269 **(We-)Space is the Place: Extended Cognition and Social Interaction** Joel Krueger <joelk@hum.ku.dk> (Philosophy, University of Copenhagen, Copenhagen, Denmark)

The extended mind thesis (EM) famously asserts that some of the physical mechanisms of cognition extend beyond the head. Some aspects of human cognition may at times depend directly and noninstrumentally upon feedback, feed-forward, and feed-bound loops distributed across brain-body-world scaffolding (Clark 2008). According to EM, then, cognition isn't merely embodied; nor is it merely embedded. More strongly, some aspects of cognition are constituted by environmental (i.e. non-neural) scaffolding. EM is thus an ontic thesis about what extended mental processes are made of. Might social cognition be a kind of extended cognition? Might some of the mental processes central to social interaction, and the physical mechanisms that scaffold them, be constituted by non-neural structures and therefore extend beyond the head? Despite intense current interest in both EM and social cognition, their relation has yet to receive sustained consideration. This paper looks to correct this neglect. In it, I explore some consequences of EM for understanding the interactive basis of social cognition. The main thesis of this paper is that social cognition is, at least in part, a form of skillful space management – the negotiation and management of "we-space" – and that some of the non-neural actions involved in the negotiation and management of we-space (e.g. gesture, facial expression, etc.) do genuine cognitive work. Social interaction, understood as the negotiation and management of we-space, is therefore a kind of extended cognition driven by non-neural bodily and environmental scaffolding. First, I discuss the notions of a "cognitive niche" and "cognitive scaffolding" and survey some of the ways that we manage cognitive space by structuring our cognitive niches with various forms of cognitive scaffolding (Kirsh 1995). I then situate these notions in the context of social cognition. I argue that the interactive process of managing and negotiating the spatial configuration of our social encounters – "we-space", or the shared, body-centric action space structured by bodily expressiveness – is material scaffolding externalizing some of the process essential for social cognition. This argument is developed by looking at two forms of social-cognitive scaffolding: (1) the material scaffolding of the expressive body; (2) the material scaffolding provided by the local structure of we-space itself. In support of (1), I draw upon research into the cognitive benefits of gesture (e.g. Goldin-Meadow 2003; McNeill 2005). I also discuss empirical work in developmental psychology (e.g., neonate imitation research (Meltzoff and Moore 1977), Moebius Syndrome (Cole 2009), and James Laird's work on the reciprocity between behavioral expression and the phenomenology of emotion (Laird 2007). In support of (2), I draw upon other work in developmental psychology (e.g. still-face paradigm (Tronick et al 1978; Murray and Trevarthen 1985), "communicative musicality" (Murray and Trevarthen 1999)), studies on the "chameleon effect" and emotional coordination (Chartrand and Bargh 1999), and argue that the

bodily-expressive coordination at the heart of dyadic encounters is a co-regulated feedback cycle serving as the material scaffolding for critical social-cognitive processes. **P5**

270 **Enacting Time-Consciousness to Account for the Indistinctness and Ambiguity of Details Experienced in the Periphery of the Visual Field** Christopher Lay <clay@uci.edu> (Philosophy, UC, Irvine, Irvine, CA)

The enactive, sensori-motor approach to consciousness, as presented by Alva Noe, offers a novel account of how the world's details are experienced in the periphery as opposed to the center of the visual field; the details experienced in the periphery are virtually present to subjects thanks to the movements and activities that can be enacted to bring them into the center, where details are experienced as actually present. While this approach accounts for the experience of the details in the periphery as accessible, it fails to account for the way those details are experienced as both less clear and less distinct than the details in the center of the visual field. To account for these differences the retentions and protentions of time-consciousness must be employed, as I argue. Only then can we properly account for the experience of details in the periphery of the visual field. **P11**

5.2 Meditation, contemplation & mysticism

271 **Can Meditation Non-Pathologically Dismantle the 'Core Self'?** Miri Albahari <albahari@cyllene.uwa.edu.au> (Philosophy, University of Western Australia, Crawley, WA Australia)

In my book Analytical Buddhism, I proposed a theory on how the illusion of self is put together; in this paper, I offer a hypothesis on how Buddhist meditation could (non-pathologically) take the illusion of self apart. I contend that the impression of an everyday self arises from our attention being a 'slave to the passions', or more precisely, from a bundle of emotion-driven thought unwittingly directing attention to serve the perpetual interests of 'the self'. As Damasio and others have argued, there is no actual separate self whose interests are served - the impression of such a self is a clever neurobiological adaptation that comes about, at least in part, from the organism's need to protect its homeostatic boundaries. Now Buddhists claim that it is possible for advanced meditation practitioners to non-pathologically dismantle the illusion of a separate self - or what Damasio would call the 'core self' (with its feelings of ownership and agency). The challenge any such Buddhist must face is how this dismantlement could be psychologically possible, given the apparently essential advantages conferred by the illusion of self, together with empirical evidence of what happens when the core self breaks down. In this paper, I outline how the practice of meditation might dismantle the core self in a way that averts the sort of pathology referred to by Damasio in his book The Feeling of What Happens. The key to its success, I contend, would lie in the precise quality and direction of attention that is cultivated. **C15**

272 **Optimal Efficiency in Every Walk of Life through Pranahuti Aided Meditation** Murty B.S. <murty.iitm@gmail.com> (Depart. of Metallurgical An, Indian Institute of Technology Madras, Chennai, India)

This paper examines the phenomenon of how the practice Pranahuti Aided Meditation (PAM) has enabled a large number of people achieve optimal efficiency in life. Efficiency at office, home and in every walk of life is a state every human being would long for. However, while striving to be efficient, majority would compare themselves with people around them. This comparison brings in competition, which not only is associated with stress but also leads to lack of harmony in life within oneself and with people around affecting adversely the peace, happiness and balancedness of individuals in particular, and society at large. Every living being in this universe is bestowed with unique qualities and capabilities. It is not appropriate to compare a jasmine with a rose, a horse with an elephant and similarly a person with another. Each one of us should realize our potential and work according to our potential and strive for excellence. The lack of efficiency is also due to the fact that people, in general, associate themselves with their physical body, which has its limitations. A spiritual person recognizes

that he is divine and understands the limitations of the body and works at optimal efficiency. A spiritual person also carries out every job assigned to him as an offering to the divine, without any expectations. When one is offering something to divine, he/she would like to offer the best and thus, he/she does every small or big job with their heart in it, which automatically leads to high efficiency. A spiritual person also does every job with the confidence that the divine is with him all the time and draws immense energy from this confidence, which significantly improves his efficiency. We found that the above qualities have been successfully achieved and demonstrated by a large number of people practicing PAM. Regular practice of PAM helps in imperiencing[1] the divinity within himself/herself by everyone. The uniqueness of the system of PAM is that a person interested in realizing his potential and the divinity in him/her is supported through Pranahuti, which helps to peel of the layers of impressions [2] that restrict one to realize the divinity within him/her. Thus, Pranahuti helps one to achieve optimal efficiency in all walks of her/her life. Pranahuti also transforms a person from lower level of consciousness, which is driven by desires and instincts, to divine consciousness, which is characterized by love, compassion, cooperation, service and sacrifice. [1] The word 'imperience' means inner intimate experience without any sensory input (i.e. sight, hearing, taste, smell, touch).It is an in-tuition rather than intellection or discursive and dichotomic dialectic. [2] Impression according to Sri Ramchandra, the founder of the system of Natural Path are of three categories:1)nascent impressions we form in our day-to-day activities, caused by a lack of control over the senses (e.g.laziness, sloth,and other impulsive tendencies to sensory pleasure); 2) unreal projections of desires for enjoyment, such as greed, avarice, jealousy etc; 3) Avaranas, past deeply rooted impressions that lead to the formation of habits. **P11**

273 **Experiences of Non-Ordinary States of Consciousness in Pranahuti Aided Meditation and Psycho-Spiritual-Behavioral Transformation: A Phenomenological Study** Sastry Bhamidipati, Wendy Wandan Zeng <sastry.bhamidipati@gmail.com> (Imperience,Centre for Research and Training in PAM, Fremont, CA)

Pranahuti Aided Meditation, or PAM, is a system of practice that aims to help people evolve to their greatest potential and be with their inner higher spirit all through in an expedient way living a normal day-to-day life. The end result of the practice is a person's total transformation, or divinization, on the mental, psychological, behavioral and spiritual planes. This paper is a phenomenological (qualitative) study exploring the Pranahuti Aided Meditation experiences and transformations experienced by individuals who practiced PAM for one to six years. Pranahuti is the essential technique employed to bring about this transformation. It is a technique for the transmission of pure thought or Primal Consciousness for the purpose spiritual uplift and transformation. The method involves the exercise of will power by an adept to infuse spiritual conditions akin to psychic energy into the participant to effect the transformation of human nature in the individual. We interviewed ten participants of PAM about their experiences. Each one has narrated profound experiences of non-ordinary (altered) states of consciousness during meditation sessions in which Pranahuti was imparted. Though each person experiences things in their own way, all participants described qualities such as deep peace, lightness, happiness, energy flow or vibration, love, freedom and more. When the participants discussed their transformations, they revealed a picture of profound transformation, having gained wholeness, purpose and meaningfulness in life, clarity of thought, expansion of perspectives, inner freedom and more. Further, they found attributes such as love and care, service and cooperation with fellow beings in all spheres of life continued to grow. The study also explored the link between certain non-ordinary states in meditation and their impact on the transformation process, how the first brought about the changes in the second. **C14**

274 **The Lived Experience of Internal and External Unity** Judith Blackstone <blackstonejudith@aol.com> (Woodstock, NY)

Recent neuroscience research indicates that internal and external experience (or self and other) is mediated by the default and task-positive networks respectively. This presentation looks at the lived experience of the balance of internal and external experience, or self and

other, through the realization of nondual awareness. Nondual realization is described as the realization of one's own nature as subtle, unbounded awareness, pervading one's own body and one's environment as a unified whole. I will show how the radical openness of nondual realization is based on deep contact with the internal space of one's own body. We therefore experience ourselves as coherent, authentic individuals at the same time as we experience the unity of our internal and external experience. When two people attune to nondual awareness together, they experience a single expanse of awareness pervading them both as a unity. This is not merging and loss of identity, but rather a concurrence of self-experience and self-transcendence. **P11**

275 **Cultivating Mindfulness Through Contemplative Creativity** Estelle Campenni, Elizabeth Yale <campenni@marywood.edu> (Psychology, Marywood University, Scranton, PA)

It is hypothesized by many that a mindful state is characterized by an increase in awareness of one's internal and external environment, enhanced attention to detail and regulation of one's emotional states. Much of the research supporting these hypotheses makes use of an eight week mediation programs targeting clinical populations (e.g., depression or cancer patients). The obvious limitation to the external validity of this research is the motivation of the target population. In a theoretical investigation of the mechanisms that facilitate mindfulness, Shauna Shapiro and colleagues (2006) incorporate intention as an additional axiom necessary for mindfulness to occur - What is the motivation driving the pursuit of mindfulness? Thus, an argument can be made that the discipline necessary to pursue an abstract contemplative practice such as meditation requires a great deal of commitment which a population motivated by disease reduction possesses. The main thesis of the present research is exploration of alternative techniques with which to cultivate mindfulness in a general population. Langer (2000) argues that a primary characteristics of mindfulness is openness to novelty and has found enhanced attention (a key component of mindfulness) when individuals are instructed to engage a novel perspective (perceptually or cognitively). In their review of research exploring the relationship between attention and creativity, Zhengkui and colleagues (2007) define creativity as novelty seeking. Taken together, it was hypothesized that participants who engage in novel creative tasks will experience enhanced attention characteristic of a mindful state of consciousness. In considering alternative methods by which individuals could cultivate the focused attention attributed to mindfulness, work by Kao and colleagues provide support for the use of creative motor tasks to cultivate mindfulness. Kao (2006) has examined the psychological and physiological effects of practicing Chinese calligraphic handwriting indicating that practicing Chinese calligraphy elicits beneficial attentional changes for individuals diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) (Kao, Hu, & Cheung, 2006) as well as normal adults (Kao, Qingmei, Songquin, & Juan, 2006). Kao and his colleagues theorized that psychological and physiological changes associated with Chinese calligraphy result from integration of mind and body (Kao, Gao, Danim, & Xufeng, 2004). Heightened attention is needed to focus on both the details of the character and motor movements executed to reproduce the character. Kao (2006) suggests that the benefits of calligraphy can be observed with repeated practice of handwriting in any language. Similar findings were obtained using mandala coloring (Curry and Kasser, 2005). I believe that the complex nature of creativity and mindfulness requires use of qualitative methodology to explore the scope of these broad concepts. Participants met as a group and given a brief presentation describing the concept of mindfulness. Instructions and materials were provided and participants were asked to practice a creative task for 20 minutes daily for one week. Participants met as a group at the end of each week to discuss their subjective experiences of attention, emotion and pleasure. Results will be presented for contemplative handwriting, English calligraphy, mandala coloring and a taped guided mediation which served as a control group. **P5**

276 **The Consciousness Conglomerate: Eastern Insights and Scientific Revalidation** Vibhas Chandra, N.A. <vibhaschandra@hotmail.com> (Philosophy, M.G.C.G. University, Chitrakoot, M.P., INDIA, Allahabad, Chitrakoot, M.P., Uttar Pradesh India)

Major breakthroughs in the scientific study of consciousness would elude us if we continue to explore it in terms of physical attributes. Wald (1988) has rightly concluded that consciousness does not emit any physical signal and that mind cannot be assimilated in science. The Vedic seers had unanimously proclaimed consciousness as a fundamental entity,non-associative,inactive and indescribable, yet informed with the power of will, a creator and destroyer of all knowledge,etc. The whole array of consciousness incorporates the ego,deemed as material substance and evolved from the buddhi(Samkhya),thus ontologically dependent upon it.We have to grapple with the paradox of ego which turns empirical consciousness into the subject of knowledge, at the same time making it the owner of its own knowledge. To undertake a scientific study of consciousness, it is profitable to scour the rich,Vedic metaphysical accounts of consciousness and its related subsidiaries and critically expound them in a new idiom, credible and convincing to us. The concept of Prana or life force, till recently, had not entered the thinking of Western thinkers. This Pranic force, readily convertible into psychic energy, is crucial for the operation of empirical consciousness. This is the bio- plasma of the Russian scientists, who observed an energy body, a living double of man,when they hooked the Kirlian equipment to an electron microscope.The sages had long declared that Prana is witnessed by the jiva (empirical self) which is floating in Prana. This may provide clues to the location of the seat of consciousness and its related functions and progressions. Consciousness is observed as fluctuating between at least five states or versions – real perception, illusion, imagination, sleep and memory. Correspondingly, there are five types of human afflictions which form part of the infrastructure that shapes the human mind. What are the interlinks between the two? Why does consciousness fluctuate at all? Locke in his Essay, Bk.II, showed that consciousness always accompanies thinking and that reflexive consciousness is a salient feature of the self. Bhartrihari had also shown that consciousness can exert only after it is preceded by Speech. The metaphysical speech-essence, eternal Sound or Shabda-Brahma operates at four different stages-para, pashyanti, madhyama and vaikhari. These four levels of Sound correspond to four states of consciousness-para(transcendental,pashyanti(intellectual,madhyama(mental) and vaikhari(physical. These states correspond to the four states viz. wakeful, dreaming, dreamless and the transcendental. Lev Vygotsky, exploring the genetic roots of thought and speech, struggles to establish that ontogenetically,the relation between thought and speech development is much more intricate and obscure as we have also to deal with the phenomenon of inner speech.Modern psychology is clueless as to how the change from overt to inner speech is accomplished or by what process it happens.I suggest that a Linguistic self informs us which is also a shelter of meaning.The inflexion point, from the physical to the mental is found here. **P5**

277 **Shaktipat-Related Synchronization Between Brains?: Statistical Analysis of Simultaneous High Density EEG Recordings of Shaktipat Sender and Receiver Subjects** Arnaud Delorme, Rael Cahn <arno@cerco.ups-tlse.fr> (CERCO, UPS-CNRS, CERCO, UPS-CNRS, Toulouse Cedex 9, France)

Studies of synchronization of EEG between subjects are rare but have begun to emerge as means to study social interaction. Here we studied the correlation of spontaneous EEG data between the brains of spatially separated human subjects during states of intentional energetic transfer (Shaktipat) vs. rest states. Three subjects participated in the experiment; one spiritual teacher (S1) was a “sender” and was alternately intending vs. not-intending a Shaktipat/engergetic transfer first in concert with the receiver subject R1 and then with the receiver R2. S1 described the process of sending Shaktipat as a “channelling”-like phenomenon whereby he enters into a meditative/”no thought” state and Shaktipat begins to flow. Both R1 and R2 were students of teacher S1 and were not informed as to when S1 was directing Shaktipat towards them or any aspects of the block-designed experimental paradigm. Two distinct 128-channel Biosemi EEG recording systems were used, one for the sender and one for the receivers. The

free Datariver software (www.sccn.ucsd.edu/wiki/datariver/) was used, allowing for precise (1-msec) co-registration of EEG signals. The S1 and R1/R2 subjects sat in separate rooms with eyes closed and ~30 meters distant from each other in a meditation center with doors closed between locations. Two conditions alternated: A condition of active Shaktipat wherein S1 intended for the energetic transfer to take place between himself and R1/R2 vs. a condition of rest. We recorded simultaneous EEG for 5 consecutive sessions of 5 minutes each. During 2-3 of the 5 sessions, S1 was instructed to intend Shaktipat - he was free, however to choose which of the 5 sessions he would do so. The receiving subjects (R1/R2) were asked to stay in a meditative/receptive state throughout the recordings and given no further information as to experimental design. The Matlab-based EEGLAB software (www.sccn.ucsd.edu/eeglab) was used to analyze the EEG signals in and between the S1 and R1/R2 subjects, focusing on the brain activity in/between each subject pair during Shaktipat vs. rest conditions. For correlation analysis, we computed correlation! s between 3 midline scalp channels from S1 and all scalp channels from R1 and R2. We fist extracted clean 0.25 second data epochs for each condition. We then computed pairs of average correlation maps for the selected channels using all correlation values from Shaktipat vs. rest conditions, separately for each electrode site with false detection rate (FDR) correction for multiple comparisons. During the S1/R1 recordings, R1 entered an intense trance-like state in association with one of the Shaktipat periods but no significance correlations between subject brain activity were observed between conditions. For the S1/R2 recording, we observed a significantly higher pairing during Shaktipat vs. rest between Cz (vertex electrode) of S1 with a group of central vertex electrodes of R2. This result was obtained by pooling all the clean data from Shaktipat vs.rest states for the S1/R2 recording sessions. Significance was p=0.001 after correction for multiple comparisons. These promising results will be discussed in relation to previous work with similar paradigms with additional control analyses presented. **C21**

278 **Neuroimaging of Meditation: Imaging Meditation and fMRI Analysis of Transcendental Meditation** David Hubbard, Alarik Arenander, PhD, Brain Research Institute, Fairfield, IA <davidhubbardmd@appliedfmri.org> (Applied FMRI Institute, San Diego, CA)

Background: Four decades of meditation research have examined EEG parameters as well as peripheral physiological measures including heart rate, respiration and electrodermal activity. Initial studies of direct imaging of meditative brainstates have been reported. The reported ability of meditation to provide access to ?deeper, more expanded? states of cognitive function is of particular interest in light of the default mode network underlying spontaneous, non-directed mentation. Moreover, the significance of intrinsic brain functioning may find a unified, fundamental basis in a ?ground state? of cognitive function reported during transcendental experiences. The first part of this workshop will review the current status of published neuroimaging findings across various meditative techniques in the context of intrinsic brain function. Recent studies of fMRI and of EEG During Medtation: There have been a few fMRI studies of cognitive responses to tasks after meditation training, but no fMRI studies during meditation. The second part of this workshop will review the EEG studies and the first imaging studies of Transcendental Meditation. EEG Review of Transcending: Many EEG studies of Transcendental meditation have shown a predominance of alpha power and a frontal-central alpha coherence and significant reduction in beta and the relative extinction of gamma power. fMRI Study of Transcending: In Study 1, subjects were asked to rest with their eyes closed for 1 minute then meditate for 20 minutes, then rest with eyes closed for 1.5 minutes. fMRI brain images were collected continuously. The average of 5 epochs of 30 seconds each (2.5 minutes) of meditation at 13 minutes were contrasted with (subtracted from) the average of 5 epochs of 30seconds each (2.5 minutes) of eyes-closed rest before and after meditation (TR 2000, TE 30, 33 slices). In Study 2, subjects were instructed to cycle between three states – resting with eyes closed, daydreaming, and meditation every 30-46 seconds for a total of 5 cycles (BOLD EPI collected at TR 2000 TE 30, 33 slices). The brain images show meditation contrasted with daydreaming. fMRI Findings: We studied 19 practitioners of TM, aged 18 to 62, with 3 months to 30 years experience in daily practice. fMRI images ranged from wide-

spread activation to very localized areas of activation and deactivation. Brain patterns fell into three groups: 1) widespread activation in executive and sensory areas and activation in rostrolateral prefrontal cortex (RLPFC) associated with attention, 2) deactivation in executive and sensory areas with sustained activation in RLPFC, 3) deactivation in RLPFC and activation in unilateral insula. Discussion and Future Directions: We will conclude the workshop with a discussion of how these findings and possible future experimental designs can help clarify key issues regarding unique brainstates during meditation and how an expanded understanding of these meditative states across traditions can help to define the significance of the default state, and the nature and role of intrinsic brain activity. **C12**

