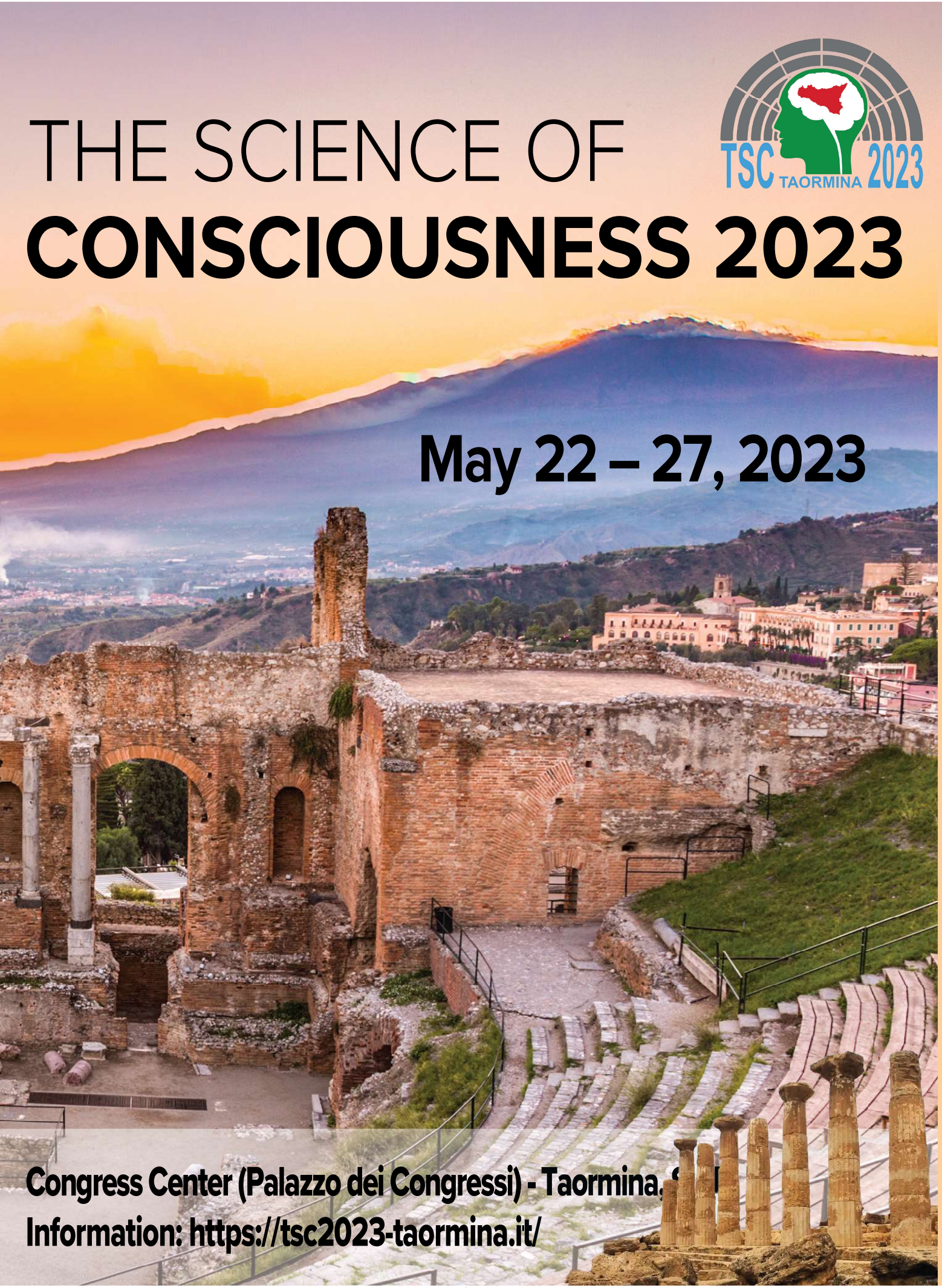
THE SCIENCE OF CONSCIOUSNESS 2023

TSC TAORMINA 2023



May 22 – 27, 2023

Congress Center (Palazzo dei Congressi) - Taormina, [illegible]

Information: https://tsc2023-taormina.it/

Organized by Stuart Hameroff, Antonio Chella, Riccardo Manzotti and Pietro Perconti

THE UNIVERSITY OF ARIZONA Center for Consciousness Studies

Università degli Studi di Messina

UNIVERSITÀ DEGLI STUDI DI PALERMO

IULM università iulm

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Special thanks to all Committee Members, Presenters, Volunteers and Staff.