279 **A Randomized Study of a Brief Novel Zen Dialogue Method For Rapid Induction of "Kensho Experience" with Enhancement of Mindfulness and Well Being Parameters** Michael Johnson, <michael.johnson@hsc.utah.edu> (MEG Lab-Psychology, University of Utah, Centerville, UTAH)

A novel Zen meditation based dialogue technique was determined to produce a "kensho" experience with enhancment of well being and mindfulness meditation parameters after 1 day of interaction with an experienced Zen Master (Roshi). The results justify further investigation of the technique as a rapid spiritual intervention tool particularly for clients facing end of life issues. **C18**

280 **Self and Transformation - Game of Life** Narayana K.C., N.V. Raghava Rao; I. Chalapathi Rao <bvsks@sriramchandra.org> (Inst'te of Sri Ramchandra Consciousness,Imperience, Secunderabad - 500 026, Chennai India)

The root of everything is consciousness. This is an accepted fact by spiritualists, philosophers, scientists and everybody else. Humans have the capacity to think and this thought process gives us the distinct advantage of transforming ourselves from one plane of consciousness to higher planes of consciousness. Each plane of consciousness is characterized by a set of predominant thoughts or a defined thought pattern. For instance a person who is always selfishly thinking about himself and his needs is living in one plane of consciousness and a person who can think of good of others, trying to share and sacrifice for the sake of others while taking care of his needs appropriately is in a higher plane of consciousness and yet another person who is always selflessly thinking about the good of humanity at large and least interested in his individual needs is living in a still higher plane of consciousness. Human life is the spectrum of extreme selfishness to total selflessness. The spectrum of consciousness can be classified into individual/shell consciousness and universal consciousness. We start from the shell consciousness which can further be classified into 5 planes corresponding to the 5 elements of nature. After crossing this, we move into the cosmic, then the para cosmic further into the central region and the journey to infinity goes on. Each of us operates somewhere in between. The human endeavour is to move from our present plane of consciousness to higher planes of consciousness till we reach the highest. This spiritual journey is depicted through a game of 'snakes and ladders' and we have called it the game of life. Every good thought and deed is acknowledged and appreciated and blessed. They are the ladders. The snakes are the pitfalls that we should avoid in life. These are the negative qualities of pride, egoism, vanity etc which pull us down. The positive qualities of sharing and caring, service and sacrifice, humility, insignificance, altruism etc propel us upwards through ladders. This Game has 13 rows with 11 cells in each row. We move from the bottom left to the top right cell. The first 2 lower rows depict the various shades of the Shell consciousness of element Earth, the next 2 rows are of Water, the next 2 of Fire, the next 2 of Air and the next 2 of Ether. This completes 10 rows of the game and we have traversed the Shell consciousness. The 11th row is about the cosmic consciousness, the 12th row is about the para cosmic consciousness and the last is about the Central region. This is a pioneering attempt in the spiritual field to depict the various states of consciousness with different shades (or refinements) of the qualities/ attributes written in simple language with emphasis on clarity rather than spiritual and philosophical jargon. This is a game that can be played by a kid, an old person or a spiritual seeker of any age. This game encapsulates the Spiritual knowledge for all age groups. **P11**

281 **Taming the Disturbed Mind - A Revolutionary New Method** Madhava Kotagiri <madhava@sriramchandra.org> (Imperience-Centre for Research and Training in PAM, Secunderabad - 500 026, CHENNAI 600 036 INDIA India)

Finding happiness and peace of mind has been an eternal quest of man. Disturbed mind of man does not give him respite and he is in a perpetual state of dissatisfaction. Efforts of religions, spiritual people, psychologists have made very little dent in trying to tame the disturbed tendencies of man. In this paper a revolutionary discovery of Sri Ramchandra is presented which is a simple, easy to practice method which regulates the mind and makes it free from disturbing tendencies. Author presents case studies published in the years 1999 and 2008 where aspirants who have practiced the above special meditative methods have found their minds calm and were able to dwell in higher states of consciousness. **C18**

282 **QEEG, Mood and Personality Profiles of Novice and Experienced Meditators in Conditions of Meditation Only, Meditation with Facilitative Binaural Beats and Meditation with Hindering Binaural Beats** Christina Lavallee, M.A. Persinger <cx_lavallee@laurentian.ca> (Psychology, Laurentian University, Sudbury, ON Canada)

When two tones of differing frequency are presented to each auditory channel, a single tone (the binaural beat) is perceived. The binaural beat has been demonstrated to alter consciousness through a process called entrainment, which can have both frequency dependent facilitative and hindering effects on meditation. Little research has been conducted with respect to the quantification of the impact of binaural beats on the meditative process; therefore, the purpose of the study was to determine quantitative electroencephalographic (QEEG) profiles of novice and experienced meditators and the effect of both facilitative (7 Hz) and hindering (15 Hz) binaural beats on these profiles. The results of the study indicate significant regional (lobe and hemisphere) interactions occurring in both the delta (0.5-3Hz) and theta (4-8Hz) clinical bands between experimental condition and subject's meditation experience. Individual 1 Hz frequency analysis within the theta clinical band yielded a significant interaction in the 5-5.9 Hz range, a range which has been previously hypothesized to mediate consciousness (Persinger, 1990). In conjunction, the Profile of Mood States (POMS) and Personal Philosophies Inventory (PPI) were utilized to assess acute and chronic behavioural relationships with QEEG profiles of the different meditative conditions. Significant results revealed a change of total mood disturbance between experimental conditions as well as QEEG correlations validating the innate temporal lobe lability measure of the Personal Philosophy Inventory. The results of this study indicate that the novice meditators were affected by the hindering binaural beats more than the experienced meditators; however, the experienced meditators showed greater responsiveness to the facilitative binaural beats, where an increase in left temporal lobe delta was observed, perhaps indicating a possible tendency for the propensity of a peak experience (Persinger, 1984). **C7**

283 **The Logical Structure of Certain Mystical Experiences** Peter Lloyd <peter.b.lloyd@fencroft.com> (Fencroft Ltd, London, ENGLAND United Kingdom)

It is a popular claim that mystical experiences are incommunicable – whether they be achieved by prolonged practice of meditation, or through the use of psychedelic substances or other techniques for inducing altered states of consciousness. The claim is uncontentious in regard to the qualitative aspect of these experiences. The qualia of a mystical experience are incommunicable in the same way that any mundane experience is is incommunicable, for example, the subjective sensation of the colour of an apple. Most mystical traditions, however, and many psychedelic trips, also point to a certain structural element. This is often put in such uselessly vague terms as "everything is one" or "we are all interconnected" or "consciousness is the ground of all being". If these mystical experiences are veridical – that is, if they open the doors of perception onto an aspect of reality – then surely we can do better than these glib slogans? Surely it must be possible to define a framework of concepts that is commensurate with articulating the structural content of mystical experience? There have been some very limited attempts to do this by reducing the realm of consciousness to physics. Before the mystics had ever heard of quantum mechanics, some of them used to say that, as we are all immersed in

universe-wide fields of gravity, magnetism, and suchlike, our bodies are all interconnected and that is the physical validation of the mystical feeling of oneness. In the modern era, things have not advanced much beyond such philosophical non-sequiturs. Nowadays, quantum entanglement is supposed to be the precise physical articulation of the vague mystical apperception of cosmic unity. All such approaches, however, are doomed to failure for the same reason that physical reductionism fails: consciousness actually has an irreducible ontological status, which no physics – be it classical or quantum mechanical – can ever capture. If the structural elements of mystical experience are to be articulated precisely then it must be in terms of consciousness itself and not in terms of a third-person physical model. The proposal here is to use the languaging and conceptual framework of informatics to give expression to this objective side of mysticism. This builds on an earlier paper on the logical structure of consciousness under mental monism (Lloyd, 2009) and a ratiocinative defence of mental monism (Lloyd, 2005). References: Lloyd, Peter B. (2009), "Logical structure of consciousness under mental monism", paper read at the Science and Nonduality Conference, 21st-25th October 2009, San Francisco. Lloyd, Peter B. (2005), "Mental monism considered as a solution to the mind-body problem", pp101-144 in: Mind and its Place in the World: Non-Reductionist Approaches to the Ontology of Consciousness, edited by Alexander Batthyany and Avshalom Elitzur, published by Ontos Verlag, Frankfurt, December 2005. **P11**

284 **Meditation Based on Yogic Transmission for the New Millennium: First Experiences of Pranahuti (Yogic/thought Transmission)** Raghava Rao N.V., Sri K.C.Narayana; Dr Kesava Mannur; <nvraghavarao@sriramchandra.org> (Imperience-Centre for Research and Training in PAM, Secunderabad - 500 026, Andhra Pradesh India)

Our research in the past decade explored the phenomenon of Pranahuti (i.e. yogic/thought transmission) and has shown with substantial evidence that it has a direct effect on the participants of Pranahuti Aided Meditation (PAM). Pranahuti, the offering or transmission of pure thought or Primal Consciousness for the purpose of the spiritual uplift and self-transformation of an individual, is an astonishing yogic method re-discovered in the nineteenth century by Sri Ramchandra Maharaj of Fategarh, Uttar Pradesh, India, though until recently it has been little-known to the world. This yogic/thought transmission can be imparted by an adept in PAM during a meditation session, with no intervention by means of either touch or sound in the process. It is akin to imparting pure thought to the participants through the will power of an adept with a specific noble intention of spiritual uplift. We present a comprehensive study of over 400 new participants conducted between 2002 and 2007. They represent random sampling of people, including individuals with and without previous meditation or contemplative practice. The 1,116 data samples of guided meditation written reports collected immediately after the meditation sessions revealed that Pranahuti had a direct effect on the participants. We found that the transmission of pure thought resulted in these five categories of experiences or conditions felt by the participants: 1. happiness, 2. balanced condition, 3. freedom, 4. life activity or impulse, 5. aspiration. In the presentation, we will present the salient findings from this study. We hope to introduce this new method of consciousness transformation based on yogic transmission as an effective and scientific means for contacting our inner beings and eventually becoming one with the Universal Consciousness and transforming the human nature. **P11**

285 **Tibetan Buddhist Perspective on Consciousness, Enlightenment and Reincarnation** Za Choeje Rinpoche <zarinpoche@gmail.com> (Emaho Foundation, Scottsdale, AZ)

A Tibetan Buddhist Lama shares how thousands of years of spiritual and philosophical tradition can give fresh insight on the nature of consciousness, causality, and ideas about Self. Experience firsthand how exploring new ideas can transform your world. The co-author of "The Backdoor to Enlightenment", Za Choeje Rinpoche is a Tibetan Lama who was recognized as a reincarnated spiritual Master when he was an adolescent. He left behind his life in a refugee camp to live and study in a traditional Tibetan monastery as a student of His Holiness the Dalai Lama. The next generation of spiritual teachers, Za Rinpoche incorporates ancient wisdom with a sharp understanding of the problems of our modern world." Rinpoche is a

spiritual leader of the Tehor region in Tibet. He represented his region in the presentation of the long life prayer to His Holiness the 14th Dalai Lama in 2005. **PL7**

286 **Anxious Consciousness: Anxiousness the Mystical Portuguese Writings of Joanna de Jesus (1620-1680)** Joana Serrado <tratadodebotanica@gmail.com> (HDS, Harvard Divinity School/ University of Groningen, Cambridge,, MASSACHUSETTS)

In this paper I would like to present the concept of "ansias amorozas" (until now) unknown Portuguese Mystic, Joanna de Jesus and intellectual disciple of Teresa de Jesus. The relationship established through Joanna and God-Man (God incarnated) makes possible the discovery of an embodied consciousness. The nuptial element will be studied in a historical approach (the Cistercians Spirituality) and a philosophical hypothesis of "criture feminine", defended by Cixous and Irigaray. How will consciousness develop within the anxiousness of writing "the body"? What does it mean "razoens amorozas" (loving reasons) in the context of intersubjective consciousness? Could we even speak of a female mystical consciousness? **P5**

287 **Meditation as First-Person Methodology? Serious Promise, Serious Problems** Jonathan Shear <jcs@infionline.net> (Philosophy, Virginia Commonwealth University, Richmond, VA)

The need for systematic first-person methodologies is obvious. Studies of consciousness require reports of first-person, subjective phenomena as well as third-person, objective correlates. Without such reports there would be nothing to connect third-person phenomena with consciousness at all. Yet while we use highly sophisticated third-person methodologies (EEG, fMRI, neurochemistry, etc.) to identify and study their objective correlates, methodologies used to study the phenomena of consciousness themselves are largely merely commonsensical and intuitive. Eastern meditation traditions however have spent thousands of years developing first-person methodologies designed to enable the mind to become stably attuned to a completely silent level of inner awareness, and examine the domain of consciousness with maximum signal to noise ratio and minimum distortion. The existence of such methodologies and their potential usefulness for consciousness studies is now well known and much discussed. Associated maps of consciousness, developed empirically by Eastern traditions over millennia, are much less well known however. The map standardly used by Yoga, Vedanta and other orthodox Indian traditions, for example, distinguishes six levels. From surface to depth: senses, discursive thinking, discriminative intellect, pure ego, bliss and pure (qualityless) consciousness. Conscious content at each level is said to develop through, and depend on, the deeper ones. If accurate, such maps could prove very helpful both for understanding consciousness intellectually, and for scientific research. Locating theories and introspective accounts of philosophers such as Plato, Descartes, Spinoza, Kant, Hume, and Russell onto the above levels-map, for example, indicates that each philosopher had a specific range of levels open to his introspective awareness, and suggests why he would favor particular theories, and find specific problems unresolvable. This also suggests major empiricist-rationalist conflicts can be resolved empirically?if the map is accurate. And the map?s accuracy could be supported objectively, if research identified physiological markers of all the levels as reported by adepts from different traditions, and subsets of the levels as reported by ordinary people, occurring in the appropriate sequences. Such research may be practical. Traditional identification of complete respiratory cessation as a physiological marker of the pure-consciousness level already appears corroborated by laboratory studies of TM meditators. And Lama S. Rinpoche says that Tibetan Buddhist adepts could maintain experience at each level for this research. In addition to corroborating the above map, identification of markers for each level would provide a way to identify adepts capable of acting as reliable research ?instruments? for a wide range of level-relevant questions in consciousness studies. The potential usefulness of such traditional, empirically grounded maps is huge. Meditation-related research, however, faces widespread skepticism from perceptions of bias and vested interest, compounded by associations with religion and very implausible claims. Even meditation researchers express such concerns about research on types of meditation other than their own. A formal consortium, in which teams of researchers with prima facie competing affiliations conduct and

coauthor replications, comparative studies and meta-analyses, could address these concerns directly. Until they are addressed however, meditation-related research and methodologies cannot be expected to live up to their promise. **P11**

288 **Purification of Consciousness through the Exercise of Will Power in Pranahuti Aided Meditation: A Phenomenological Study of its Effectiveness** Wandan (Wendy) Zeng, Dr. Sastry Bhamidipati <wendy.zeng@gmail.com> (East West Psychology, California Institute of Integral Studies, San Francisco, CA)

When we apply our intellect and involve our heart's feelings in thinking processes or actions, we form impressions in our consciousness. An impression, by the Random House dictionary's definition, is the first and immediate effect of an experience or perception upon the mind, or the strong effect produced on the intellect, feelings, conscience, etc. In reality, the term 'impression' could have a broader meaning and reside in a deeper level of our consciousness. According to Sri Ramchandra, the founder of the system of Natural Path, there are three categories of impressions. These are: 1) Mala, nascent impressions we form in our day-to-day activities, caused by a lack of control over the senses that manifests itself as laziness, sloth, attraction to trivia and other impulsive tendencies to sensory pleasure; 2) Vikshepa, unreal projections of desires for enjoyment, such as greed, avarice, jealousy and so forth [1]; 3) Avaranas, layers of grossness due to past deeply rooted impressions that affect different sheaths of our being and lead to the formation of habits. Consequently, we experience positive or negative resulting effects of the impressions and that is the fruition process. The resulting effects could be enjoyment, pleasure, stress, tension, restlessness of the mind, dullness or lack of clarity in thoughts, emotions associated with unreal projections, and unwanted habits from which we seem to have little power to extricate ourselves. Cleaning or purifying ourselves in the realm of the mind 'is more important than the physical cleaning which is necessary of good health' [2]. The fact that purification of our consciousness is possible has been little known to most people. This paper is a qualitative phenomenological study of the effectiveness of certain techniques, such as 'Ocean of bliss' discovered by Sri Ramchandra, that enable people to purify their own consciousness through the exercise of their will power. We interviewed eleven individuals about their personal experiences of this daily half-hour practice. The study found that the immediate effects include the feelings of lightness, freshness and calmness. Over a period of practice, it led to several improvements, such as the calming of restless tendencies, the reduction of ego, stress relief or de-tensioning, an increase in clarity of thought, and the reduction of unreal projections. The study found that this practice is a significant help in removing certain mental, emotional and psychological obstacles in the evolution of an individual's consciousness towards union with their inner highest spirit. Bibliography: [1] K.C. Narayana. Bodhayanti Parasparam (Mutual Learning and Teaching). 3rd ed. Vol. 1. Secunderabad: Sri Ramchandra Publishers, 2003. Print. [2] K.C. Narayana. Bodhayanti Parasparam (Mutual Learning and Teaching). 3rd ed. Vol. 2. Secunderabad: Sri Ramchandra Publishers, 2003. Print. **P5**

5.3 Hypnosis

5.4 Other altered states of consciousness

289 **Shamanic States of Consciousness Compliment Transpersonal Psychology On Spiritual Emergency and Avoid Hospitalization** Samuel Breidenbach <samsarx@mindspring.com> (Tucson Scientific Shamanism Center, Tucson, AZ)

It is possible that many 'Clinically Diagnosed' cases of aberrant behavior may fit the model believed by transpersonal psychologists and accepted under DSM-IV as 'Spiritual Emergency' that can be treated equally well, and often with longer lasting positive results with Western version techniques of successful indigenous shamanism. This approach is called 'Scientific Shamanism.' In fact we will show that many cases could well fall under the heading of spiritual emergence rather than spiritual emergency. No clinic treatment is needed for a Spiritual Emergence, though the symptoms are very close to clinical schizophrenia. A 'spiri-

tual emergency' is a little different: 'We must question reality and think for ourselves; we must examine our own beliefs - test reality in the workshop of our own lives. What is spiritual emergency? In recent years there has been some discussion of Spiritual Emergency. Dr. Grof in his books has developed the view that some forms of radical awareness, at times precipitating life crises, are spiritual crises rather than pathologies. We must support such experiences rather than pathologies. Actually, the concept of spiritual emergency has been around for thousands of years in many, if not most cultures. Shamans, mystics, and spiritual explorers have regularly experienced the same states of awareness as have modern "crazy folk". Joseph Campbell speaks of these sorts of radical awareness in his mythological work. Spiritual Emergency is an alternative way of looking at certain states of what psychiatry terms as psychosis. This way of looking at the experience offers positive and beneficial perspectives rather than stigmatization and pathological categorization. Some of the same states experienced in extreme "psychosis" are the same states sought after by spiritual seekers in other times and places. Other forms of mental illness can also be seen positively. They offer an opportunity to challenge consensus reality. Breakdown can represent opportunity for breakthrough. Ultimately each of us has find her own way but we can support one another. There are many alternatives to psychiatry.' (Manrodt 1999) These problems and distinguishing between which was which and how to treat them have been around since Homo sapiens, arrived about 198,000 years. Most of that time there wasn't any formalized therapies, only what worked, usually shamanism. Shamanism has successfully dealt with these distinctions for tens of thousands of years. Another look at this indigenous therapy may answer 'What is Consciousness?' Enter Scientific Shamanism: 'A simple definition of Scientific Shamanism then is, 'The art of applying current scientific methodologies to the proven ancient art of shamanism in order for it to be understood and applied by a Western urban society. Also the art of interpreting Western cultural 'stories' in a new way by taking into consideration our ancient shamanic heritage. The combination of science and shamanism are thus rendered greater than the sum of the individual parts. ' (Scientific Shamanism by Samuel Wisechild Breidenbach, prepress) **P5**