Special thanks to:

Anna Lucentini bisazza gangi Viaggi e Turismo

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Additional Thanks to *Domenica Bruni*

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ABSTRACTS & PROGRAM SUMMARY
The Science of Consciousness – Taormina 2023
May 22-27, 2023
Congress Center Taormina (Palazzo dei congressi)

The Taormina Science of Consciousness TSC-2023 is the 29th international interdisciplinary conference on fundamental questions and cutting-edge issues connected with consciousness.

The Science of Consciousness (TSC) *is the largest and longest-running interdisciplinary conference emphasizing conceptual, empirical, cultural, and even artistic approaches to the study of consciousness. Held annually since 1994, the TSC conferences alternate between Tucson, Arizona, and various locations around the world. TSC conferences continue to bring together various perspectives, orientations, and methodologies within the study of consciousness. These include not only academic subjects within the sciences and humanities, but also contemplative and experiential traditions, culture and the arts. TSC aims to integrate viewpoints and bridge gaps, appreciates constructive controversy, and pursues the spirit of genuine dialogue. The format of the conference includes plenary sessions, in-depth workshops, concurrent presentations, poster sessions, and social events.*

TSC Taormina 2023 *will include themes such as neural underpinnings of consciousness, embodied cognition, integrated information approaches, free-energy principle, disjunctivism, hallucinations, dreams, intentionality, first-person experience, anesthetics, psychedelics, animal cognition, quantum biology, phantom limbs, dual-aspect monism, mind-object identity, bistable perception, religious studies, evolution, language, embodiment, time consciousness, neuroscience, phenomenology, and will offer a complete overview of the state of the art of consciousness science and studies.*

TSC Tucson, Arizona is planned for April 22-26, 2024, and will celebrate the 30th annual Science of Consciousness conference.

Contents

Benvenuti a Taormina per il TSC2023!
Welcome to the TSC2023!

Dear TSC2023 Participant,

It is with immense joy and anticipation that we welcome you to this edition of TSC2023, set to take place in the stunning and ancient land of Sicily. This region, many centuries ago, was the cradle of Greek thought, which significantly contributed to our critical understanding of reality.

We find ourselves living in tumultuous times, witnessing epochal revolutions in technology and science that challenge our conceptions of existence and humanity. Consciousness remains the central problem of philosophy and science, and it is our firm belief that its understanding will require a profound revolution in our cultural roots and the assumptions that currently underpin philosophical speculation, scientific thought, and technological progress. The new frontiers of artificial intelligence and robotics, advancements in neuroscience, the deepening of cognitive science themes, and the challenges posed by quantum mechanics and information theory provide us with numerous opportunities to address the most important questions: What are we? What is consciousness? What is our place in nature?

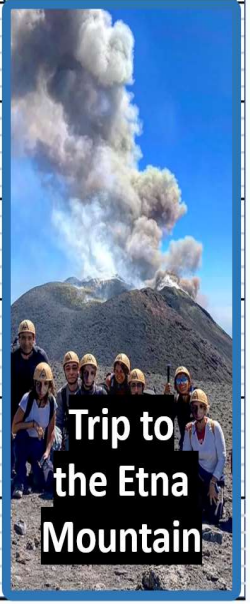
Thus, without further ado, it is with the greatest pleasure that we eagerly await your participation at TSC2023 in Taormina, a land of infinite beauty and surprises!

Welcome! Benvenuti!

Antonio, Riccardo, Pietro, and Stuart

Taormina, May 5th 2023

PROGRAM AT A GLANCE

	May 22 Monday	May 23 Tuesday	May 24 Wednesday	May 25 Thursday	May 26 Friday	May 27 Saturday
8:00			Experiential time	Experiential time	Experiential time	Experiential time
8:30		8:30 Welcoming speech				
9:00	**W1**: 9:00-13:00 Workshops 1-4 Ethical issues of AI and consciousness Contextual Emergence and Consciousness Quantum Computing and Collapse of the Wavefunction Varieties of Consciousness and Contemplative Practice	**P1**: 9:00-10:45 **Quantum Brain Biology** Travis Craddock Jim Al Khalili Stuart Hameroff	**P3**: 9:00-10:15 **Neuroscience** Jay Sanguinetti Orli Dahan	**P5**: 9:00-10:45 **AI & Consciousness** Manuel & Lenore Blum Owen Holland Susan Schneider	**P7**: 9:00-10:45 **Consciousness & Evolution** Frans de Waal Giorgio Vallortigara David Edelman	**P9**: 9:00-10:10 **Free Will** Mario De Caro Alain Morin
9:30						
10:00			10:15-10:45 Coffe Break			**K3**: 10:10-11:00 **KEYNOTE** Sir Roger Penrose
10:30		10:45-11:15 Coffe Break		10:45-11:15 Coffe Break	10:45-11:15 Coffe Break	
11:00		**K1**: 11:15-12:30 **KEYNOTE** Anil Seth	**Poster session 1** 10:45-12:15	**K2**: 11:15-12:30 **KEYNOTE** David Chalmers	**Poster session 2** 11:15-12:30	**Concurrents** **11:00-13:00** **C33-40**
11:30						
12:00						
12:30		12:30-14:00 Lunch Break	12:15-13:30 Lunch Break	12:30-14:00 Lunch Break	12:30-14:00 Lunch Break	
13:00	13:00-14:00 Lunch Break					
13:30						
14:00	**W2**: 14:00-18:00 Workshops 5-8 The Unity of Consciousness and the Subject of Experience Quantum Biology Unifying Fundamentalist Theories of Consciousness The role of embodiment in self-aware humans and robots	**P2**: 14:00-16:30 **Phenomenal Experience** Nicholas Humphrey Kevin O'Regan Shaun Gallagher Uriah Kriegel	**P4**: 13:30-16:30 **Hallucinations** Fiona Macpherson Heather Logue Alex Byrne Riccardo Manzotti	**P6** 14:00-16:00 **Intentionality** Tim Crane Pietro Perconti Alberto Voltolini Nancy Salay	**P8**: 14:00-16:30 **EM & Resonance Theories** JohnJoe McFadden Tam Hunt Michael Levin Anirban Bandyopadhyay	
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16:00						
16:30		16:30-17:00 Coffe Break	16:30-17:00 Coffe Break	16:30-17:00 Coffe Break	16:30-17:00 Coffe Break	
17:00		**Concurrents** **17:00-19:00** **C1-8**	**Concurrents** **17:00-19:00** **C9-16**	**Concurrents** **17:00-19:00** **C17-24**	**Concurrents** **17:00-19:00** **C25-32**	
17:30						
18:00						
18:30						
19:00		**Welcome Cocktail**		**Social Event**	**19:00 Discussion** Humphrey - Castano	

TSC TAORMINA 2023

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May 22-27 2023

Taormina (Italy)

Concurrent Sessions TSC2023

Tuesday 23

C1 Ontology of Consciousness

13	Marcus Schmieke	Four valued logic of consciousness
114	Peter Boltuc	Deflationary nonreductive physicalism. May awareness be 'creature consciousness', and may AIs have it?
142	Michaela Zadra-Gößnitzer	The Nature of Consciousness
245	Lorenza D'Angelo	On the Non-Sensory Nature of Valent Experience
271	Jakub Mihalik	Phenomenally Manifest Subjectivity and the Experiential Multiplication Problem

C2 Epistemology

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308	Rex Welshon	Joint Attention, Extended Attention, Joint Extended Attention, and Joint Extended Consciousness
401	Alberto Barbieri	A Phenomenal Character-Based Account of the Phenomenal Unity of Consciousness
423	Andrea Velardi	On the possibility of a strong emergentist account of consciousness
399	Elisabetta Sacchi	Perceptual Content, Phenomenal Character, and Externalism

C3 Machine Consciousness

322	Anja Lueje	Towards a criterion for assessing conscious processing in IA systems
325	Jesper Tegner	Unity of our Awareness of Being in the World compels Subjective Agency a Will to Survive
345	Iris Oved	The View from Outside the Matrix: Doing Philosophy of Mind and Cognitive Science with Virtual Worlds
181	Giuliano Sterrantino	Prospects for Integration as a Solution to the Combination Problem
30	Luis Mazas	Mind as a processor of conscious and unconscious mental contents