290 **Sympathetic Nervous System Augmentations of Consciousness Using "Third-Eye" Hypnosis** Reginald Humphreys, Kathleen Eagan-Deprez <drrbh@compuserve.com>
(American Society of Clinical Hypnosis, Dallas, TX)

The autonomic model of consciousness (Humphreys & Eagan, 2000; 2002) provides a conceptual framework for understanding phenomena of health and illness according to levels of activity within the sympathetic and parasympathetic branches of the autonomic nervous system (ANS). Sympathetic-dominant states of the ANS are understood as toxic, dysfunctional states associated with illness, while parasympathetic-dominant states are associated with comfort and healing. Parasympathetic-dominant states such as hypnosis and meditation have historically been the altered states of consciousness of greatest interest, being associated with personal growth, enhanced spirituality, and relief from symptoms and pathologies resulting from sympathetic accumulations within the ANS. Verification of the central hypothesis of parasympathetic healing has been accelerated through the use of frequency spectral analysis of coherence in heart rate variability (HRV) as a psychophysiological marker for parasympathetic dominance. This has led to a final conceptual pathway in which the strength and effectiveness of any healing intervention within mind-body medicine may be gauged in terms of its ability to foster the cardinal signs of heart optimization, cardio-respiratory phase locking, and musical heart rate rhythmicity (HRR) (Humphreys & Eagan-Deprez, 2008). Both sympathetic and parasympathetic fluctuations occur in the context of complete mind-body circuits. Promoting activity within trophotropic, parasympathetic circuits has been the main focus of clinical applications of the autonomic model so far, resulting in the availability of numerous techniques within hypnosis and mind-body medicine for promoting parasympathetic dominance. The potential of expanding existing technique to include strategies for augmenting ergotrophic, sympathetic circuits has remained as an acknowledged, although mostly undeveloped area of promising future clinical application. Contemporary advances in the neuroanatomical study of brain structures participating in sympathetic nervous system activity have provided new insights regarding the organization of sympathetic activity. Of pri-

mary interest is an accumulated body of research focused on the neural activities of the suprachiasmatic nucleus (SCN) of the hypothalamus. The SCN functions as the pacemaker of the nervous system, and is the body's true biological clock. Each of the several thousand neurons within the SCN fulfills this pacemaker function by pulsating or firing in synchrony with the other neurons in the array. These synchronized impulses allow the SCN to exert its biological clock function as a unified entity, regulating the timing and chronology of scheduled bodily functions from birth until death. The endogenous oscillations of the SCN pacemaker neurons are understood as constituting the basic energy of life, and the basis of sympathetic tone. We hoped to apply this knowledge by exploring the possibility that sympathetic tone could be enhanced through the use of hypnotic suggestions focused on augmentation of SCN functioning. The authors modified a hypnosis script to include imagery for augmentation of SCN activity. As the anatomical location of the SCN corresponds exactly with that of the so-called "third eye" of Indian mythology, we refer to our approach as "third-eye hypnosis". Mastery of the approach of augmenting sympathetic activity will allow for the development of new avenues of treatment planning, and provide interventions for conditions not currently treatable. **P5**

291 **Posttraumatic Stress Disorder Onset and Altered State of Consciousness Symptoms** Brock Kilbourne <ecps@um.att.com> (El Camino Psychology Services, PC, Oceanside, CA)

The Diagnostic and Statistical Manual for Mental Disorders (DSM-4), the main source of mental disorder diagnoses in the United States, does not identify as part of the diagnostic criteria for Posttraumatic Stress Disorder (PTSD) the mental state or cognitive mediating variables of individuals at the onset of PTSD. The present paper develops a conceptual analysis of the unique mental state or the cognitive mediation that occurs in the individual between the traumatic event and the individual's emotional reaction of numbness and/or helplessness. Based on reports from clinical samples, both civilian and military (active and retired), chronic PTSD clients report the onset of the traumatic event and PTSD as different from their normal state of awareness and report vivid memories of the traumatic event (i.e., as if it happened yesterday), lasting sometimes decades after the traumatic event. Chronic PTSD clients typically characterize that experience in terms of some individual pattern of altered state of consciousness symptoms (ASC) (e.g., time distortions, perceptual distortions, de-realization and depersonalization, etc.). A conceptual analysis of PTSD onset is proffered that recognizes ASC symptoms at the onset of PTSD, the stamping of ASC symptoms on the traumatic event(s), neurobiochemical involvement at the onset of PTSD, the development of a neural memory or neural imprinting at PTSD onset, and the paradox of PTSD memories. Implications for diagnosis and treatment (i.e., early intervention and prevention) are discussed as well as implications for understanding our normal state of consciousness. **P5**

292 **From 'Plants of the Gods' to Shamanic Consciousness** Elaine Perry, Valerie Laws <e.k.perry@ncl.ac.uk> (Institute Of Ageing And Health, Newcastle University, Newcastle Upon Tyne, TYNE AND WEAR United Kingdom)

Shamanic practitioners use a variety of methods, including ingestion of psychoactive plants, to deliberately enter altered states of consciousness. The objective is to obtain otherwise inaccessible information, allegedly from 'other dimensions' of consciousness. Active across most geographic regions and extending back thousands of years, shamans have acquired extensive knowledge on altered states of consciousness that either has contributed, or has the potential to contribute, towards the science of consciousness. Aspects of such knowledge, variously verified in scientific terms, impact on three important areas of consciousness research: psychopharmacology, theoretical frameworks and psychopathology. First, chemicals in extracts of 'plants of the gods' used to induce altered states (hallucinations or 'spirit journeys' according to belief) continue to lead to identification of key pharmacological mechanisms controlling conscious awareness (most recently interaction of DMT, an ayahuasca ingredient, with sigma1 receptors) (reviewed Perry, 2002; Perry and Laws, in press). Second and controversially, anecdotal evidence of conscious interactions beyond the physical brain during shamanic 'journeys' is supported by some scientific evidence of such phenomena as te-

lepathy, clairvoyance or psychokinesis published in peer reviewed journals) (reviewed, Perry and Laws, in press). Evidence for these apparently anomalous effects is provided by data obtained in controlled studies (over 100 published on telepathy in the last 30 years), deviating from chance to only a small extent (presumably reflecting if they do exist the function of the normal brain to filter incoming information), but with extraordinarily high levels of statistical significance. As neither sceptics nor believers we suggest such evidence is worth considering as potentially contributing to much needed paradigm shifts in theories of consciousness (parallel to 'thinking the impossible' in current theories in the field of quantum physics). Thirdly and more speculatively, but potentially clinically important, shamanic claims for 'ectopic' influences on mental health ('spirit invasion' or 'soul loss') are so far supported by only occasional scientific reports. Brain pathologies in disorders such as dementia, including cholinergic deficits with relative serotonergic hyperactivity, are similar to pharmacological effects of many 'plants of the gods' and could, by reducing normal filter mechanisms, expose a minority of individuals to confusing or disturbing experiences of consciousness beyond the brain (Perry, 1995; Perry and Perry, 1995). While evidence for consciousness beyond the brain is lacking for most paranormal phenomena, it is in some specific instances convincing enough to provoke consideration by mainstream neuroscientists, and stimulate further controlled investigation towards the goal of generating new testable theories of the science of consciousness. Perry EK (2002) Plants of the gods, in 'Neurochemistry of Consciousness' (Ed Perry E, Ashton H and Young A) John Benjamins, pp 205-28 Perry EK, Laws V (in press) From plants of the gods to shamanic consciousness, in 'Exploring the boundaries of consciousness' (Ed Perry E, Collerton D, Lebeau F, Ashton C) John Benjamins. Perry E (1995) Conscious awareness and neurotransmitter signaling: possible non-local interactions? Int J Geriatric Psychiat 10:1093-4 Perry EK and Perry RH (1995) Acetylcholine and hallucinations: disease-related compared with drug-induced alterations in human consciousness. Brain and Cognition 28:240-58 **C7**

293 **Visions of Quantum Superposition in William James' "Subjective Effects of Nitrous Oxide"** Keith Turausky <bickbyro@gmail.com> ([STUDENT], University of Arizona, Tucson, AZ)

The reputation of William James as the Great American Philosopher remains a commonplace in consciousness studies, even a century after his death. It is no doubt a sign of how much society has since changed that an intellect of James' eminence could ever get away with publishing an essay entitled "Subjective Effects of Nitrous Oxide" – much less with data consisting entirely of anecdotal evidence collected during his own recreational use of the anesthetic! It is just as much a sign of James' truly *phenomenal* genius, however, that even these now-risque explorations bear out history's glowing remembrance of his prognostic abilities. When he published "Subjective Effects of Nitrous Oxide" in 1882, James obviously could know nothing of relativity, much less quantum mechanics. Nevertheless, an informed modern reading suggests that James caught a glimpse of the forces at work in the quantum model of consciousness known as Penrose-Hameroff Orch OR. In this paper, I will argue that the subjective effects of nitrous oxide correlate with the objective mechanism of nitrous oxide's influence on the brain – specifically the accelerated state of superposition it forces upon certain neural proteins via quantum-mechanical forces. Using a framework of six discrete phenomenological themes, I will argue that the experiences, sensations, and thoughts (i.e., "visions") induced by sub-anesthetic amounts of nitrous oxide could rightly be called *subjective quantum effects*. In addition to James' observations on the subject – which extend well beyond his 1882 essay – I will consider earlier writings from nitrous oxide's discoverers and first enthusiasts. It is my belief that modern science and philosophy can shed significant new light on these often cryptic texts. Whether or not Penrose-Hameroff Orch OR entirely explains consciousness, it is backed by solid evidence that anesthetic gases like nitrous oxide (N2O) affect the physical brain at the quantum level. If one accepts this much, it stands to reason that the phenomenology of nitrous oxide-induced conscious states would likewise involve quantum strangeness. One with the intellectual stamina to *take notes* on the scene thus revealed would be a rare genius indeed, but such an accolade would come as nothing new to the great William James. **C7**

294 **Exploring Higher States of Consciousness in Sport - Sport as a vehicle to understand the potential of human consciousness** Damian Vaughn, <damian@vaughncenter.com> (The Vaughn Center, Phoenix, ARIZONA)

The essence of my talk is grounded in the research that I have done for my upcoming book and my coaching practice working with high-performance athletes. I will talk on the concept of 'Flow' coined by Dr. Mihaly Csikszentmihalyi, and discuss the different levels of 'flow' or 'the zone' that I propose of being available to us. Firstly, We will create a definition of the zone (flow, peak experience) in sports based on the surveys I carried out with over 200 professional athletes in various sports (MLB, NFL, NHL, NBA, PGA, Olympic, etc.). We will create a definition of the zone based on its attributes. These attributes will be based on the subjective experiences of the athletes surveyed, including my personal experience as a professional football player. Secondly, I will discuss the barriers, obstacles, and inhibitors of the zone experience in sport and life. All of these barriers are effects or manifestations of one fundamental cause - the Ego. We will define the ego as the level of mind that is incessantly concerned with survival, positioning, comparison, and categorization. **A2**

5.5 Transpersonal and humanistic psychology

295 **Ground-Breaking Qualitative Research Method: Intuitive Inquiry Embedded With Grounded Theory** Laurel McCormick <thenextmoment@gmail.com> (Institute of Transpersonal Psychology, Charlotte, NC)

An innovative research method was used in a dissertation study of the experience of no-self in advanced stages of spiritual development. In this examination of the phenomenon of no-self as lived experience, the intuitive inquiry research method was ideal for exploring and analyzing semi-structured interviews of participants voicing their complex, detailed oral histories related to no-self. Intuitive inquiry was the overarching method that guided this exploratory, qualitative research; however, the investigation into no-self potentiated generating empirically based theory or of confirming current theories. Therefore, constructivist grounded theory was incorporated into intuitive inquiry as a pragmatic foundation for coding, categorizing, and analyzing participant data, with the goal of providing a framework for new theory. Including grounded theory in the intuitive inquiry method required an innovative course of action for analyzing data and synthesizing results. The intuitive inquiry method structured the research project through 5 iterative, hermeneutical cycles processed by means of intuition and interpretation. Successive rounds of grounded theory data analysis were integrated into intuitive inquiry cycles. Combining the intuitive inquiry method with grounded theory verified intuitive inquiry information, conclusions, and procedures in a pragmatic, analytical research process toward theoretical results. Both methods functioned toward guiding emerging data analysis and theory development by cross-checking and making apparent the intuitive and analytical cognitive processes of the researcher. The intuitive inquiry and grounded theory exploratory study of no-self as lived experience produced a theory of no-self as a continuum toward enlightenment; future research may substantiate research results. Due to attention to detail afforded by combining intuitive inquiry and grounded theory, this study may further understanding of self, dissolution of ego, and transformation and integration of experiences of no-self toward higher stages of consciousness. **P5**

296 **Transformations of Bereavement in a Psychomanteum Process: Qualities of Meaning and Paths of Change** Rebecca Merz <rebecca.merz@gmail.com> (William James Center, Institute of Transpersonal Psychology, Palo Alto, California, Manchester, MT)

This doctoral dissertation research reports qualities of participant experiences in a psychomanteum process used to ease grief components. The psychomanteum process is a mirror-gazing procedure that induces a mild altered state of consciousness in the participant who desires to contact a deceased loved one to facilitate bereavement. The psychomanteum is a quiet, dimly lit room or booth with a mirror at one end used to focus attention. The participant sits in a chair and softly gazes at the mirror, which is tilted to reflect the surrounding darkness. In the present study, the participant was led by a trained psychomanteum facilitator through

a three-part process which involves remembering the deceased, followed by sitting in the psychomanteum booth, and then discussing the experience. Quantitative analysis of pre to post Likert-scale measurements with 100 participants positively replicated earlier research demonstrating statistically significant reductions in bereavement components in feelings such as grief, anger, and guilt, as well as significant increases in positive feelings, such as love and a sense of resolution. This qualitative study provides descriptions of the subjective experiences of participants (n=12) who experienced the most change as a result of the process. The purpose of the study was to explore the meaning and transformative qualities of the participant experience, as based on thematic content analysis of the transcripts of post-session interviews. The results of the research demonstrated significant shifts in affect, cognition, sensory perception, and shifts of a transpersonal nature. The psychomanteum process was commonly described as helpful, healing, comforting, and peaceful. As well, it was frequently reported that the experience left the participant with a sense of well-being and a feeling of serenity and acceptance. These findings demonstrate the largely positive effects of the psychomanteum process and support its use as a tool to facilitate the subjective experience of grief. Discussion of the role of the set and setting, as well as descriptions of the altered state of consciousness illustrate how other aspects of the psychomanteum process contributed to the meaning of the experience and the ways that participants changed. Examples are given of recurrent, complex paths of change presented as common sequences of phenomena. Despite the differences among the participants, the uniqueness of each one's loss, and the indefinite number of possible participant experiences, this study illustrates common components involved in transformations of bereavement in a psychomanteum process. **P5**

297 **Transformations in Consciousness through Spiritual Engagement** Cassandra Vieten , Marilyn Schlitz, Tina Amorok, Adam Cohen, John Astin <cvieten@noetic.org> (Institute Of Noetic Sciences, Petaluma, CA)

Spiritual and religious experiences and practices can result in transformations in consciousness - significant changes in people's worldviews, motivations and priorities, perceptions of self and environment, cognitive/affective functioning, and behaviors. A series of studies including narrative analyses, focus groups, surveys, in-depth interviews, and longitudinal studies conducted by our research team has shed light on what aspects of spiritual experience and engagement predict health and well-being outcomes, as well as potential mechanisms of change. A model of the transformative process will be presented. **PL7**

5.6 Psychoanalysis and psychotherapy

298 **Modalities of Consciousness in Experiential Psychotherapies** Annmarie Early, P. David Glanzer <aearly@mac.com> (M.A. In Counseling, Eastern Mennonite University, Harrisonburg, VA)

Three modes of consciousness are managed in parallel in experiential psychotherapy - consciousness in the domain of explicit knowing, the consciousness in implicit knowing, and consciousness in the zone of emergent formation where the two meet. The origins of this differentiation of consciousness modalities can be traced to work, originating from the Rogerian tradition, in experiential therapies (Gendlin, 1998; Greenberg, 2002; Fosha, 2000). Gendlin (Focusing Oriented Psychotherapy, 1998) argued that therapy is a "process that centrally involves experience before it becomes one of [a set of] defined 'packages' and again afterword when it dips back into the prepackaged zone at the edge of consciousness" (p. 4). The "prepackaged zone" is the realm of implicit knowing, while the packaged zone contains explicit knowing and languaging. In Gendlin's terms, the "edge" is where they meet; or drawing on similar concepts, the "edge" is the encounter between bottom-up and top-down processes. At this intersection is where the most potential for therapeutic change emerges, in "the present moment" (Stern, 2004). Each of the three type of consciousness is phenomenally unique, has different observable markers, and affords different therapeutic strategies. Consciousness at the "edge" is what Gendlin (1998) calls the "felt sense". The felt sense is the meeting point between what is known explicitly and what is known in a bodied way. It offers a third kind of

knowing that creates a conversation between the explicit and implicit. Felt sense consciousness can be languaged or given interpretive meaning, thereby influencing cognition, but only after the experiencing. In turn, the languaged and interpreted experience in the now can be given back to the felt sense for validation, which in turn functions as a platform from which the next step of felt sensing can come. This dialog between the implicit and explicit is critical for the moving forward process of change. The phenomenal sense of certain knowing and scripted action, the characteristic thoughtfulness of explicit consciousness, meets the (mindful) awareness of being-in-the-world in the current moment and the characteristic emotionality of implicit consciousness, and at this intersection exists the potential for change - in the emotion's thoughts and in the thought's emotions. The role of the therapist is to assist in making this encounter safe, negotiable and accessible in conscious awareness. **P11**

299 **The Consciousness of Bodily Felt Sense in Focusing (Gendlin): An Adaptive Resonance Theory (Grossberg) Account with Application to Experiential Psychotherapy** P David Glanzer, Annmarie Early <glanzerd@emu.edu> (Eastern Mennonite University, Harrisonburg, VA)

Gendlin's (1998) method of Focusing works to enhance the consciousness of bodily felt sense at the 'edge' between implicit and explicit consciousness. Focusing has been taught widely as one path of consciousness training and has also been empirically validated as effective in its applications within experiential psychotherapies. Focusing works toward conscious encounter at the interface between the unformed 'bottom-up' and the formed 'top-down' processes - at this 'edge' is the possibility of new awareness. Adaptive Resonance Theory (Grossberg, 1980) is a conceptually derived (from apriori psychological givens) system for unsupervised arbitrary pattern learning that, in an extensive series of computer implementations (cf. Glanzer, 2006, 2008) allows exploration of the microprocesses of learning. The theory generalizes as a useful model of how bottom-up and top-down processes interleave to create flexible and stable learning. Much of the work in this system is done at the intersection of top-down and bottom-up process where patterns coming from both directions meet, and, if matching to a given attentional criterion, create resonant dynamics, but, if mismatching, create the potential for new pattern learning. The primary system parameter is the degree of arousal or vigilance at this match/mismatch intersection between memory (the historical record) and current inputs. The concepts and dynamics of this ART system generalize well to an account of these dynamics in phenomenological language that is used to describe change processes in experiential psychotherapies. In particular, Gendlin's felt sense of working at the 'edge' between implicit and explicit processes maps well to the ART model. Emotion focused therapy, an experiential psychotherapy, also maps well to the model, with respect to the management of arousal and other microprocesses of establishing new patterns to override maladaptive scripts (Greenberg, 2002; Fosha, 2000). Utilizing the systems perspectives in adaptive resonance theory suggests new ways of conceptualizing the process of 'thinking at the edge' (Gendlin, 2004) and the micro-processes and strategies within the experiential therapies. Within experiential therapies, these resonant processes emerge not only intrapersonally, but also interpersonally in the therapeutic relationship between therapist and client, and in couples therapy, between partners. The ART model, originally applied to modeling the interface between external bottom-up and internal top-down patterns, also applies to the interface between any two systems capable of establishing mutually informed resonant patterns of activation. This theoretical perspective can be used to help understand what makes the therapist-client relationship 'therapeutic', and how well established but maladaptive resonant patterns between persons can be supplanted by more functional resonant patterns. **P5**

300 **Origin and Function of Fantasy in Freud's Works** Carlos Alberto Mattos Ferreira <cmattos@ccard.com.br> (Independent, Carlos Alberto de Mattos Ferreira by WAK Editora - Rio de Janeiro, Rio De Janeiro, RIO DE JANEIRO Brazil)

The objective of this study was to investigate the origin and function of fantasy based on the Works of Sigmund Freud by means of performance in the constitution of human psychism and its importance in producing the sense of life. The bibliographical research was undertaken

to clarify the different uses and modifications of the term "fantasy" in the course of the discoveries realized by Freud during his life long work. An analysis of the investigation revealed three descriptive complex principle themes, which at times can be contradictory, yielding and subjugating with constant redefinition, which characterizes the fantasy as a symptom, a creation and an enigma of generational transmission. Fantasy exists in various forms in psychism - including hallucinatory realization; trauma and erogenous function; psyche activities as symptom, creation and art; primordial fantasies as philogenesis and ontogenesis; as enshrouded memories; as infancy sexual investigation and as consolation: the daydreams, the make believe. The conclusion corroborates the presumption that life does not make sense without the capacity to fantasize. The fantasy: occupies a place of fundamental importance in Freudian thought; presents as an essential element in the constitution of psychism and reveals horizons for researchers of psychoanalysis to amplify their investigations leading to further revealing of the psyche. At this time, the thoughts regarding Freud's Works are completely contemporary. **P11**

301 **The Potential Therapeutic Benefit of Mediumship Readings in the Treatment of Grief** Chad Mosher, Julie Beischel, PhD; Mark Boccuzzi <chadmosher@windbridge.org> (The Windbridge Institute, Tucson, AZ)

Grief is a natural experience among people of every culture. Unresolved or complicated grief, however, can yield detrimental effects for some individuals including increased morbidity and mortality (e.g., Schaefer et al., 1995; Shahar et al., 2001; Stroebe et al., 2007). Over the past four decades, stage models of grief were posited (e.g., Kubler-Ross, 1969) which, in turn, were adopted by psychotherapists. Viewed as pathological within a stage-model, unresolved grief is treated in traditional psychotherapy sessions with a goal of "working through the stages," and resolving the sense of loss. In a recent meta-analysis of traditional psychotherapeutic grief treatment outcomes, Currier, Neimeyer, and Berman (2008) revealed a "discouraging picture for bereavement interventions" (p. 656) which added "little to no benefit beyond the participants' existing resources and the passage of time" (p. 657). In sharp contrast, non-traditional interventions and experiences have been repeatedly demonstrated to dramatically diminish or even entirely alleviate grief (e.g., Botkin, 2000; Drewry, 2003; Hastings et al., 2002; LaGrand, 2005; Parker, 2005). These include both spontaneous and induced experiences of after-death communication (ADC). Although ADCs have been described as "paranormal" and "extraordinary," or associated with delusion and psychopathology, several researchers have found that ADCs are universal in nature and usually healing, comforting, and beneficial (e.g., Drewry, 2003; Houck, 2005; Klugman, 2006; Sanger, 2009). Conversely, though anecdotal reports exist regarding the positive and profound effects a reading with a psychic medium can have on the bereaved, no systematic studies have been published investigating the potential therapeutic effects of a personal mediumship reading from a modern-day, non-denominational, mental medium. The use of mediumship readings in the treatment of grief may provide advantages over traditional grief counseling interventions, non-traditional methods, and spontaneous experiences for several reasons. First, readings may be less frightening, less intimidating, and easier to understand than more personal, spontaneous ADC experiences. Second, the scheduled and regulated environment of a reading makes it well-suited as a controlled and prescribable treatment option. Third, a reading may be preferred for individuals who long for contact but have not experienced it. Finally, a medium serves as a non-judgmental participant in the experience who will not disparage, disbelieve, or pathologize the experiences of the bereaved. An exploratory collection of reports from individuals who received mediumship readings (n=83) indicated noteworthy relief from grief. In addition, the subset of participants (n=29) who also worked with a mental health professional (MHP) reported comparatively greater satisfaction and relief after their mediumship reading. Participants' verbatim comments will be discussed regarding the short- and long-term effects of a mediumship reading, negative experiences with a MHP, and the importance of the combination of the two interventions in recovery. The absence of effective treatments for grief and the trends from these exploratory data warrant further study into the potential therapeutic benefits of mediumship readings in the field of grief psychology. We recommend controlled

research trials with readings from credentialed mediums whose abilities to report accurate and specific information about the deceased have been demonstrated under controlled laboratory conditions (e.g., Beischel, 2007/2008). **P11**

302 **Dissociation as a Consciousness Oriented Phenomenon: A Blessing or a Curse?** Madhu Sameer <madhu_sameer@hotmail.com> (PhD student, Pacifica Graduate School, Carpinteria, Fresno, CA)

Much has been written about the perils of dissociative phenomenon. Freud associated dissociative symptoms with trauma, psyche's attempt at defending from the debilitating pain of trauma by distancing itself. The Diagnostic and Statistical manual for mental Diorders (DSM-IV TR), the encyclopedia of mental disorders and the final authority on defining mental ailments in the managed care system, cites it as a mental disorder. Millions of people worldwide suffer from some form of dissociation following a traumatic incident, billions of dollars are spent in research, on treatment and cure. This paper addresses the etiology, the meaning and the core concepts of dissociation. It explores its links to consciousness and human predisposition to dissociative states even in the absence of trauma. Dissociation is explored from the standpoint of Eastern philosophy and meditational practices, and viewed in context of its adaptive, healing, wisdom, growth and wellness promoting functions that define its role as a catalyst in evolution of consciousness. The paper extracts the dissociative phenomenon from the pejorative dungeons of DSM-IV by redefining dissociation as a consciousness oriented phenomenon; the process attempting to break the integrated consciousness into its contituent parts, to be viewed and honored as a message from the unconscious, depersonalization being an objective pole of the subjective self. Optimum health and wellness may lie within the continuum, contingent on being able to become aware of the promises of possibility of the extremities within. Much like the wisdom that lies within the dark emotions, only by accepting and honoring dissociation as a sacred state of mind can we hope to harness the wisdom from dissociative states. The paper explores the impact of such reframing on the treatment of various "dissociative disorders" and discusses interventions that may enable clients experiencing distress in their dissociative symptoms to move along the continuum towards healing, growth and evolving consciousness. **P11**

5.7 Lucid dreaming

303 **Video Game Play and Lucid Dreaming as Socially Constructed Meditative Absorption** Jayne Gackenbach, Harry Hunt <gackenbachj@macewan.ca> (Psychology, Grant MacEwan University, Edmonton, Alberta Canada)

Absorption, fantasy play, lucid dreaming, and dream bizarreness/metaphority are psychological constructs. Their relation to gaming (Gackenbach, 2006; 2009; Gackenbach et al., in press) raises a more general level of analysis. We consider the placement of gaming in the social nature of consciousness as explanatory vehicle. Often the collective societal nature of higher states of consciousness, and absorptive states generally, is missed by westerners, given our values of heightened autonomy and extreme individualism, whereas in fact similar states in traditional tribal societies, guided by their explicit mythological systems, are what held these societies together in the sense of Durkeim's collectivity of consciousness (Hunt, 1995; Turner & Whitehead, 2008). We propose that gaming serves some of the same societal function in today?s youth as explicit mythological systems have in indigenous cultures. For us, unwittingly as a rule, these states experienced in gaming are a spontaneous reengagement with that level of collectivity from a place of our individual conscious isolation in highly differentiated and pluralistic modern culture. In support of this thesis, in this paper we explore research which has shown that video game players report more lucid dreams than those who rarely game (Gackenbach, 2006; 2009) which appears to be mitigated by a type of meditative absorption. The lucid dream/video game connection is examined from three perspectives: lucidity as meta-cognition, lucidity and dream bizarreness, and lucid-nonlucid differences in general dream content for hard core gamers. It appears that gaming adds a dimension to the lucid dreams of gamers such that their full potential for focused problem solving is expressed

very much like the strategies of video gaming. The enhanced bizarreness of lucid-gamer associated dreams may also serve as a trigger for the emergence of their increased lucidity. The exotic-mythic element of the lucid bizarre dreams of gamers (Gackenbach et al, in press) is similar to previous research on the archetypal content in dreams (Hunt, 1989). Finally, by comparing the lucid versus non-lucid dreams of gamers, it was concluded that lucidity in gamer's dreams emphasized the already generally positive dream experience of being lucid in sleep, including the enhanced aggression which facilitated the sense of empowerment also typical in video game playing. Not only is there more lucidity in gamer's dreams, but that lucidity seems to be further enhanced by the gaming experience. To be absorbed in consciousness, be it in lucid dreams, intense fantasy or meditation is also to be absorbed in the social field more deeply than is available in ordinary consciousness. Since consciousness itself is collective already, and the high absorber is entering the level provided in traditional times by externalized ritual and myth, gaming offers those in contemporary western individualistic society much the same function. Specifically video game play provides an experience with an externalized absorptive consciousness which provide patterns that are accordingly socially structured, simultaneously shared, and so offering some of the support of tribal societies. **C11**

304 **Lucid Dreaming: Possible Implications for Psychiatric Treatment** Ivan Limosani, A. D'Agostino; E. Perry <ilimosani@gmail.com> (A.O. San Paolo, Università Degli Studi Di Milano, Milan, Italy)

Although almost all the funding pioneers of the modern scientific approach to mental disorders have in some way or another commented on the similarities between dreaming and psychosis (Freud, 1900; Kraepelin, 1906; Jung, 1907, Bleuler, 1911, Minkowski, 1927), the scientific objectivation of this observation has not yet been reached. Recent advances in the understanding of neurochemical modulation and regional brain activation provide some support to the hypothesis that acute psychotic mental states share several neurobiological similarities with dreaming (Schwartz S, Maquet P, 2002). Lucidity in dreams may be conceptualized as a dissociation of levels of consciousness, so that the sleeping dreamer is aware of being within a dream and may decide to actively influence dream plot and interactions rather than passively experience the dream as usually occurs (LaBerge, 1989; Voss et al., 2009). In our view, the neurobiological underpinnings of lucidity may be a key to the understanding of psychotic patients' loss of touch with reality. Research into the psychopharmacological and cognitive induction of lucidity may prove of use in the treatment of acute psychoses, by helping patients to gain awareness into the abnormal origin of their condition. **P11**

5.8 Anomalous experiences

305 **What is it Like to Experience Synesthesia and What Might it Mean?** Patricia Lynne Duffy <plduffy@gmail.com> (UN Language And Communications, United Nations Language and Communications Program, New York, NY)

Patricia Lynne Duffy, author of Blue Cats and Chartreuse Kittens: How synesthetes color their worlds (Henry Holt & Company 2001 – the first book by a synesthete about synesthesia, will describe her own experiences of synesthesia as well as those of the numerous synesthetes she has interviewed. Duffy will explore the question, "What is it like to live with the 'fused-sense' perceptions of synesthesia?" and "Is there a connection between our 'personal coding' of information in a given domain – and the way in which we understand and develop ideas in that domain?" For example, did author Vladimir Nabokov's experience of the alphabet as a 'landscape' of colored and textured objects – affect his development and use of language in his literary works? Did physicist Richard Feynman's synesthetic sense of "colored equations flying all around him" contribute to the way he perceived connections and evolved his theories of Quantum mechanics? (Feynman made a still widely used pictorial representation scheme for the mathematical expressions governing the behavior of subatomic particles). Similarly, saints and seers have described a blending of sense perceptions in accounts of their mystical experiences. Is there a connection between synesthetic perception and types of consciousness? By citing a variety of descriptions of synesthetic experiences, Duffy will explore the mystery of

synesthesia and its possible implications. Does the study of synesthesia also open a door to exploring the unique ways that each human being 'personally codes' information? **PL5**

306 **Varieties of Anomalous Experience: Evidence from Psychopharmacology, Sensory Deprivation and Dreaming** Oliver Mason, Celia Morgan H Valerie Curran <o.mason@ucl.ac.uk> (Research Department Of Clinica, University College London, London, United Kingdom)

Increasing evidence suggests that anomalous experiences are more common than previously thought. Not only do they occur in a range of psychopathological conditions such as schizophrenia, healthy individuals can also experience them under a wide range of conditions. We have sought to study these systematically in both laboratory and naturalistic conditions using a variety of methods to record phenomenological, behavioral, cognitive and psychophysiological changes. One novel development has been the Psychotomimetic States Inventory (Mason et al. 2008) to study these changes in real time as they occur. Several studies of the acute and chronic effects of marijuana, ketamine and other recreational drugs (Mason et al. 2008, Mason et al. 2009, Morgan et al. submitted) shed light on the different effects of these drugs. Ketamine in particular produces a wide range of experiences and changes to cognition that mimic psychosis. Marijuana has very different effects depending on the amount and type smoked, and the individual user. Although informally documented from time immemorial, psychological quantification of these effects as they occur has rarely been achieved. After an inexplicable hiatus (to the authors) in investigations of sensory deprivation since the 1960s, this powerful technique for inducing anomalous experience is described and a laboratory study reported (Mason and Brady 2009). In the absence of external input, non-veridical perceptions and cognitions occur that mimic aspects of the recreational drugs described above. Dreaming also occurs largely in the absence of external input; we have studied phenomena occurring during REM sleep by using a Sleeptracker (TM) motion detection device worn on the wrist. Some, but not other, aspects of anomalous experiences reported during dreams compare with the altered states of consciousness seen in sensory deprivation and drug use. Across these contexts, personality differences help explain why some individuals are more prone to anomalous experience. In another study (Prescott et al. submitted) we have explored further why for some of these provoke distress and may contribute to psychopathology, while other hallucinatory, psychic and psychotic-like experiences provide existential meaning or psychological help of some kind, perhaps at times of stress or loss. **P11**

307 **Post-Classical Phase Transitions and Emergence in Psychiatry: Beyond Engel's Biopsychosocial Model of Psychopathology** Donald Mender <donald.mender@yale.edu> (Psychiatry, Yale University, Rhinebeck, NY)

This paper explores the flaws underlying George Engel's biopsychosocial paradigm of psychiatric illness and offers a quantum-neurodynamical alternative that addresses these defects. It is argued that the current conceptual foundations of biopsychosocial psychiatry, insofar as they rest upon analogies between neural network theory and classical statistical mechanics, are plagued by tensions and inconsistencies among notions of causation, spatio-temporal scale, and objectivity. In particular, explanations for the pathogenetic and therapeutic impact of "counter-supervenient" causation, i. e. malignant and ameliorative influences of mental states on neuronal pathologies, are self-contradictory in the context of classically emergent properties. The recent rise of a potentially more adequate post-classical paradigm, grounding cognitive neuroscience in quantum principles which allow for counter-supervenient effects, is described with a triune focus on 1) phase transitions entailing tunneling and the unification of gauge field types, 2) measurement interpretations advanced by Von Neumann, Wigner, and Stapp, and 3) quantum-theoretic transformations of space-time and scale. It is thereby suggested that quantum approaches to the mind-brain nexus may radically empower psychiatry's understanding of mental disorders through an explanatory adequacy and a logical coherence superior to Engel's classically limited ideas. Novel illustrative examples of possible quantum-neurodynamic perspectives on specific mental disorders such as schizophrenia and PTSD are offered. **C18**

308 **When Realities Collide: A Methodology for the Systematic Study of Synchronistic Phenomena** Lesley Roy, James Clement Van Pelt <lesley.roy@synchroproject.org> (Center for Synchronicity Studies - Synchro Project, New Haven, CT)

As commonly used, "coincidence" designates an event determined not by human influence or intention, but rather by a random element, yet which delivers meaning in a way that connotes intention – a message breaking through the window of a random (or wildly improbable) event. The idea that ontologically objective and veridical meaning can emerge from improbability and randomness challenges the dominant paradigm that human consciousness is the only source for meaning. The term used by Carl Jung for this encounter is synchronicity – in essence, meaningful coincidence – which he believed implied an immaterial domain called the collective unconscious. Since then that explanation has remained one theory among many, while skeptics regard the phenomenon as self-delusion or an indication of a poor grasp of the laws of probability. Yet there is little hard data to support either presumption. How does one study such an evanescent phenomenon? Russell Hurlbert has collected data on the raw contents of consciousness by paging subjects at random who then record their momentary mental contents. Given that the experience of synchronicity is a specific subset of momentary mental contents, a more structured approach is required. The word Synchro has been coined to designate a well-defined and vivid instance of synchronicity. This presentation proposes ways that evidence related to the Synchro phenomenon can be accumulated reliably and conveniently. A tentative classification scheme – a taxonomy of coincidence – has been developed to guide that effort. A unique collection methodology takes the step from pagers to iPhones. Subjects are assigned iPhones programmed with a custom application that facilitates reporting the traits of a Synchro experience immediately after it occurs. The data is then uploaded automatically from the iPhone to the project's data collection server. To standardize these reports, a classification method called RS3 – Roy Synchro Symbol System – is built into the custom "app". Standard Mac/Windows typographic characters are adapted to represent factors shaping the Synchro experience such as temporal proximity, context and mindset, degree of anomaly and low probability, intensity and significance, frequency and repetition, and others. As field reports accumulate, ongoing analysis of the growing database may reveal patterns constituting evidence supporting one theory or another from which plausible, falsifiable hypotheses can be derived concerning the ontological, epistemological, and/or psychological implications of the Synchro experience – if any. An early finding is that such events are very often erased from memory rapidly and irretrievably. Using the iPhone camera, the subject can take a photograph "in the moment" to aid in recalling the specifics of that particular Synchro. A third tool is the project website (synchrocenter.org) at which individuals from large sample groups (e.g. a student body) can report events they perceive as synchronistic, with the goal of accumulating a substantial collection of anecdotal evidence, which can be examined for possible correlations with the more rigorously reported data. **P5**

309 **Nonlocal Consciousness: A Concept Based on Scientific Studies on Near-Death Experience** Pim van Lommel <pimvanlommel@gmail.com> (Velp, Netherlands)

In my lecture a concept of nonlocal consciousness will be described, based on recent studies on near-death experiences (NDE). I realize that my approach will be new or unexpected for most neuroscientists, and that my conclusions will not always be in conformity with the currently widely accepted materialistic paradigm in western science. Recently several theories have been proposed to explain an NDE. The challenge to find a common explanation for the cause and content of an NDE is complicated by the fact that an NDE can be experienced during various circumstances, such as during severe injury of the brain as in cardiac arrest to continuum when the brain seems to function normally. Since the publication of several 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 conclusion that most likely the brain must have a facilitating and not a producing function to experience consciousness. **C21**

5.9 Parapsychology

310 **Old Dog, New Trick: The Effect of Animal Micro-Psychokinesis on Quantum Events** Mark Boccuzzi, Julie Beischel, PhD <mark@windbridge.org> (The Windbridge Institute, Tucson, AZ)

The term psychokinesis (PK) is used to describe the phenomenon of "mind over matter" or the effects of consciousness on the material world. Macro-PK effects are visible to the naked eye whereas the more oft-studied micro-PK events, such as changes in the output of electronic sources of randomness, require statistical analyses to be detectable. Numerous researchers, perhaps most notably those from the Princeton Engineering Anomalies Research (PEAR) laboratory, have demonstrated the effects of human consciousness on the statistical distribution of the quantum output from random event generators (REGs; reviewed in Jahn & Dunne, 2005). The current study examines the possible effects of the consciousness of a single canine companion animal on a distant REG through the use of the SyncTXT(R) service by Psyleron, Inc., an outgrowth of the PEAR laboratory. "SyncTXT is a research experiment and a self-exploration tool that combines modern technology with the concept of synchronicity, as postulated by the psychologist Carl Jung" (www.synctxt.com). Based on in-house exploratory data, Psyleron discovered that "the subconscious [of members of the staff] was capable of shifting the REG output during everyday life." The SyncTXT service employs the following steps: (1) a user purchases an on-line SyncTXT account and chooses a selection of potentially relevant messages, (2) data from a remote REG device is assigned to the user and runs continually, (3) when the output from the REG contains "certain low-probability events," the system selects a message from the user's message pool and sends it to the user's mobile phone or email address. Psyleron indicates that "under normal conditions (e.g., without an effect due to the operator's mind) this process would lead to randomly selected messages with random timing" though users have anecdotally reported meaningfully timed messages. In this long-term, on-going study, an email account and a SyncTXT account were dedicated solely to the canine participant. Seven messages were written by the guardian experimenters to reflect increasing levels of activity on the part of the canine participant (e.g., 1=sleeping, 4=quietly observing, 7=running, playing, or eating) and used as the pool of SyncTXT messages for that account. The canine participant is video recorded at all times in an unrestricted, home environment using five infrared video cameras and a time-stamped, multi-feed digital video recorder. The emails sent from SyncTXT are collected and only the dates and times are noted. The activity level of the canine participant in the video recording at the time of each SyncTXT email is coded by two investigators on the 1-7 scale used for the SyncTXT message pool. The content of the emails (i.e., which of the seven messages was contained in an email) is not read until the coding data are recorded for a 24 hour period. A Spearman rank-order correlation analysis is performed to examine the potential correlation between the activity level of the canine participant and the activity level reported in the messages sent by SyncTXT. The data collected to date, conclusions drawn, potential implications, study limitations, and value of the research tool will be discussed. **C21**

311 **Consciousness - Forever** Ingrid Fredriksson, Elizabeth A. Rausher And Russel Targ: Alexander Graur: Goran Grip: Janet McIntyre: Anthony Freeman: James Beichler: Amit Goswami: Susan Blockmore: Edgar Mitchell And Some More. <ingrid-f@telia.com> (Society for Parapsychological Research, Sweden, Arjang, Sweden)