C4 Neuroscience

408	Robert Pepperell	Consciousness as a product of energy transfer in complex material systems
103	Sulamita Frohlich	A Theoretical Study of the Role of the Oculomotor Cranial Nerves in Consciousness
149	Mareike Wilson	Spontaneous Necker-cube Reversals are not that Spontaneous – An EEG Study
303	Melia Bonomo	A graph model of sound encoding in the ear
91	Jesús Martín-Fernández	Awake neurosurgery for brain tumors in polyglot patients: Do languages share the same brain regions?

C5 CognScience & Psychology

372	Beverley Zabriskie	The Dreams of Scientists
166	Kaitlynn Sims	Assessing Dogs' Attention to Their Owner: Still-Face Interactions with Household Dogs
440	Ellen Joos	Explicit and implicit measures of temporal order judgments in Schizophrenia and Bipolar Disorders
426	Donnchadh O Conaill	The Unity of Consciousness and the Subject of Experiences
334	Angelo Gemignani	Report from a Tibetan monastery

C6 Physical Science & Biology: Quantum

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7	Bogdan Oralbekov	"The Minkowski it from the Penrose quantum bit". Continuation of John Wheeler's "It from bit" concept.
32	Matti Pitkänen	Comparison of Orch-OR hypothesis with the TGD point of view
130	Joachim Keppler	A Field-Theoretical Model of Brain Dynamics Reveals the Mechanism Underlying Macroscopic Quantum Coherence and Its Significance for the Formation of Conscious States
256	Betony Adams	Nuclear spin qubits: quantum coherence and entanglement in the brain

C7 Quantum Approaches

120	Daniel Sheehan	Beyond Turing: Testing for AI Sentience via Precognition
98	Seungjoo Ahn	Study on a Topological Quantum Computation Model for the Orch OR Theory
247	Wolfgang Tschacher	A Concept of Intentionality Based on Complexity Science
452	Alessandro Chiolerio	Liquid intelligence: advancements across the synthetic domain
365	Arik Shimansky	Proposing a solution to the hard problem by extending Sarfatti's PQM approach

C8 Culture & Humanities

336	Tobi Zausner	Archetypal Symbolism and Altered States of Consciousness in Prehistory
47	Mette Høeg	The value of literature in the age of neurocentrism
403	Harald Walach	In Praise of Death – A Critique of the Transhumanist Program of the Abolition of Death
327	Karsten Wendland	AI Consciousness - Insights from a Technology Assessment Perspective.
16	Rosalyn Berne	A Phenomenologically Informed New Ethics of Engineering and Technology: Implications of other-than-human consciousness

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418	Ron Chrisley	Physical omniscience and meta-knowledge: Why Mary learns what it is like to see red when she leaves the black and white room
190	Artem Besedin	Methodological Illusionism About Qualia
202	Davide Bordini	Self-Representationalism, Intimacy, and Mental Representation
213	Bradford Saad	Dancing Qualia Revisited

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413	Daniel Kim	Naïve Realism and Sensorimotor Theory: A New Response to the Problem of Perceptual Presence
278	Kranti Saran	Against GOTHic Hallucination
198	Joseph Neisser	Memory experience, metamemory feelings, and the doctrine of concordance
346	James Pustejovsky	Meaning to Mean: A Precondition for Sentience and Understanding in Large Language Models

C11 Panpsychism

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477	Paavo Pylkkänen	Active information, neural processes and conscious experience
318	Andrew Bailey	A New (Jamesian) Panprotopsychism
348	Robert Van Gulick	The "Combination Problem", physicalism, integration theories of consciousness and virtual selves.
433	Abre Fournier	Humanity's Transformation from Industrial to Noospheric Selves

C12 NCC

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151	James Pagel	The Neuroelectric Fields of Consciousness
165	Daniel Montoya	What Is It Like To Be A Brain Organoid? Implications of Biological Neural Networks for Consciousness and AI.
216	Adam Eisen	Propofol-Induced unconsciousness destabilizes neural dynamics across cortex
237	Paradeisios Boulakis	Large-scale cortical deactivations precede episodes of mind-blanking during ongoing mentation