This is a presentation for a book about consciousness. I had a dream to publish a book about our consciousness, quantum mechanics, string theory, dimensions, space and time, nonlocal space, the hologram and what happens with our consciousness when we die. The idea I

had was that a selection of famous scientists and authors should take part in the creation of the book and write a chapter each. I have described Near-Death-Experiences and the AWARE-study. Prof. Susan Blackmore has written about 'Near-Death Experiences: In or out of the body' and 'Waking from the Meme Dream.' Dr. Goran Grip has written about 'Near-Death Experiences: The Ins and Outs of the NDE Perception.' Dr. Alexander Graur has written about 'Music Integrative Neurotherapy' A brief Presentation of The-Method.' Did you know the correspondences between sound and colour? Dr. Janet McIntyre has written about 'Wellbeing, mindfulness and the global commons,' Alf E. Sjoberg, Masters in Economy who has studied and practice yoga and meditation since 1960, has written a chapter about our mind. Prof. Elizabeth A. Rausher and Russel Targ have written 'Investigation of a Complex Space-Time Metric to Describe Precognition of the Future.' I have described a little about remote-viewing and Russel Targ's achievements in this area. Anthony Freeman has written a personal reflection about 'A long time coming' and 'The Sense of Being Glared At: What Is It Like to be a Heretic.' Prof. James Beichler has written about 'Consciousness and Consequences' and Prof. William Braud has written about 'The Beyond Is Within: Recognizing Larger Realities.' Prof. Amit Goswami is writing about spiritual economics and Prof. Jens Tellefsen has written about the 'Physics and Consciousness.' At this time Prof. Richard Amoroso and Prof. Jean E. Burns are busy writing. Scientist and astronaut Edgar Michell has written about 'What is the Quantum Hologram' and 'Natures Mind: the Quantum Hologram.' One of Einstein's discussion partners was the physicist from the University of London, David Bohm. One of David Bohm's discussion partners was Karl Pribram. Even though Bohm and Pribram approached the problem from different directions they both agreed that the brain and the entire universe is a hologram. Prof. Karl Pribram has written a very interesting paragraph for the book. You can also read what Michael Talbot says about the hologram. Managing Director Jennifer Kanary Nikolov(a) is going to illustrate her view of the scientific area. The all is consciousness - forever. **P5**

312 **Effects of Individual and Group Distant Healing Intentions on Patterns of Cosmic Rays** Gary Schwartz, Mark Boccuzzi; Susan Kagel <gschwart@spamarrest.com> (Psychology, The University of Arizona, Tucson, ARIZONA)

As reviewed in The Energy Healing Experiments (Schwartz, 2007) and The Intention Experiment (McTaggart, 2007), a large body of evidence exists suggesting that human intention - both individual and collective - can have local and distal effects on living systems. Numerous spiritual energy healing traditions posit that some sort of Universal Energy is invited to enter the consciousness and body of the healer; the healer is taught to use his or her intentions to direct this energy for 'the best and highest good' of the patient or client. It is typically assumed that this energy or 'higher power' is of a 'high frequency'; however, to the best of our knowledge, no laboratory research has been conducted to address this assumption. Using a computer controlled low light CCD camera system cooled to -77 degrees centigrade, our laboratory has documented that it is possible to detect super-low intensity biophoton emissions from plants and humans, including 'auras' surrounding and interconnecting living systems (reviewed in Creath and Schwartz, Journal of Scientific Exploration, Vol. 19, No. 4, pp. 531-550, 2005). The CCD chip detects sporadic bursts of high energy, high frequency cosmic / gamma rays; these gamma bursts are typically treated as 'noise' and removed prior to statistical analysis. However, we theorized that patterns of cosmic ray activity, analyzed using fast Fourier transform (FFT) images generated by ImageJ analysis software (available from the National Institutes of Health), might reflect the presence of high frequency energies purportedly generated during spiritual energy healing practices. The camera's lens was focused on a stage containing white graph paper in a completely dark, light-tight metal chamber. The light-tight chamber was housed in a temperature controlled light-tight room. The computer and research assistant were housed in a separate room. Each run consisted of a 30 minute baseline 512 x 512 pixel image that was subtracted from four 30 minute data image trials. Eight runs involved a spiritual energy healing practitioner intending that the Universal Energy enter the 'distant' light-tight chamber housed in the separate room; 4 of the runs involved the third 30 minute data trial and 4 runs involved the fourth 30 minute data trial. Eight matching runs had the same

practitioner perform an intention meditation control where he focused his attention on imaging the stage in the chamber, but without inviting the Universal Energy to participate. Sixteen runs were conducted as 'blank' trials to control for possible order and time effects. Cosmic ray images were generated for each of the 128 data trials. FFT images were calculated, and Plot Profile statistics provided by ImageJ software were performed. Analyses of variance revealed a highly significant ($p<.0000001$) condition by averaged pixel interaction for the Universal Energy compared to the Meditation Intention and Blank Controls. A replication and extension experiment involved a group of 245 practitioners of Healing Touch approximately twenty miles from the laboratory sending healing intentions. The pattern of cosmic ray finding was replicated; the magnitude of the effect was greater. Alternative interpretations of the findings, including experimenter belief, are considered. **C21**

5.10 Miscellaneous

313 **There is Representation And Actual 3-Dimensional Colored Pictures in the Head** Abdellatif Abujudeh <amalwaanan@yahoo.com> (Teaching (English Language), Ministry of Education, Rusaifa, Jordan)

I claim that there is representation and actual 3-D colored pictures in the head. However, if one closes his eyes to answer a question about a detail of colors/ shapes contained in such pictures, he may make a mistake because some parts of the 'seen' view (excluding its first perfect appearance) are obscured for rivalry, unconscious processing in an unstable and differently-colored realm that is subject to illumination and other effects, and consciousness which encompasses and shows it all in general, while attention deals with a certain spot during taking pictures. To prove my claim and achieve a breakthrough, I think that brain imaging technologies such as fMRI and cognition & consciousness EEG should be used with the right candidate. To the best of my knowledge, MY CLAIM IS A FACT, regardless of all contrary views, like that of Block (1981): No one "thinks that people can literally see and manipulate real internal pictures." or Dennett's (1996): "No sane participant in the debates would claim that the product of perception was either a picture in the head –". J. Boros also says, "Rorty means in a very Kantian manner, there is no outside perspective for an independent test of the correctness of representation, because we cannot get out of our language or of our mind". Hypothetically, an external light such as sunlight, amalgamates with internal light (which recalls that sort of 'luminosity' and form of consciousness "that pervades the universe"), and together they make the eye(s) glow with two distinctive colors (red & blue) and actuate the process of taking pictures of physical objects to display on what I call the "Heavenly Screen" (HS) (violet then). The HS can also embrace, stimulus-independent thoughts that have, 'intentionally' or not, been turned into pictures persisting for a while. During mind wandering, the HS with its pictures are banished or rather remain unnoticed. On the other hand, by looking at two photos (5x10cm), one can voluntarily manipulate, project, and (with open eyes) 'see', for a long time, their represented pictures so amazingly and sterioscopically enlarged (50x100cm) on the HS. The HS is known to Locke as a 'blank slate'; to Hellie a 'field suffused with a sort of blackness'; to Deikman 'an amorphous field of blackness, perhaps with red and yellow tinges'. Aristotle says, "if after having looked at the sun or some other brilliant object, we close the eyes, then, if we watch carefully, it appears in a right line with the direction of vision (whatever this may be) at first in its own color, then it changes to crimson, next to purple, until it becomes black and disappears." He indeed 'saw' distorted pictures but could not recognize them obviously for the brilliance of the sun. All objects are, after all, either lighting or reflecting light to a certain extent. Phosphene experiences to Block (1996) are non-representations but to Tye (2000) they are misrepresentations. You just cannot imagine what you may 'see' if such experiences are at their best, taken to the extreme. **P11**

314 **Mindfulness, Anatman, and the Possibility of a Feminist Self-consciousness** Keya Maitra <kmaitra@unca.edu> (Philosophy, Univ. of North Carolina at Asheville, Asheville, NC)

This paper explores the role of Buddhist mindfulness in developing a feminist conception of self-consciousness. I will open with a discussion of the role and function of self-consciousness within feminist consciousness. Although largely unrecognized in the literature, feminist self-consciousness is an essential component of feminist consciousness and, as such, the political activity of feminist consciousness-raising is dependent on the development of a distinctively feminist self-consciousness. Mindfulness is understood in terms of certain meditative practices to attain an altered consciousness that provides a better awareness of one's bare subjectivity. In Buddhism successful mindfulness results in a cessation of suffering and pain and finally of the self itself as ordinarily understood (anatman). I will argue that similar meditative practices can play a role in articulating feminist self-consciousness. Techniques used to cultivate mindfulness can help us articulate and attain a feminist self-consciousness that takes into account the particular situations, contexts, and positions of individual women and does not homogenize them in one group in an essentialist fashion. What makes the comparative relevance of Buddhist thinking on self-consciousness to feminism interesting is their shared suspicion of essentialism and shared interest in finding ways to liberation. One of the central points of this paper is that meditative practices associated with attaining mindfulness could provide a perspective to attain self-consciousness in many feminist contexts. At first glance, this comparative engagement may seem far-fetched and at best forced. One might argue that while the Buddhist engagement with liberation is motivated by an other-worldly concern, feminist conception of liberation is fundamentally this-worldly. Even with this difference, however, it seems worthwhile to explore how understanding mindfulness and its associated meditative practices can illuminate our understanding of feminist self-consciousness. Especially if meditative practices are understood not as a means to withdraw from the world but to engage with it with a better understanding of reality, then that kind of self-knowledge can certainly be useful to understanding and raising feminist consciousness. **C14**

315 **The Consciousness of Movement** Karen Studd <kstudd@gmu.edu> (George Mason University Center for Consciousness and Transformation, Fairfax)

In learning mode we are somewhat conscious of our movement but once actions are learned they fall out of our conscious awareness **P5**

6. Culture and Humanities

316 **Twelve Beds for the Dreamer: A Poetry Performance** Máighréad Medbh <maighreadmedbh@gmail.com> (Swords, CO. DUBLIN Ireland)

Many poets are, and have been, interested in astrology. Louis MacNeice wrote a book on the subject; W. B. Yeats was chairman of the Irish Astrological Association during the 1920s. Having studied it for a few years and dabbled for several more, I find the natal chart remarkably accurate, even in the hands of this amateur, on personality traits, innate skills and propensities. As the moon is said to affect the subconscious, I decided to take note of my dreams for a month and check whether there might be any discernible connection between them and the passage of the moon through the zodiacal constellations. This was not a scientific experiment and couldn't lead to conclusions, though sometimes themes and moods seemed to coincide. What I did achieve, I think, was a sort of brief history of a subconscious. I wrote the dreams as poems, added other recurring or striking dreams, and found that they could be allocated thematic places within the twelve astrological divisions. I also noticed that the dreams could be read as reflections of the times, influenced as they were by the prevailing social environment. The performance presents twenty dream-poems in recitation, using the signs of the zodiac as a loose narrative structure. The journey is from Cancer (home, children, tradition) to Gemini (information, communication, restlessness), a road that has been walked by my generation. Dreams and poetry share metaphor and the tendency to resonate with a multiplicity of sense impressions and experiences. So the poems spread out in different directions, propelled by the dreams, their own impetus, and their birth in the night's melting pot. I hope that the presentation of these very immediate emissaries of subconscious thought might

contribute peripherally to the conference themes of mind wandering, unconscious processing, body consciousness and self and transformation. I have presented the bulk of the sequence at a conference held by the Irish Astrological Association, and was pleased to receive general approbation for the relevance of the material and the appropriateness of the sequential arrangement. I am an Irish poet with four well-received published collections. In Ireland I am well known for my dramatic performances, and I have also performed in Great Britain, Europe and the U.S. I have written three novels, containing themes of altered states, confused perceptions and emotional disturbance. I have just completed the first book in a planned four-volume story for teenagers, the premise of which is that we create an immaterial, but real world with our thoughts. My interest in the subject of consciousness arises from my own confusions about reality, perception and notions of the true. I am also engaged by the subjects of free will and guilt. The astrological chart would seem to deny free will, as does my life experience. I seek the science. My website is at (www.maighreadmedbh.ie) "Maighread Medbh is well known as a unique performance poet. Her combination of verbal panache, vital delivery, iconoclasm and incisiveness has been much remarked." (Nessa O'Mahony, poet, Dublin) **S3**

6.1 Literature and hermeneutics

317 **The Contemporary Neurological Narrative in Fiction and Autobiography (English and French Speaking Literatures)** Herve Lambert <hplambert@hotmail.com> (Faculty Of Humanities, Kyushu University, FUKUOKA, Japan)

Relations between literature and neurology are almost consubstantial since Charcot's enormous influence. Some writers related autobiographical aspects of neurological syndromes and epilepsy has been the most described neurological syndrome in literature. On the other side, neurologists like the Russian Luria, Oliver Stacks' model, wanted to keep on presenting neurological cases with a literary style inherited from the XIXth century masters. Today with neurosciences expansion, literature shows a neurological turn and a special interest for neurological syndromes. Knowledge about synesthesia dramatically improved in the last years and a lot of novels narrate the transformation of what had been previously endured as a hidden condition. Capgras syndrome is the theme of Richard Powers's The Echomaker Autism is the theme of Mark Haddon's Curious Incident of the Dog in the Night-Time, Tourette?s syndrome is the theme of Jonathan Lethem's Motherless Brooklyn. We could also mention McEwan's Saturday about Huntington's disease, Rivka Galchen's Atmospheric Disturbances about Capgras syndrome again, etc. Besides fictional narratives with neurological themes, exists a new trend of autobiographical texts about neurological conditions, like with Patricia Lynne Duffy's Blue Cats and Chartreuse Kittens for synesthesia or with Daniel Tammett about autism (and hypermnesia and synesthesia also!), or with Boris Cyrulnik about resilience, or Annie Ernaux about Alzheimer, among other examples.This paper would like to draw a conceptual map of the contemporary relations between neurology and neurogical fictional and autobiographical narratives. This paper would like to draw a conceptual map of the contemporary relations between neurology and neurogical fictional and autobiographical narratives. **P12**

318 **Science Fiction and Consciousness** Robert J. Sawyer <sawyer@sfwriter.com> (Mississauga, Ontario Canada)

Robert J. Sawyer's bestselling science-fiction novels have long explored issues of consciousness. In this keynote, Sawyer will discuss the models of and theories about consciousness he's variously employed in novels such as FlashForward (and the ABC TV series based on it, for which he is consultant and a scriptwriter), in which the consciousness of all human beings is displaced forward in time for a period of two minutes; Mindscan, in which consciousness is digitized and uploaded; Hominids, in which true self-aware consciousness arises in Neanderthals; The Terminal Experiment, in which a biomedical engineer records the final cessation of consciousness at death; Factoring Humanity, in which a technology is developed that allows surfing of the collective unconscious; and his current WWW trilogy of Wake, Watch, and Wonder, about the spontaneous emergence of consciousness in the World Wide Web. Sawyer is one of only seven writers in history to win all three of the science-fiction

field's top awards for best novel of the year: the Hugo (which he won for Hominids), the Nebula (which he won for The Terminal Experiment), and the John W. Campbell Memorial Award (which he won for Mindscan). In addition, he has won the top SF awards in Canada, China, France, Japan, and Spain. He's previously given talks at the headquarters of Google, at the Center for Cognitive Neuroscience at Penn, and at the Library of Congress, and he's been published in both Science (guest editorial) and Nature (fiction). His website is SFwriter.com. **PL11**

6.2 Art and aesthetics

319 **Exploring the Relationship Between Consciousness and Virtual Reality** Brian Betz, Gregory Little; Dena Eber <bbetz@kent.edu> (Psychology, Kent State University/Stark Campus, Canton, OHIO)

To understand the relationship between consciousness and virtual reality researchers have focused on the degree to which participants feel a sense of psychological presence in simulated environments. There are a variety of definitions for presence, however, most who research virtual environments characterize it as involving a sense of "being in" a virtual world (Schumie et al., 2001). Although a considerable amount of research has been conducted exploring the relationship between virtual environments and psychological presence, very little has been done to specifically investigate psychological presence in virtual environments that are works of art. We refer to computer based virtual environments designed specifically for artistic purposes as Artistic Virtual Environments (AVE). In addition to presence another manner to investigate consciousness experience in AVEs is to examine the nature of the aesthetic experience in such virtual environments. Just like presence, there are a number of ways to describe the aesthetic experience, which is somewhat subjective. Walsh-Piper (1994) stated that the aesthetic experience is an instant in which a person may feel "...A combination of interest and pleasure and curiosity...The moment is one of heightened attention to perception, which is what makes it both meaningful and memorable" (p. 105). Others have noted that the aesthetic experience is complex and multifaceted. In addition, the aesthetic experience may be characterized by a finely tuned state of consciousness, or an experience in which the person is in awe, intensely focused, and in pure enjoyment (Csikszentmihalyi & Robinson, 1990). Our most current research has focused the effects of cognitive factors on psychological presence and the aesthetic experience. One way we have approached this issue is to manipulate subjects' cognitive set, which is defined as specific mental predisposition one uses in approaching a situation. Another approach we have used is examining the knowledge base which subjects have to interpret their experience of an AVE. For example, we have found that knowledge of the visual arts plays a critical role in psychological presence. **A2**

320 **Transcendental Realism: An Introduction to the Nondual, Aperspectival Geometric Art of Adi Da Samraj** Gary Coates <gcoates@ksu.edu> (Architecture, Kansas State University, Manhattan, KS)

For more than forty years, artist, scholar and spiritual teacher Adi Da Samraj (1939-2008) was involved in the production of a diverse, unique and voluminous body of visual art including: Zen-like black and white ink brush paintings; color paintings; black and white and color photography; videographic suites with synchronized music, and; abstract geometric images generated by digital technology. Adi Da's purpose in all of this work was to create images which would enable the fully participatory viewer to experience at least a taste of the inherently blissful state of nondual awareness that he asserts always already exists prior to the presumption of being a separate 'subjective' self perceiving a separate 'objective' reality. To make this experience of 'aesthetic ecstasy' possible he created each image to be a 'Self-Portrait of 'Reality Itself', which he describes as being inherently 'Non-separate,One and Indivisible' and 'always already the case', prior to space-time and every separate and separative 'point of view'. Adi Da's exploration of the art of 'Reality-Itself' culminated in many thousands of abstract geometric images which he describes as being 'aperspectival, anegoic and aniconic.' These monumentally scaled images were specifically aimed at undermining

and transcending 'the structuring-force of the conventional and ego-based uses of the body as a perceptual mechanism', thereby liberating the image-making and image-perceiving process into 'the free-domain of egoless coincidence with Reality Itself'. This poster and presentation, which focuses on Adi Da's geometric art, is based observations of him making his art, a review of his published and unpublished writings, as well as direct experience of his art through study of digital archives and participation in national and international exhibitions of his art (including his highly acclaimed solo collateral exhibition at the 52nd Venice Biennale in 2007). The intention is to enhance the audience's capacity to understand and experience Adi Da's art in the radical way he intended. **A1**

321 **Bioelectromagnetism as Integrative Art Form. Towards a Non-Representational Art Practice** Luis Miguel Girao <luis.miguel.girao@artshare.com.pt> (R&D, Artshare Lda, Aveiro, Portugal)

Bioelectromagnetism is here understood as the study of the intersections of biological entities and the electromagnetic spectrum. Extending what is established as a discipline, this text brings to discussion a global perspective on this field of research and faces bioelectromagnetism as broadly as a culture. A culture of interactions between biological beings, including their spiritual dimension, in which art plays a fundamental role by creating alternative forms of communication and congregating and mediating consciousnesses at a collective level. At this stage of my personal understanding I recognize interaction within the same dimension as the sine qua non condition for art forms to be considered bioelectromagnetic. In other words, assuming electromagnetism as interactive by nature, in Bioelectromagnetic Art the electromagnetic spectrum is the main, if not the only, channel of expression. Induction is obviously the key concept in this discourse. Most of the art works dealing with electromagnetism employ either transduction or translation techniques in order to make electromagnetic variations effectively perceivable. Inducing sensations only by manipulation of the electromagnetic spectrum is what makes of bioelectromagnetism a distinct channel of expression. The phenomena described by bioelectromagnetism is obviously not new. It is something that was always around, we live in it. Quoting Sheldon Lee Glashow, "Everything we see, hear or touch is electromagnetism." (Punset, 2004). New will be the devices to operate within the spectrum, because the basic principles were already established without doubt. Even the newness of these devices is questionable, because in technological developments there is nothing really new. The new is a derivation or a combination of the old. In fact, some devices for induction of sensations within bioelectromagnetism already exist. The Microwave Auditory Effect (Frey, 1962), by means of pulsed modulation of microwaves directed to the area around the cochlea, allows the hearing of sounds without the normal acoustic process involved in hearing. The ultimate example is the induction of full Out-of-Body Experiences by means of Transcranial Magnetic Stimulation as experimented and described by Blanke and Thut (Blanke, 2007). Through the electromagnetic stimulation of the temporo-parietal junction of the human brain autoscopic experiences are induced in the subject of such stimulation. Yasuo Yuasa presents us an understanding of the human body as body of energy (Corazza, 2008). One of the manifestations of that energy is bioelectromagnetism. Interacting with humans via bioelectromagnetism opens up the possibility for non-mediated access to consciousness. Emotions and sensory perception are the primary manifestations of consciousness. The location of autonomous emotional centres throughout the body is an ancient belief that is being studied by many researchers. Hopefully that intermediary stage will contribute for the future development of integrative systems based on bioelectromagnetic technologies. Bioelectromagnetic Art utilizing these technologies will produce non-representative experiences. The world of simulations will no longer exist. Art will then be able to fully accomplish what from my perspective is its main aim: to transform consciousness. **A2**