C13 Neuroscience

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264	Ksenia Toropova	The effects of associative learning on neuronal activity and functional connections in the conscious mouse brain resting state networks
287	Azadeh Hassannejad Nazir	Investigating the neurodynamics of intentionality in terms of attractor networks
289	Alessandro Scaglione	Social Interaction Enhances Inter-Brain Synchrony
306	Hans Liljenström	On the Evolution of Intentional Complexity

C14 CognScience & Psychology

158	Makayla Vermette	Connections between Self-Reported Inner Speech, Theory-of-Mind, and Self-Awareness
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167	Nadia Kolesnikova	Validity and Reliability of Inner Speech, Theory-of-Mind, and Self-Awareness Questionnaires
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307	Fernando Rodriguez	Frame by frame? A minimal time consciousness model.

C15 Physical Science & Biology

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462	J. Bruno Debruille	Electromagnetic field (EMFs) theories of consciousness: experimental evidence.
263	Aliakbar Kouchakzadeh	Perception of Time's Passage in Quantum Consciousness Theories
177	Martin Timms	Experimental Geometrical Musical Language (GML) Nested Clock Universes, the Definition of Bindu and the Philosophical Similarities to One That Arises From Simulation
227	Vasileios Basios	Non-local correlation deviations of randomness as traces of critical consciousness-state changes.

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150	Amit Chaturvedi	Reconsidering the "Memory Argument" for Reflexive Awareness
298	Vahid Ehsanian Mofrad	Are real and virtual experiences indistinguishable? Disembodied brain in a vat vs embodied brain
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331	Bruno Neri	Summer School "Consciousness and Cognition": an integrated multidisciplinary approach of the University of Pisa between Western and Eastern traditions

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Thursday 25

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3	Anand Vaidya	Nyāya on Perception and Illusion in Relation to the Debate over Disjunctivism
225	Claudia Passos	What do recurrent processing theories predict about infant consciousness?
451	Geoffrey Lee	The Methodological Puzzle and the Prospects for a Theory of Consciousness
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358	Aleksandra Mroczko-Wasowicz	Perceptual experience and its objects

C18 Representational Issues

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172	Brandt van der Gaast	Phenomenal States, Analog Representation, and Hume's Missing Shade of Blue
182	Jason Ford	Visual Snow Syndrome and Representationalism
214	Bar Luzon	Representation is Re-presentation

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435	Masataka Watanabe	A Platform for Experimental Validation of Various Hypotheses on Consciousness and Seamless Mind-Uploading
144	Ignazio Infantino	Artificial consciousness and ethics in social, collaborative robots: a discussion on realistic scenarios and PeACE model description.
302	Aïda Elamrani	To what extent can machines be conscious?
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188	Caroline Prodhon	Will Quantum Computing Enable Strong Artificial Intelligence?

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316	Ryder Dain	The Trouble with Consciousness as a Mental State

C21 NCC

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405	Andrea Lavazza	Human brain organoids, a new frontier in consciousness studies
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72	Andrew Budson	Consciousness as a Memory System
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240	Carolina Maria Oletto	The Honeycomb Illusion is not an Illusion

C23 Physical Science & Biology

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C24 The Concept of Consciousness

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255	Gergely Csépány	The problematic of the "new" and the criteria of scientificity in the area of consciousness
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349	Albert Newen	The ALARM theory of consciousness: a two level theory of phenomenal consciousness
321	Krzysztof Dolega	Phenomenal properties are virtual properties

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79	Diane P Gillard	Apparent Motion: fMRI and EEG Evidence for the Where and When of Visual Consciousness Does not Support the Multiple Drafts Model

C27 Psychedelics

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311	Zeus Tipado	Tripping in Extended Reality: Psychedelic Use of the Future
436	Valerio Pascucci	Psychedelics research as a data-intensive science
445	Giuseppe Vitiello	Non-linear Dynamics and Chaotic Trajectories in Brain-Mind Visual Experiences during Dreams, Meditation, and Non-Ordinary Brain Activity States
313	Nir Tadmor	Phenomenology of psychedelic integration