322 **Empathising with Gregory Bateson: Ecologies of the Extended Mind** Jon Goodbun <jon@wag-architecture.co.uk> (Architecture, University of Westminster, London, LONDON United Kingdom)

"So by 'aesthetics' I mean responsiveness to the pattern which connects... which .. is a meta-pattern... [and] defines the vast generalisation that indeed it is patterns which connect." Gregory Bateson In this paper I will explore a resonance between the aesthetic theory of empathy, and the ecological aesthetics of Gregory Bateson, as a contribution to extended mind theory. The English word 'empathy' is a neologism, coined by Edward Titchner in 1908 as a translation for the German Einfuehlung. This German concept itself had undergone a remarkable intellectual journey during the second half of the nineteenth century. Einfuehlung (literally feeling into) was first developed in Young Hegelian philosophy as an aesthetic concept, a means of describing how we perceive space and form. For empathy theorists, aesthetic experience was an extended, projective process, and had important panpsychic and prosthetic dimensions. As Robert Vischer, writing in 1871 noted, the organism "projects its own bodily form, and with this also the geist [mind/soul] into the form of an object. From this I derived the notion of empathy." Indeed, in Vischer, the aesthetics of empathy was nothing less than an early form of extended mind thinking, and described the active integration of tools and environments into the cognitive organism: "I feel a stick to be an extension of my arm and an increase of my power. This is a special sense of form, which, like a foreign shoot grafted onto pure self-feeling, can be described as a continuation of it." If empathy was originally a means of grasping dynamic feedback in subject-object relations, it was not long before it expanded to the social sense that we have today. Theodor Lipps took on empathic aesthetics, and extended it to describe a theory of mind: our recognition of ourselves in each other. Today, mirror neuron and cognitive mapping research is providing support for the insights of empathy theory. A further anticipation of extended mind thinking can be found in the work of Gregory Bateson. Indeed, in many ways the work of today's extended mind thinkers - which might broadly include Alva Noe, Andy Clark, Shaun Gallagher, Evan Thompson and Nancey Murphy and Warren Brown - can be understood as a fleshing out of Bateson's thinking, despite the fact that his work is rarely referenced in this discourse. In this paper I suggest that Bateson's insight that mind (of both strongly and weakly emergent types) is a property of all structured systems has much to contribute to the extended mind thesis. For Bateson, our minds are ultimately active in loops that encompass global ecologies, although he felt that we could only experience such extensions through aesthetic intuition. Some recent theorists have returned to think about empathy (including Thompson, and Lakoff and Johnson). I develop these moves further, and consider an expanded conception of empathic aesthetics as a means of connecting with patterns in space and time: the network of selves, societies and environments that is our extended ecology of mind. **P6**

323 **A Human/Computer Artistic Collaboration Using Patterns to Generate Abstract, Spiritual "Paintings"** Lucia Grossberger Morales <cyber-chica@cox.net> (Lucia Grossberger Morales Art, Tucson, CA)

My current work is a series of digital images, "Meditations on Computer Patterns." Some of the artists that have influenced this work are Mark Rothko, Wasilly Kandinsky, and Helma af Klint, all addressed spirituality, using abstraction, in their work. Many of their images were inspired by abstract mystical concepts, including; the universe is alive; the dualities, such as female and male, vertical and horizontal, dark and light can be transformed into a state of non-duality, and the imagination is real. Much of their work was based on abstract concepts, often using pure geometrical shapes, particularly circles, squares and spirals, which have their basis in mathematical abstraction. In this new work my goal is to create images that evoke the spiritual, using pure mathematics, generated on the computer. The final product is either video or a giclee print on canvas. Computer and human intelligence have unique abilities when it comes to pattern generation and pattern recognition. Humans have pattern recognitions skills which are difficult to simulate on the computer, for example, it turned out to be more challenging than computer scientists expected to create an algorithm to distinguish between a cat and a dog. Yet very young children can differentiate between then easily. Human's ability to

recognize patterns in the environment and consciously act on the information is an important adaptive ability, for example, recognizing a lion in the forest. On the other hand, computers are particularly well suited to generating patterns from simple equations, as well complex nonlinear-iterative equations. In addition to being a computer artist, for over thirty years, I am a painter. I am accustomed to the physicality of paint and brush strokes. These images are not created out of a physical act and the abstract mathematical equations don't look anything like the final work. Creating these images is both a rational and intuitive process. I decide on the equations, a basic idea of what I want and then I begin to change the variables. I don?t know what the final image will be and often am in a trance-like state, a state of flow, as I change the parameters, watch the computer generate the image in real time, then finally, I choose the images that speak to me. It might be possible that by digitizing my choices, evaluating them, algorithms might be able to select the images I would find aesthetically pleasing, but my tastes change through time and are affected by the zeitgeist. The software does not, can not evaluate what are aesthetically pleasing images for me. Perhaps, it as difficult for a computer to decide what is aesthetically meaningful to me as it would be for me to generate the iterative patterns that the computer processes so quickly. I would have not have imagined many of these images and certainly would not have created them without the computer, yet by generating thousands of them, I have selected a few they satisfy my aesthetic sensibilities as a painter. **A1**

324 **Aesthetics of Consciousness** Jennifer Hall <jhall@massart.edu> (Mass College of Art and Design, Boston, MA)

It is reasonable to start with what we see and what we do when describing an interactive experience. In fact, this is primarily how we have come to critique most interactive art. However, in an attempt to refocus our attention towards why we may be drawn to art, this paper will introduce a slightly different perspective. Instead, I will consider how the material elements of the brain apply to a philosophical potential of aesthetic perception. Much of what occurs at the internal biological level mirrors action at the full body level. So when an artist builds a case for an aesthetic experience, she is also building a case for the material properties of perception and consciousness itself. As brain functioning may suggest how we behave in the larger world of being, aesthetics may function as a way to locate these perceptual exchanges within the multiplicity of self-awareness. The implication for how we view, make, and critique art is important here because what we see as evidence of the artist's process is also modeled simultaneously in the synapses of the brain. A we no longer look at the brain to be the engine of the body, the decision maker, or even the sole source of consciousness; one is not a trigger of the other, but rather consciousness is an emergent pattern that can be found at many levels of experience. So when art is experienced, these patterns repeat to iterate both the biochemical and the mechanical locomotion of consciousness. The pattern is reciprocal - consciousness creates the aesthetic moment, and the process of experiencing art becomes a reflection of our consciousness. Interactivity becomes an instrument for this understanding in action. We do, we see, we feel, we comprehend, and we react all as part of a whole action of becoming conscious. Contemporary art that explicitly stretches into these boundaries equates work that fosters an inter-subjective contribution to the transformation of the historical mind/body duality. Developing an interactive aesthetic is part of an awareness of this exchange, and manifests the literalness of this by working beyond a singularity of the sense, and towards a relational nature of a new corporeal understanding and aesthetic experience. Intersubjectivity performs within phenomenology the valuable function of empathy, which involves experiencing another body as another subject (and not just an object among objects). In doing so, one also experiences oneself as seen by the other, and the world in general as a shared world (instead of one that is only available to oneself). Intersubjetivity is functional in the arts de facto, because it flourishes in the rarified circumstances of the artwork that is viewed by an art audience, who frames it separate from the everyday world. In the aesthetic exchange, participation is the constant search for meaning through these special connections. Things and people are meant to move and interact. The 'thing' or the person does not emerge until this exchange occurs. **P12**

325 **Vision-Space: A New Form of Illusionary Space** John Jupe, Andrew Baker (Swansea Metropolitan University SMU, UK; Darren Adams (ChaosTrend Ltd, UK) <johnjupe1@googlemail.com> (Atelier Vision Ltd, Bristol, North Somerset United Kingdom)

Vision-Space (VS) is a new form of illusionary space based not on the structure of optic and central perspective but on the structure underlying the phenomenon of vision (perceptual structure). The fundamentals of optics have almost nothing to do with it! There is no information structure 'blur' in vision. There is no 'motion blur' in vision. There is no 'depth of field' in vision. There are no 'pictures' in vision. No picture frames. No exposure times. No frames per second. There's no process of binocular (stereo) fusion taking place in vision! The twin drivers in the creation of VS have been a combination of understandings from1st person data drawn from visual artists and 3rd person data drawn from computational vision science. 'The so called deformations in visual art show us flashes of perceptual structure (Prof Jan Koenderink D.Sc).The natural linkages from VS through phenomenology and neuropsychology are self evident as the data structures of the twin processing streams involved in VS mirror the often opposed 'realities' that can be attributed to the right and left hemispheres as expressed by Dr. Iain McGilchrist (The Master and his Emissary). As we appreciate, conscious visual awareness is dependent on the various forms of attention and intent that call them up. Having charted these through intuitive study and then interrelating them with what is understood scientifically, the influence that these causal factors enact while controlling the various compositions of data appearing across visual field VS can be deployed within representational media. VS presents us with the potential to introduce this order of 'meaning' into representational media. The appreciable attributes of Vision-Space media are that viewers are able to recognize and participate in, an artificial rendition that is closer to an as perceived 'real-setting'. This more subjective 'experiential' reality can be contrasted with a wholly objective and hence deficient 'virtual' one. The new media is more immersive, communicative and enables a new range of spatial judgments (essential proximity cues) to be understood by the viewer. VS clearly points towards the possibility of more immersive artificial environments without the requirements for specialist eye-ware or screen technology. Where the optical structure of the 'picture' formed the basis for the age of film media throughout the 20th C, its perceptual structure and the structure of 'images' that will form the basis of digital media in the 21st C. However, there are more significant fish to fry here than the creation of more 'effective' toys! It would appear that we have a means of moving directly into perhaps the opening gambits to first chapter for a science of consciousness. As VS moves from a commercial architecture into an academic architecture resulting in a robust real time technology, it will be possible to generate, in controlled manner, a new range of stimuli from which to obtain psychophysical data into perceptual structure and its command structure. **A1**

326 **The Intersection of Art and Science in Cinema: "Yesterday Was A Lie"** James Kerwin, Chase Masterson <kerwin@mac.com> (Helicon Arts Cooperative, Glendale, CA)

'Yesterday Was A Lie' is a new film by writer/director James Kerwin and actress/producer Chase Masterson who will give this presentation. The film's story was influenced in part by, and includes references to: 1) Dean Radin's physiological presentiment tests, 2) the 'pigeon hole' analogy for the non-linear time experience (proposed by Fred Hoyle and Paul Davies), and 3) the theory of objective reduction of 'alternate' quantum realities (proposed by Roger Penrose). These issues will be discussed with selected scenes from 'Yesterday Was A Lie', providing a unique perspective into how science in cinema can be used to entertain, inform and inspire. 'Yesterday Was A Lie' screened in over 50 festivals on four continents, at which it received 25 awards (including 12 for 'Best Feature'). It was named one of the ten best films of the year from the festival circuit by 'Film Threat' magazine. 'Yesterday' opened theatrically in December, is scheduled for release on DVD March 23. The presentation will also explore the so-called 'high motion problem' in filmmaking. Recent advances in psychology and psychiatry effectively contradict the 'persistence of vision' concept in cinema theory. There is no current, commonly accepted explanation for why audience members fail to experience suspension of disbelief when watching films or television programs which are captured and projected in 'high motion' (i.e., over 40-48 images per second) as opposed to the standard

24 or 30 frames per second. 'Suspension of disbelief' is a concept in cinema theory used to describe the fact that audience members psychologically allow themselves to 'forgive' the fact that the images and story they are watching would, on the surface, appear to be unbelievable. If a cinematic image appears too realistic, audience members fail to experience suspension of disbelief, and therefore 'disbelieve' what they are watching. 'High motion' frame rates result in increased believability but decreased enjoyment due to the audience's perception that the images they are viewing are 'too real.' We reject certain proposed theories that this is based upon cultural conditioning, and give examples as to why such an explanation is unlikely (examples include the Todd AO experiments in 50 frames-per-second film and British television drama). We propose that this phenomenon is a direct result of the number of conscious events per second in the human brain. **C6**

327 **Art, Indeterminacy and Consciousness** Robert Pepperell <pepperell@ntlworld.com> (Fine Art, Cardiff School of Art & Design, Cardiff, United Kingdom)

One of the functions of the brain and perceptual system is to categorize data from the world into discrete meaningful chunks and so impose distinctions on the world that are consistent with the biological needs of the perceiver. However, under certain conditions such as deep meditation, when afflicted by particular agnosias, or when faced with visually indeterminate stimuli, these object distinctions break down or disappear altogether. The world can then appear as indeterminate, i.e. devoid of the objective distinctions that characterize our habitual engagement with the world (a mode of perception termed 'nirvikalpa' in Indian psychology). I will show that artists have long understood this contingent nature of objective distinctions and tried to create works that evoke indeterminate perception by dissolving the hard, deterministic boundaries around objects. This has resulted in varying degrees of visual indeterminacy in art movements such as impressionism, fauvism, cubism, and abstract expressionism. I will discuss my own paintings, which attempt to induce a visually indeterminate state in the viewer, and the collaborative work I have done with psychophysicists and neuroscientists to investigate the effect of indeterminate artworks on subjects' responses and brain functions. This indeterminacy in visual experience is analogous to the inherent indeterminacy operating at quantum levels of reality, according to the standard Copenhagen interpretation. I will suggest that the viewer who interprets an indeterminate image is attempting to 'collapse' many potential states into an actual state in the same way states of quantum superposition are said to collapse during observation of sub-atomic events. This, I will argue, suggests a role for consciousness as the process by which the inherent indeterminacy of nature is resolved into the more determinate world we experience. I will close with the claim that the experience of trying to resolve visually indeterminate states demonstrates how the conscious mind acts to bring the world into being for us. **C6**

328 **Do You See What I See: Commonalities in Synesthetic Art** Carol Steen <rednote2@infohouse.com> (New York)

Although awareness of synesthesia has existed for over 300 years, until relatively recently scientists seldom studied it, believing it difficult to explore despite countless similar, though idiosyncratic, anecdotes. They asked can synesthesia be real when what one synesthete reports seeing has little resemblance to what another synesthete says they see when both experience the same 'trigger'? For example, one synesthete might describe the sound of a trumpet as a biomorphic blue shape, yet for another, it would look like a red pinprick of intense, moving light. In the 1920's, one of the scientists willing to do research on people who experienced synesthetic photisms, though only from having taken hallucinogenic drugs, was the noted experimental psychologist, Heinrich Kluver. He, among others, wondered if there were any commonalities in what people saw and asked them to draw or paint their visions. He discovered that people drew the same sorts of things and he called these basic forms of perception, "Form Constants". However, the fact that researchers sought measurable evidence for synesthesia presented no obstacle to genuine synesthetic artists who literally perceive the world differently from individuals without synesthesia and who quietly use the commonalities they experience to create their works. Even if one is not aware of having synesthesia, these

"Form Constants" have a way of appearing unconsciously in the artworks of those who are synesthetic and these commonalities can be found if one knows what to look for. In my paper, I will show Heinrich Kluver's "Form Constants", as identified by him and others, and discuss various synesthetic elements that some artists, including David Hockney - who knew about synesthesia, and Charles Burchfield, who didn't, used in their works. I will also explore how visual synesthetic commonalities can be used to investigate the possibility that some artists who are no longer living, like Van Gogh, were synesthetes. **C6**

329 **The Virtual SEER [Self Extension and Experience Realization] in Phenomenological Self Exploration within the Creative Process** Tonietta Walters <tonie@theartsoffice.net> (Center for Applied Aesthetics, NoumenArts Institute, Lauderhill, FL)

The SEER [Self Extension and Experience Realization] Model of Creativity is a synthesis of Self-Type 33: Extended Self-Development and Mind Type 41: Experience Realization Forms (Greene 2001) from the extensive creativity meta-research by Richard Tabor Greene, Professor of Knowledge and Creativity at Kwansei University in Japan. The SEER Model both identifies a personal methodology in the phenomenological investigation of inner experience and brackets highly subjective portions within the creative process and aesthetic experience of an artist. The Virtual SEER Exhibition delves into the world of Xhyra Graf - the nom de souris of Tonietta A. Walters, artist and philosopher. The XhyraGraf was born in the MMORPG of Second Life where she putters around meeting people, doing things and going places. She takes photographs that chronicle her experiences, makes the occasional never to be seen in real life sculptures and rather disjointedly tries to maintain her studio and gallery space. Per Roy Ascott, British artist and theorist "Second Life is the rehearsal room for a future in which we endlessly create and distribute our many selves." (Ascott 2007) The XhyraGraf documents the POP3D - Points Of Presence (Walters 2003) in 3D virtual reality of being in its freest form so far as extended into a freely realized construct that includes the physical representations of the color of her skin or the shape of her body and the social representations of the clothes worn, the land owned, the home studio or the entertainment and religious establishments visited. A 3D walkthrough within the Second Life MMORPG and immersive virtual environment adequately enriches the sensory perceptions and phenomenological aspects of digital display. The 'art viewer' would experience an immersive environment and a sense of spatial interactivity with the artworks as in a virtual reality game. Both 2-dimensonal and 3-dimensional artworks will be displayed including narratives in digital snapshots of Second Life experiences, virtual sculpture and Xhyra Graf's reinterpretation of real life artwork such as Epistemai Logos (Walters 2001), A Phenomenological Approach (Walters 2002), Zone: Points of Presence (Walters 2003), Layers of Experience (Walters 2004), The Quality of Red-Bottom Up (Walters 2006), My Last Nerve: Pinpointing the Neural Correlates of Emotion (Walters 2006), Lead Weights: No Concept of Deep Structure Here Either (Walters 2006), and Axis Mundi (Walters 2006). The resulting installation of artwork, including narratives or reference information on supplementary papers and virtual exhibitions, creates an immersive virtual gallery exhibition environment documenting instances of Self Extension and Experience Realization that can be interactively experienced from anywhere in the world. Visit the Virtual SEER here: http://slurl.com/secondlife/Flinders%20University/207/73/26/?title=Flinders%20University%20Social%20Science **A1**

330 **Exploring the Relationship between Affective Response, Psychological Presence and the Aesthetic Experience in a Virtual Environment** Brandi Whitemyer, Jon M. Cefus, Kent State University, Stark Campus; Dr. Brian Betz, Kent State University, Stark Campus <bwhitemy@kent.edu> (Psychology, Kent State University, North Canton, OH)

Affective response has been demonstrated to be a defining quality of the aesthetic experience (Freedberg & Gallese, 2007). Cognitive processes by which an individual judges such an experience also hold a reciprocal relationship with the affective response of the individual. Much of the processing of cognitive responsiveness and affective reactivity, particularly in relation to artistic content, results in positive and negative states of consciousness, often pro-

cessed as the individual returns to homeostasis (Watt, 2004). Further, the degree and quality of the individual's affective response will tend to determine the specific quality and strength of an individual's felt aesthetic experience (Freedberg & Gallese, 2007). The aesthetic experience is characterized by object focus, freedom and active discovery and interest (Csikszentmihalyi & Robinson, 1990; Csikszentmihalyi, 1996). Additionally, Riva et al. (2007) found a direct relationship between the strength and quality of an individual's psychological presence while experiencing virtual environments and the affective response of the individual. Psychological presence is defined as the sense of being there, or having the sense of being in a world that exists outside of the self, resulting from complex, multi-dimensional perceptions of sensory data and various cognitive processes. Recent research has demonstrated that linguistic processing of the affective response to images, through verbalization or writing, leads to significantly diminished affective responses (Tabibnia, Lieberman & Craske, 2008). The affective response can be down-regulated through the use of written or verbal linguistic processing, as opposed to ruminated upon, which produces a diminished overall response (Graf, Gaudiano, & Geller, 2008). Additionally, written and verbal processing techniques are highly effective methods of regulating both positive and negative states of consciousness, in the attempt to regain homeostasis (Watt, 2004). Linguistic processing of the affective response has also been linked to heightened aesthetic experience when processing responses to creative media (Csikszentmihalyi, 1996). Mediating the affective response in the virtual environment could have a number of beneficial effects in better understanding and controlling the factor of psychological presence, improving the aesthetic experience and minimizing negative effects of the virtual environment. In our recent study, we have explored how subjects may have responded to an Artistic Virtual Environment through expressing written affective commentary. We examined the responses of subjects following their exposure to a desktop artistic virtual environment. Content analysis was performed, concentrating on subjects' comments on their experience viewing the virtual environment. In this study, 80 subjects viewed a five minute desktop artistic virtual environment and were given the opportunity to comment on their experience in a written post-experimental format. We have found that psychological presence and absorption play a key role in increasing the subject's tendency to express written commentary in response to these environments. Further, we also found that negative responses were more commonly expressed and that females were less likely to provide a written response than males. **P6**

6.3 Music

331 **Music as a Transformative Tool** Katherine Creath <kcreath@ieee.org> (College of Optical Sciences, University of Arizona - Optics/Music, Tucson, AZ)

In previous talks here I have presented research results showing that music has a statistically significant physiological effect on a biological system. Music has been shown by other researchers to have psychological and healing effects on listeners. Intuitively, we know that music moves us and triggers response in ways no other medium can. Who among us has not experienced a magical transformative moment while listening to music? Response, however, is not universal. A song that causes one person great joy can cause another great sorrow. Music can help facilitate transformation in a variety of ways. Think of times when you used music to help you focus your consciousness on a particular problem. Or when a song evoked a particularly clear memory. Or how a concert you attended resonated into your deepest soul. Because music is a vibratory phenomenon and we ourselves are composed of energy, then it makes sense that our choice of music not only helps to define us, but can also help us heal, and aid in transformation of self at a very basic level. My research on physiological effects of music grew out of my personal experiences as a performer as well as research in the 1960's led by Helen Bonny showing that psychedelic experiences could be triggered by music. Bonny's finding led to the development of a method of Guided Imagery and Music (GIM) as a tool to help work through psychological issues. Using a Jungian model, it was hypothesized that music enables taking a person deep within their psyche wherever they need to go to work out an issue. This method is totally nonlinear and has documented many transformational results.

One of the keys to using music as a transformative tool is the choice of music. Not only how it relates to an individual, but how it relates in terms of the musical and energetic space it contains and supports. Different performances of the same exact piece of music can have very different effects on different people. One performance may connect to people on a very deep level, whereas another will not. Many performers understand these connections, but many do not. Once these parameters are understood by performers and practitioners, it should enable them to better facilitate music choice for a particular transformative purpose. This paper will review research studies on biological systems showing correlations between music and direct and indirect psychological and physiological transformation on biological systems. Clear relationships between musical sound and consciousness are obvious when we consider how biological systems are affected by music. In this context a model of sound healing and the relationship with vibration will be presented based upon global optimization, simulated annealing and chaos theory to aid researchers in the development of methodology to further test the transformational powers of music. We will also discuss the various dimensions of musical space as well as quantitative and qualitative parameters involved in choosing the most effective music for use as a transformative tool. **A2**

332 **Think a Song! Brain, Mind, Consciousness-the Musician's Way** Alexander Jon Graur <graur@medicamus.com> (President, Medicamus Italiana Torino, Pavarolo, TO Italy)

In the ancient civilizations of Athens and Rome, of China and India, music was considered and studied as a science, together with mathematics and grammar. And there is a logical reason for that: Music is the link between abstract and concrete thinking. It prepares the mind to understand the abstract thinking and to apply it to the concrete, living world. Music is also a language, with a vocabulary, a grammar and syntax. Ever wondered how come that people belongings to ALL the cultures in the world can (and do) learn Music? It is because Music is the most abstract language; together with the mathematics it is the pure product of the human consciousness. Plus the lively effects on the brain-mind-organism relationships. It is working on these relationships that I developed my neurotherapy. I am a professional musician with a medical school background, and I think that music is a science above all: because the rules the Music used and apply are the rules of the logical thought and consciousness. In this presentation I would like to present and analyze the musical thought in relationships with both the consciousness? aspects and the living applications of the consequences in neurotherapy. **P6**

6.4 Religion

333 **Spiritual Discernment Profiling: Further Quantitative and Qualitative Analyses: Religious and Political Affiliation Profiles** Robert Benefield, Lisa Belknap Univeristy of Texas at Tyler <rbenefield@etbu.edu> (Behavioral Sciences, ETBU, Marshall, TX)

Previous reports (see Benefield, Newman, and Shaffer, 2008 and Benefield and Newman, 2007) regarding the findings of the Spiritual Discernment Project have summarized quantitative and qualitative analysis of responses of participants (n=938) to the Spiritual Discernment Survey (SDS) and content analysis of websites and blogs hosting discussions specific to spiritual discernment. The current study confirms the previous findings regarding the effects of two demographic variables (religious affiliation and political orientation) on the factors that constitute the ascribed characteristics of spiritual discernment. The quantitative data from the current report is the analysis of recent respondents to the SDS (n=248). Specifically, analysis of variance of the quantitative data base indicated that spiritual discernment profiles based on religious affiliation could be constructed for five of the seven spiritual discernment factors: good vs. evil, new age spirits, the nature of God, God initiates behavior and prerequisites to discernment. That is, responses to the questions regarding these five factors and total factor scores could be reliably predicted based on the participants' religious affiliation. The second factor (political orientation) was found to significantly affect six of the seven spiritual discernment factors. Thus, politically conservative and political liberal participants were found to differ significantly on the following factors: good vs. evil, gift versus learned discernment, new age spiritual concepts, the nature of God, prerequisites to discernment, and God initiates

behavior. Similar data were obtained by examining z-scores comparing means of religious and political preference clusters and grand means and correlations between the responses to the SDS by political conservatives and one cluster of religious affiliates and political liberals and a second cluster of religious affiliates. These data taken together permitted the construction of spiritual discernment profiles as a function of religious and political affiliation. The qualitative component of this research focused on the analysis of 'spiritual' blogs and websites each of which addressed issues related to spiritual discernment. Specifically, qualitative content analysis of the frequency of the seven factors comprising the ascribed characteristics of spiritual discernment were examined in both Christian and non-Christian blogs and websites (n=67). Using a paired-observations methodology and maintaining reliability coefficients of .80 or higher, the frequency of discussion of the spiritual discernment factors at each blog and/or website was determined. For all data, the following five spiritual discernment factors were discussed most frequently: 1) 'gift versus learned ability,' 2) 'how God communicates,' 3) 'prerequisites to discernment' 4) 'new age/spirits,' and 5) 'discerning good versus evil spirits.' The 'how God communicates' data was examined for the Christian blogs (n=47) and non-Christian blogs (n = 15). Christian blogs produced the following top five 'ways that God communicates': 1) Sacred Scripture or Bible, 2) (leadership of or baptism of the) Holy Spirit, 3) Listening/Silence, 4) Inner Voice, 5) Prayer/Meditation. Non-Christian blogs produced the following top five listing: 1) Experiences in nature and Light, 2) Insights, Dreams and Out of Body Experiences, 3) Sacred Scripture, 4) Inner Voice, 5) Prayer/Meditation. **P12**

334 **How the Myths of God and Mind Emerged from the Evolution of Internal Communication** Jack Friedland <jack@adeeperintelligence.com> (New Gateway Press, Fountain Hills, AZ)

The objective of this presentation is to show that the ideas of God and mind are metaphysical constructs that were created to serve as reference points for our internal communications. The argument is as follows: When we are communicating with someone else, it is clear at any point in the conversation who is the speaker and who is the listener. There is rarely any confusion regarding this matter. This dynamic however, changes completely once our communications become internalized. The question of who is speaking and who is listening becomes an open one in that the speaker and listener remain to be defined. Our need to have a speaker and a listener in our internal communications, much as we do for our social communications, leads us to create the metaphysical entities of God and mind. When our internal communications are simple internal verbalizations or monologues, the idea of God serves as the reference point for these intrapersonal communications. As our internal verbalizations and monologues evolve into internal dialogues, the metaphysical constructs of the self and mind become the reference points we created to represent the speaker and/or listener of these inner dialogs. The implication of this idea is that God and the mind do not exist as anything more than necessary metaphysical reference points for our internal communications. They are, in other words, myths. This theory is supported by the near universal creation and acceptance (with cultural variations, of course) of the metaphysical ideas of God, self and mind. However, more than just reference points for our internal communications, these metaphysical constructs represent where we believe our personal, subjective experiences emanate from. The implications of this approach for the ideas of consciousness, self-awareness and the mind-body problem will also be discussed. **P6**

335 **Similarities Between the Hard Problems of Qualia and of God** Stanley Klein <sklein@berkeley.edu> (Optometry, UC Berkeley, Berkeley, CA)

It may come as a shock to secular scientists studying consciousness that many of our issues are mirrored in the science-religion debates. The ontological status of qualia and of God have many similarities. Both deal with the connection of subjectivity and objectivity. This paper is on the connection of the "Hard Problem" of qualia (Chalmers, Tucson 1994) and the problem of understanding God's actions in an age of science. It describes eight approaches common to qualia and God. a) PANENTHEISM. Wikipedia's panentheism entry is sufficient to make the connection between recent (and old: Hinduism, Sufism and Hasidism)

theological thinking and approaches to consciousness that start with mind. Incidentally, pantheism doesn't qualify since without a personal God, it doesn't deal with subjective states like compassion. b) NEW RULES AT BOTTOM. Protoconsciousness (e.g. Chalmers) and Process theology (Whitehead) introduce slight modifications of rules at the bottom to account for qualia or God's action in the world. c) NON-INTERACTING REALMS. The epiphenomenal mind-body duality in the realm of qualia and Gould's "non-interacting magesteria" together with Hume's "can't get ought from is" in the realm of religion are examples of non-interacting dualities. d) CHRONO-THEOLOGY AND FREE WILL. Libet's research on the timing of urge-initiated volition has been called chrono-theology because of the importance of free will in many theologies. e) EXPERIENTIAL. The raw experience of qualia or of God together with their neural correlates are further examples of parallelism. f) MODERN DUALISM. Based on a quantum mechanics metaphor, it differs from the "new rules at bottom" duality (item b) and the "non-interactive" duality (item c) in enabling multiple, compatible worldviews. g) AGNOSTICISM. Regarding qualia: Crick/Koch say let's first figure out the Easy Problems before worrying about the Hard Problem. Regarding religion: many progressive theologians say let's first accomplish God's mission on earth in this life before worrying about a less certain afterlife. h) ATHEISM. Dennett connects the two realms by arguing that both qualia and God are meaningless. CONCLUSION. The parallels between these eight approaches to qualia and God are so close that one wonders whether these two communities of scholars (scientists and theologians) can learn from each other. Neuroscience progress in relating subjective states to objective neural activity is indeed impacting progressive religion. The Institute on Religion in an Age of Science (IRAS) discussion group frequently discuss qualia and the connection of the subjective and objective worldviews, as well as recent articles in the Journal of Consciousness Studies. Roger Sperry published several papers on the emergence of consciousness in Zygon, the IRAS journal. In the other direction, religious practices can shed insight into different states of consciousness and awareness. From its founding days, the Tucson Towards a Science of Consciousness conferences have had a component showing the relevance of various religions to our understanding of consciousness. The goal of this paper is to make explicit how the discussions we have on a broad range of consciousness topics connect to parallel discussions on a broad range of religious topics. **C14**

336 **Why Synthesia Matters: Spirituality** Maureen Seaberg
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Synesthesia has been experienced situationally in meditative states as proven by Roger Walsh in his 2005 paper, "Can Synesthesia Be Cultivated? Indications from Surveys of Meditators?" in the Journal of Consciousness Studies This points to a spiritual connection to the gift, which has been cited in religious literature from The Old Testament's Exodus, to The Kabbalah to ancient Buddhist texts. Ms. Seaberg will do a survey of spiritual synesthesia through the centuries and speak on her own experience as a synesthete and journalist. **C14**

6.5 Mythology

6.6 Sociology

337 **Disease Consciousness, Illness Consciousness and The Behavior or Actions Taking Medical Treatment of The Prostitute in Bei-tou** Chao-Huei Laii
<dj222307246@hotmail.com> (STS, National Yang-Ming University, Taipei, TAIWAN Taiwan)

Facing this issue, people associate with that prostitute should pay more attention to their body and health subconsciously while others prefer to make those prostitute be managed by government. I do strongly inquisitive about that what opinion these female hold about their health. Not only about their body but also their psychology. There is no need for me to put any emphasis on the risk of the walk of life. Many experts to warn as multiple sexual companions may lead to get venereal disease. As we know, gonorrhea, even AIDS. Many of the world's academic organization share a belief that multiple sexual companions, sexual behavior of

gays-these are high risk group who may get AIDS more easily than heterosexual. But history present many instances about the patients who got AIDS are heterosexual. And those people merely be a prostitute as a work. Furthermore, why prostitute seldom become illness or disease is worth noticing. It even might be said maybe they're already hold some social-technical network to operate skills to avoid it. For instance, from my study, the disease they got the most are common cold and vagina infected. Base on the study by WHO, it define health by two aspects: mind and body. If we want to check somebody suffers from a kind of disease, we need some physiological data to prove, but illness not. Based on the difference between disease and illness, the individual agency and consciousness, I firmly belief that the stereotype of the prostitute is the high risk to get disease should have be considerable conscientious, **P6**

6.7 Anthropology

338 **Consciousness, Language and Symbolic Thought in Albert Einstein's Relative Space-Time: New Inter-Disciplinary Perspectives in Einstein's Mechanics of Relativity** Nildson Alvares Muniz <alvaresmuniz@bol.com.br> (Independent Researcher, Brasilia, Distrito Federal Brazil)

The main objective discusses the role of consciousness,figurative language and symbolic thought in Albert Einstein's conceptualization, figurativisation, and metaphorisation of relative space-time. The second objective presents new inter-disciplinary perspectives in the field of consciousness studies in order to discuss Einstein's conceptualization, figurativisation and metaphorisation of relative space-time as a symbolic language act. The third objective discusses the role of consciousness, figurative language and symbolic thought in Einstein's innovative method in order to confirm Theory of General Relativity. When a total eclipse of the sun was introduced as a new method of observation and measurement of sun light deflection in Einstein's Theory of General Relativity. This methodological innovation has become a long-standing enigma in Einstein's formulation of Relativistic Mechanics. This method verified the sun light in May 29,1919 in Sobral,Brazil,when it introduced an observation of a total eclipse of the sun as a new method of investigation and confirmation in Modern Physics. The fourth objective takes an inter-disciplinary perspective among the following academic disciplines, Semantic Anthropology, Phenomenology, Cognitive Linguistics, Hermeneutics, Cognitive Grammar, Semiotics, Structural Anthropology, Imagery Anthropology, and Cognitive Semantics in order to explain the above methodological innovations,namely, in Albert Einstein's conceptualization, figurativisation and metaphorisation of relative space-time. The main question our paper discusses is two-folded. First,a general problem,namely,which meaning does figurative language have in Einstein's experience of cosmological order, and the second question of particular aspect, namely,which meaning does cosmological order have in Einstein's representation of relativity. With this analytical perspective,we intend to answer why and how Einstein's conceptualization, figurativisation, and metaphorisation of Relative Space-Time does establish a scientific and a conceptual revolution in Modern Physics. Since 1919, there have been numerous interpretations of Einstein's Theory of General Relativity in Modern Physics, when Einstein presented an innovating conception of Cosmology with new scientific consequences for human knowledge and for the Human Gender. Taking an inter-disciplinary perspective, we consider the main contribution of prominent theorists in the following fields, such as Cognitive Linguistics, Phenomenology, Cognitive Grammar, Semiotics, Semantic Anthropology, Hermeneutics, Cognitive Semantics, Imagery Anthropology, and Structural Anthropology in order to discuss the role of consciousness, figurative language,and symbolic thought in Einstein's conceptualization, figurativisation and metaphorisation of relative space-time. In order to carry out the objectives above cited,we mention some of the main theorists identified in our study,such as, Immanuel Kant, E.Cassirer, R.Rorty, J.Searle, J.Fodor, H.Putnam, E.Sapir, B.L.Whorf, L.Bloomfield, N.Chomsky, S.K.Langer, Joseph Kokelmans, J.L.Austin, Hans-Georg Gadamer, K.Otto Apel, L.Wittgenstein, A.J.Greimas, G.Lakoff, M.Johnson, Paul M.Churchland, D.Chalmers, D.Davidson, E.Husserl, P.Ricouer, M.Merleau-Ponty, C.S.Peirce, G.Bachelard, G.Durand, T.Kuhn, P.Feyerabend, W.Noth, C.Geertz, C.Levi-Strauss, G.Durand, M.Silverstein, T.Deacon, N.Nersessian, P.Thagard, R.N.Giere, Bas Van

Fraassen, among the main theorists identified to carry out this inter-disciplinary research. Since 1919, Einstein's innovative scientific method and experience have been considered to be one of the most important contribution to Modern Physics, so we argue that our results so far obtained in order to discuss the Physics of Einstein,if they do not completely solve and contribute to a clear and a concise comprehension of Einstein's long-standing enigma of relative space-time, they point at least to some new inter-disciplinary scientific perspectives in our comprehension of the much complex, but fascinating field of man-language-myth-natur **P6**

6.8 Information technology

339 **Molecular Nanobrains - The Future of Consciousness?** Anirban Bandyopadhyay, Satyajit Sahu, Daisuke Fujita <anirban.bandyo@gmail.com> (Adv. Scanning Probe Microscopy, National Institute for Materials Science, Ibaraki, Japan)

Currently mankind is trying to send robots to moon. For hostile environments,robots appear dumb, even if a minute change takes place in the details of its surroundings, the robot fails in its operation. For the day-to-day works,decision-making parameters change unpredictably, several parameters are required to be addressed at a time; however manmade technology does not provide us with this particular feature in the hardware. In our brain, one neuron talks to 10,000 others and take decision collectively, however, in CMOS circuits we see that a device takes output from its previous one and send the signal to the immediate next. In this linear process entire computation is carried out, all solutions are predictable and everything has to be defined in a predictable manner. In our daily life, our environment changes always, never remains the same again, therefore human processors become useless in a continuously changing scenario. Therefore we need to change the fundamental architectural principle of a decision-making hardware. With this view, we built nano brain in the year 2008, wherein a molecule could control 16 others at a time logically. We have improved and succeeded in collective processing of 750 bits at a time. Simultaneous operation of 1000 bits in a standalone nano brain unit is underway. Going through this process, shall we be able to create true intelligence, adaptation, creativity one day? How far are we from generating consciousness? Can we really be able to do that? To answer these questions, we will concentrate on higher level logic and how their implementation in a hardware will enable us doing amazing things in the coming future. **PL10**

340 **Mindfulness and Video Game Play: A Preliminary Inquiry** Johnathan Bown, Jayne Gackenbach <johnathanbown@gmail.com> (Psychology, Grant MacEwan University, Edmonton, Alberta Canada)

Being present to the moment has long been espoused among eastern meditative traditions as a central idea in the development of consciousness. This attentional attribute has recently been focused upon by Western psychologists as mindfulness. Various associations between mindfulness and well being have been identified. Several researchers have also noted an association between scores on mindfulness scales and psychological absorption. In this research program we have been investigating the proposition that the attentional demands of video game play may be affecting the consciousness of players. In the present inquiry two measures of mindfulness were administered to hard core gamers and students on websites and in face to face settings. One measure was structured to inquire about mindfulness in general while the other was structured to inquire about mindfulness while playing a video game. It is expected that hard core gamers will be mindful while in the game but less so outside the game. Game play history was assessed in two ways; questionnaire asking about the participants? History and a scale assessing the degree to which subjects felt present in the video game they played just before filling out the questionnaires. Finally, a scale assessing a general immersion tendency, which is comparable to psychological absorption, was included. It was expected that presence, immersion and video game play history would be positively associated with each other and to some degree with at least the mindfulness during gaming inventory. Almost 400 individuals filled out the surveys. Slightly more than half were women (53%) and about 76% were students under 25 years of age. Five questionnaires were administered: Video Game

History, Kentucky Inventory of Mindfulness Skills, Mindful Attention Awareness during Video Game Play Scale, Immersive Tendency Questionnaire, and Presence Questionnaire. Only those who reported that traditionally hard core games (i.e., first person shooter, strategy, action, adventure, and role playing) were their favorite type were included in the subsequent factor analysis. Only 77 of these played a game prior to filling out the surveys. For these 77 individuals, most of whom were male (n=57), a factor analyses was computed based on scale and subscale scores and items including gender. These variables were entered into a principle component factor analysis and five factors emerged. The first factor offers support for the primary hypothesis. That is, the younger they were when they began playing and the more presence they felt while playing a recent game were associated with a tendency to experience immersion and with three mindfulness scores from the Kentucky Mindfulness scale and one from the video game mindfulness scale. The other factors further illuminated this relationship. In this preliminary inquiry we found some support for the hypothesized relationship between game play (history and presence) and mindfulness attenuated by a tendency to become absorbed (immersion). When gender entered the equation then gaming was either negatively related to mindfulness (females) or not related to mindfulness (males). **P6**

6.9 Ethics and legal studies

341 **Consciousness and Human Rights: Preservation and Protection of Consciousness-Based Technologies of Indigenous Peoples** Lurleen Brinkman <lurleen2001@yahoo.com> (American Indian and Indigenous, University of Tulsa College of Law, Lawrence, KS)

Even as Western scholars are beginning to explore the ontology and science of consciousness, many consciousness-based technologies are in a critical state of existence throughout the world. That is, many indigenous and traditional knowledge systems, such as mind-body healing practices, in addition to critical languages, are on the brink of extinction. This presentation will address the issues of American Indian and other indigenous peoples of the world in their quest to preserve and protect their local, consciousness-based technologies. This presentation will also address the role of the Western researcher in the appropriate reflection of consciousness-based technologies in academia. The methodology for this presentation will include critical analysis, comparative analysis, and case studies, and will conclude with a discussion on the guidelines (as they relate to consciousness studies in academia) from the 2007 U.N. Declaration on the Rights of Indigenous Peoples. **P6**

342 **Key Bioethical Questions at the Cusp of Our Assuming the Governance of Evolution** Timothy Dolan <timothydolanenterprises@gmail.com> (Public Administration, The Catholic University of Korea, Bucheon, Gyonggi Do Korea, Republic of Korea)

A theme review of the 58 principle articles published in The Journal of Bioethics (AJB) was conducted for content pertaining to genetic policy. The initial review found some references with one special issue with specific focus on individual access to genetic testing. Many deal with popular concerns around the seemingly perennial question of the status of human fetuses in stem cell research and cloning. Other articles are more prosaic ranging from moral questions over the development and use of performance-enhancing technologies for soldiers in the military to the emergence of nanotechnology as a legitimate concern for bioethicists. If this topical inventory is at all representative of the field, bioethicists have indeed at least begun to wrestle with this very significant emerging issue while maintaining a focus on those perennial ones. A further analytical breakdown of governance themes indicates the focus clustering around the following: 4 articles on personal control of genetic information; 2 of which also spoke to governmental policy on this dimension) 7 articles on government policy primacy over genetic innovation (3 focusing on shared governance with individual control over a: personal genetic information (2) and b: corporate involvement (1) 3 articles on corporate policies governing genetic products (1 of which seeing shared government policy formation and regulation on the issue of monopoly patent rights) 1 article on physician primacy on decisions to use biotech in the treatment of patients. If this snapshot actually represents the distribution of foci among bioethicists, then it would suggest that the emphases are somewhat misplaced.

This is because the locus of control is structurally split between corporate and government entities in their respective roles of product makers and regulators. The only remaining issues at this point are to determine the range, depth and locus of regulation to impose including enforcement protocols. The basis for this view comes specifically from the U.S. Supreme Court?s 1980 Diamond v. Chakrabarty decision essentially ruling that recombinant genetic material is patentable and is thus, by extension, property. This does not mean that public or professional influences are insignificant, but it does mean that evolution has essentiallyl been corporatized. To clarify one critical point, life forms that exist in nature are not patentable, but new life forms created by human manipulation of genetic materials that did not previously exist in nature, are. Thus, we can anticipate and preferably manage not only a wealth of new medicines and vaccines, a quantum leap in the green revolution, but a rationally regulated neo-eugenics that focuses on informed individual choice to extend human possibility beyond the constraints of convention and culture. **P12**

6.10 Education

343 **Building Better Human Beings from the First Flickering of Consciousness. Activating mastery of art & science of being human - Learning to lift the skirt of consciousness & take advantage of yourself.** Natalie Geld <bighandsproductions@msn.com> (Los Angeles, CA)

The mind leads - the body follows. Simple, right? Not really. From our first flickering of consciousness, we are taught what to think, not how to think. Unfortunately, most of us know more about our iPhone Apps than about what makes us tick. Thoughts and emotions tweak our chemistry and, in turn profoundly shape our lives. We humans are walking chemistry Labs - Petri dishes for our own human experiments - quantum possibilities awaiting our observation. We look at the great minds as being anomalies. They use their minds differently - consciousness is key. This is our time to begin introducing students to the vital, exciting and challenging domains of consciousness, of our quantum potentiality. In the 2008 conference, Brack and Hill noted that most undergraduate and graduate students in the healing sciences "... admit to distrusting science as any form of guide for working with "real human problems." And they proposed: "helping to map human problems onto the domain of Quantum Mechanics, Chaos/Complexity theory, and Consciousness offers exciting new perspectives on the human experience." Great idea - let's grease their wheels before they reach grad school. Many in general are science phobic, thinking science is something for what's 'out there.' Generally our chemistry, biology and physics courses in primary education (perhaps even secondary and beyond, you tell me) tinker with external forces to reveal process and potentiality; using equations, beakers, elements, a blowtorch, philosophical discussions, or a frog, cat, pig and scalpel. Our bodies, our minds are mysterious and fascinating and the perfect 'tools' for mastering the art and science of being human; the practice of which illuminates the resonance of science in our lives. Supple, fertile minds of youth are eager for the discovery of how to tap and use their potential, and wither when their studies and experiences don't make sense for them. There is opportunity for expanding current curriculum to include an experiential examination of consciousness. Quality instruction on the science of being human, simplifying our complex mind/body maps and experimenting with our individual chem labs, will generate improvements for students across the board - including critical thinking, creativity, self-reliance, innovation and motivation, as well as building a foundation for free thinking minds. I turn my 10 minutes of Q&A time toward you, to spark a dialogue and tap into this collective consciousness, this very dazzling pilgrimage of mastery and ingenuity for 'how.' **P6**

6.11 Miscellaneous

344 **Did Mirrors Cause Consciousness?** Peter Reynolds <j.rathbone@mypostoffice.co.uk> (Runcorn, Cheshire United Kingdom)

Vilayanur Ramachandran described a case where a Cap Gras syndrome sufferer thought that his own image in a mirror was an impostor. Ramachandran refuted the Freudian explanation of the syndrome, rather suggesting it to be caused by damage to the connection between frontal cortex and emotive centers. I suggest that what Jacques Lacan was observing during his Freudian 'mirror phase' is the connection between frontal cortex and emotive centers whence the infant is using his primal ability of 'habitat tracking' to track his internal feelings onto his reflection. This primal ability to 'track' also occurs in brain structures subsequently responsible for 'reading', in fact, 'reading' having 'invaded' these structures about 5000 years ago.Historically, Julian Jaynes described a change in the nature of consciousness over a period which he described as involving 'The breakdown of the bicameral mind'.I do not dispute Lacan or Jaynes results, rather I reinterpret their findings as being due to the connection and coordination of the forebrain with the emotive centers, as described by Ramachandran in the case of Cap Gras.I posit that Jaynes is observing the spread of a mirror technology originating in Pharonic Egypt and arising accidentally from the discovery that gold produces a robust flexible mirror image which with continued ritual use, imparted the property of introspective consciousness upon the pharoahs. I believe that the discovery of 'mirrors' happened at least twice in human evolution. The first time by accident - when an early hominid picked up a piece of pyrites and instantiated consciousness in his brain - so becoming human. Feedback with the mirror gave rise to precise coordination of the lips with sounds generated, so condensing a gestural language into a spoken one and producing the coordination necessary to paint. However, early hominids did not realise what their interaction with portable mirrors was doing to them and so mirrors were overlooked. Thus this spoken language was not developed into a written language for tens of thousands of years until the pharoahs again accidentally discovered gold and the properties mirrors produced. Before the pharoahs use of mirrors - all civilisations worshipped the stars and their Gods were often half-man half-beast. This happened because the mirror-self effectively invaded structures previously used for other functions. In doing this - the new consciousness was/is mirror inverted. Hence images of other humans were mistakenly overlaid on images of animals. The Sphynx - Angels - Minotaur. Other brain functions were bestowed with other counterparts. A 'past' used to track signs of food was now situated in counterpart to a projection into the future. Up was confused with down. The heavens appeared to be as 'real' as the ground. All civilisations built upward toward an equally perceived reality of a future in the sky. The Pyramids, Stone Henge, The Nazca patterns. Mirrors had produced a mind which perceived a real future in the sky. I postulate that this may have occurred due to the way in which we scan images during conscious perception arranging sensory data so that it integrates and supports our primary rapid sense of vision.(R/L) **P6**

345 **Concepts Concerning Collective Consciousness, the Cosmological Constant, and the Search for Extraterrestrial Intelligence** Kasey Wells, Stephan Adelson <kw@empyreumenterprises.com> (Innovation, Empyreum Enterprises, Lexington, IL)

Accepting one's own mortality can be a difficult concept to come to terms with. The majority of the world's population seeks religion as the means for maintaining morality and finding peace with death. This paper (while part science; part science-fiction) intends to present one specific way in which all of our conscious actions throughout our lives may continue to be interpreted post-death: by The Collective (Cosmological) Consciousness. Thus, providing an alternate purpose for exercising ethics and understanding the eternal from a point of view that lies outside traditional religious contexts. Through observing Albert Einstein's Theory of Special Relativity, understanding spectroscopy, and knowing the rate at which the speed of light travels (186,000 miles per second) it is speculated that light is a conduit through which consciousness is continually carried across the cosmos. Hence, any heat or light be-

ing reflected off of, or emitted from our planet will continue to radiate out into the universe (omnidirectionally) for an indefinite span of space and time. Now, if one were to consider the advancements mankind has made in space-telescope technology in the past 50 years and if one's imagination perpetuated toward a future path of picturing continual space-telescope technological growth in the pursuit of discovering extraterrestrial intelligence; then one might eventually imagine a time when the human-race will possess space-telescope technology capable of zooming into distant earthlike planets and observing their surfaces much in the same way our space-satellites view "Google Earth" today. If such technological feats are achieved... and if such observations are made... and if "we" witness biological interactions occurring on the surfaces of these planets... then it can be reasonably assumed that "we" will continue to keep a close watch on such relations. One might also presume that such observance over such interactions may contain the ability to affect and/or influence the consciousness of the observer. Furthermore, if one believed in the possibility that there may be intelligent civilizations in our universe whom already possess such technology, then one may be lead to the realization that every conscious action anyone has ever engaged in, on this planet, has carried with it the potential to affect and/or influence our distant "cosmic-kin" for an underdetermined amount of light-years to come. "Like throwing a rock in a pond..." all of our conscious actions eternally undulate out into the universe through the conduit of light (The Cosmological Constant.) All of our lives are on permanent light record. The universe may be watching. What shall they see? **P6**

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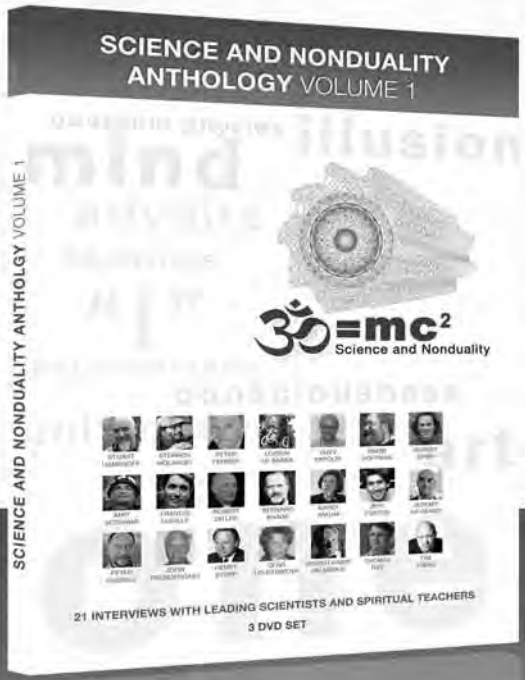

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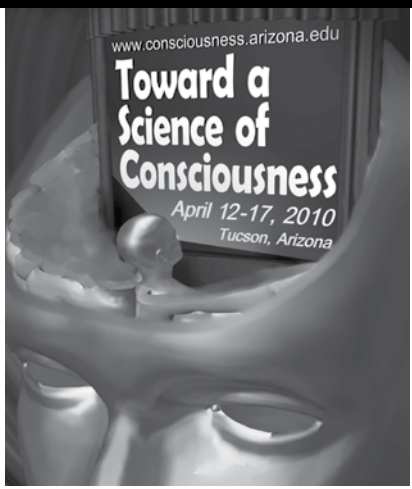

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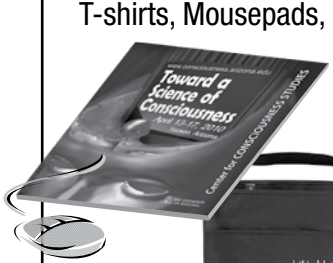

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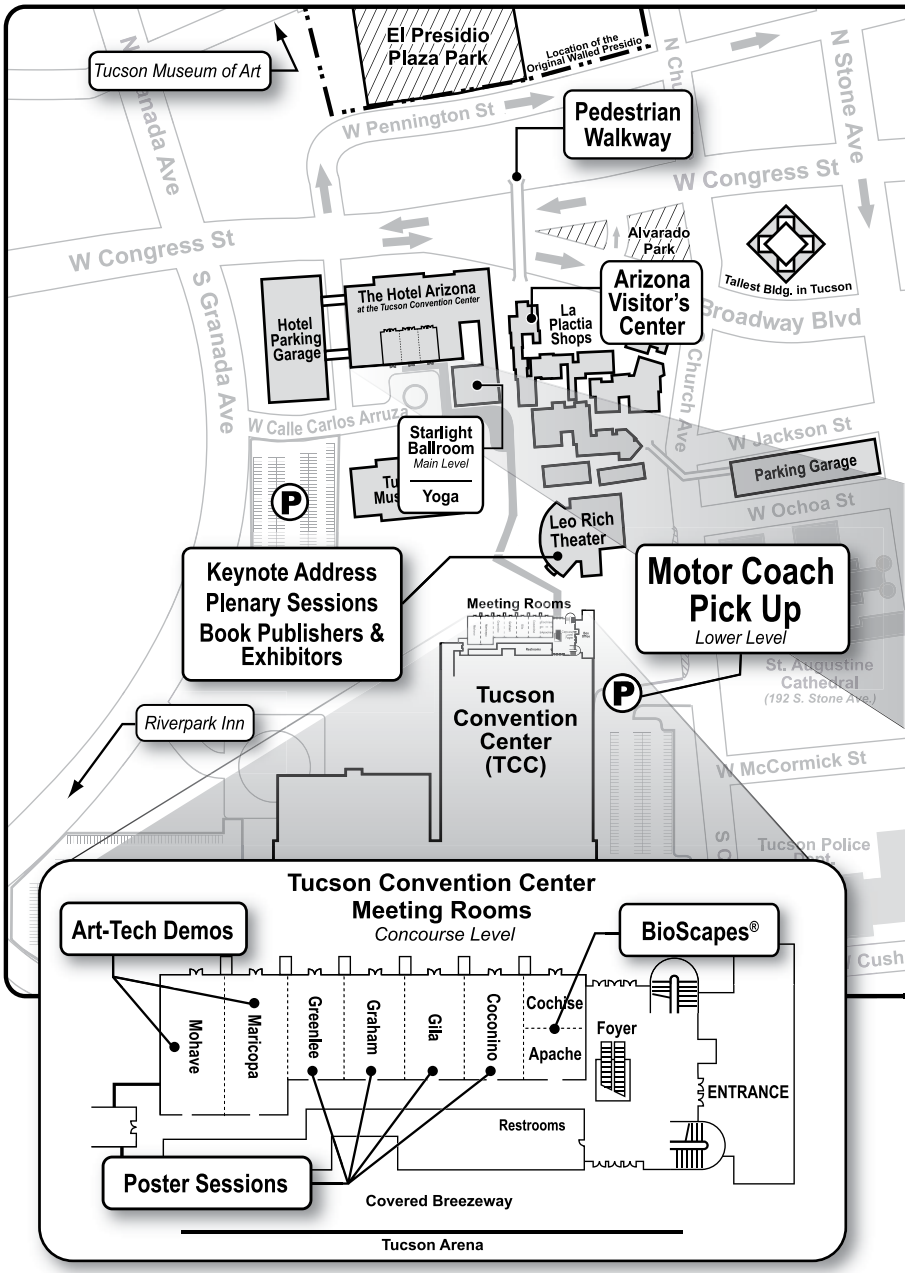

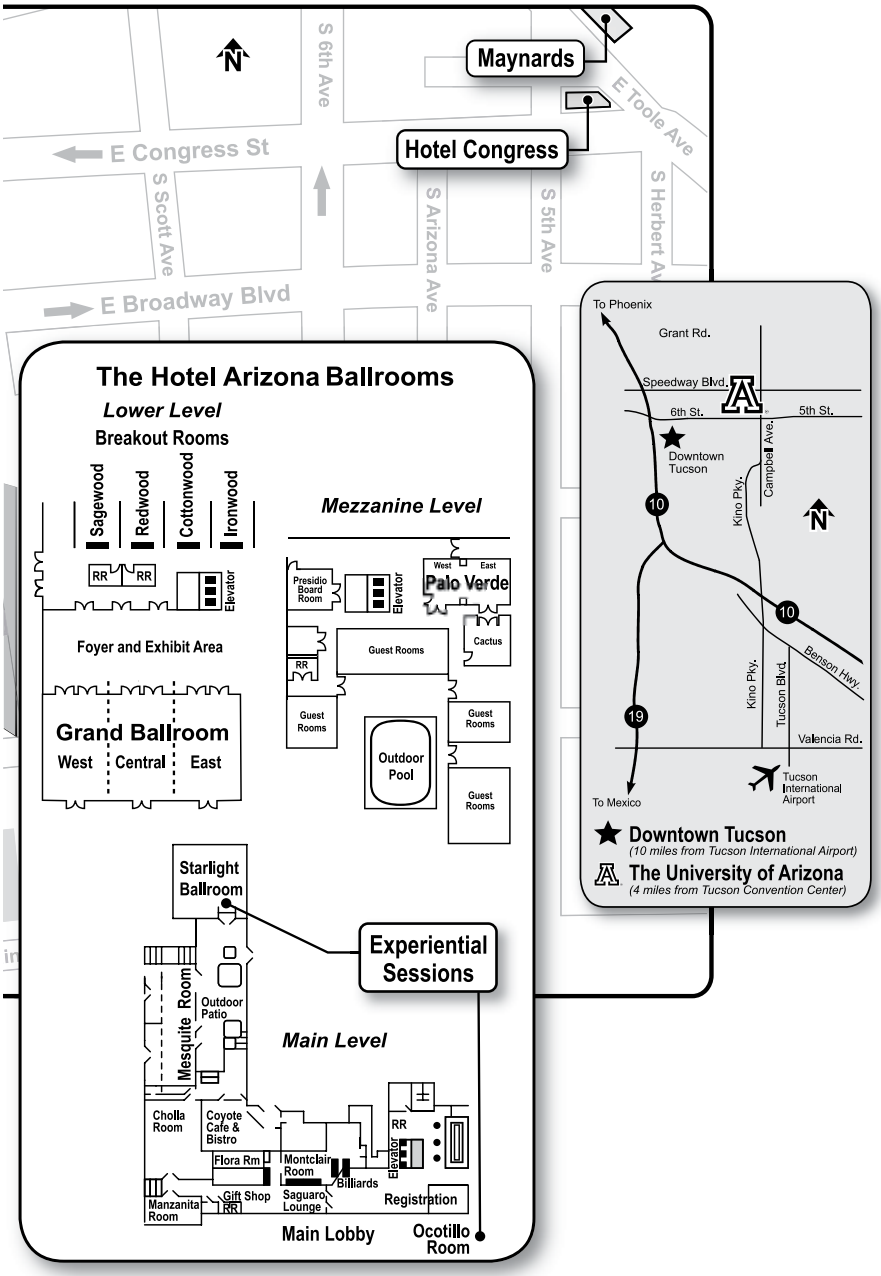
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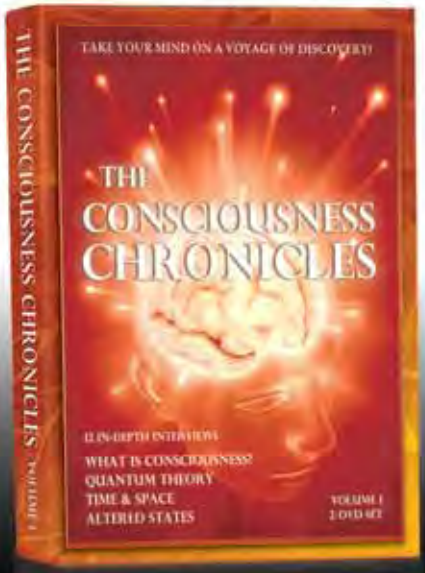

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