C28 Phenomenological Approaches

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218	Matthew Williams	Enactive Cognition as Foundation for an Anti-Individualist Epistemology
230	Andrei Mertsalov	Prospects of the Psychological Approach to Personal Identity in the Context of Moral Responsibility
90	Brad Caldwell	Rings of Fire: How the Brain Makes Consciousness

C29 Neuroscience

135	Irene Rembado	Perturbing the Brain to Measure Distinct Conscious States and Track Cortico-Thalamic Causal Interactions
439	Mitchell Head	Neuroethical Implications of Focused Ultrasound for Neuropsychiatric Illness
353	Elan L Ohayon	From Homeostasis to Homeodynamics: A Playful Examination of the Confluence of Agency, Identity and Sentience
338	Jonathan Schooler	Hierarchical Consciousness: The Nested Observer Windows (NOW) Model
220	Thomas Brophy	Penrose' Platonic world and Orch OR Quantum Collapse Models in the context of Property Dualism Actual-Theory

C30 CognScience & Psychology

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300	Andreas Chatzopoulos	The role of simulations in Cognitive Science
270	Stefan Schmidt	The Neurophenomenology of Volition: Revisiting the Libet Task with First-Person Methods
192	Larry Fort	Embodied Perceptual Moderation: How Interoceptive and Exteroceptive Engagement Affect Perceptual Performance

C31 CognScience & Psychology

224	Anthony Lambert	Incidence of anauralia and aphantasia, and associations of sensory imagery with measures of personality and well-being in a large New Zealand sample
226	Zoé Schelp	Auditory Imagery and the Phonological Loop
249	Azadeh Mozhdefarahbakhsh	Visual imagination can influence visual perception – a new experimental paradigm to measure imagination
441	Maja Gutman	Humans, Dreams, and Machines: How computational models enhance our understanding of dreams
314	Gage Quigley-Tump	Associations of Visual and Auditory Imagery With Occupational Choice

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500	Roumiana Tsenkova	Water as Quantum Field Connecting Micro and Macro World
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420	Alessio Plebe	Conscious Language Models: Lessons from Animal Studies
242	Peter Fazekas	Sensory representations, perceptual reality monitoring, and the status of higher-order theories of consciousness
160	Petter Johansson	Using Magic to Study the Impact of Future Neurotechnology

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65	Peter Ells	Pan-idealism: a novel metaphysical position that is consistent both with libertarian free will and contemporary physics
89	Steven Gouveia	Free Will and Determinism: A Neurophilosophical Analysis
175	Sandeep Gupta	Free Will & Consciousness

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11	Navneet Chopra	Enactive vs Zen Perception: A Thought Experiment using Muller Lyer illusion
246	Eugeny Loginov	Does Moorean argument refute Illusionism?
254	Andrea Pace Giannotta	Naturalizing Phenomenal Intentionality
260	Daniel Weger	Structuralist representationalism about phenomenal consciousness
272	Giacomo De Luca	Continuity of consciousness and deep sleep awareness in Upanishadic texts

C35 Mental Causation

176	Ana Brito	The Impact of Libet's Mind-Time Theory of Consciousness on Criminal Law
235	Yair Pinto	The algorithm dodging paradox
248	Elena Draghici-Vasilescu	Some dilemmas concerning the notion of Free will
293	Karina Vold	Augmenting the dimensions of consciousness
383	Joshua Bergamin	Free (?) Agency : Towards a Phenomenology of Musical Improvisation

C36 Neuroscience

207	Prisca Bauer	"All of a sudden I see myself – a microphenomenological analysis of out of body experiences in epilepsy"
284	Kathleen Pait	What Types of Messages do People Perceive from the Departed? A Qualitative Study on the Nature of After-Death Communication
312	Jonathan Dinsmore	Let There Be Light: A Mixed Methods Investigation of Mystical Luminosity Experience
243	Viktoria Duda	Reincarnation and the Simulation Hypothesis
359	Sergio Frumento	Behavioral and neural evidences of subliminal multisensory integration challenge the prevailing theories of consciousness

C37 CognScience & Psychology

273	Konstantin Anokhin	Consciousness as a global percolation in the neural hypernetwork
62	Joshua Caln	Enhancing the Meditative Experience with Ultrasound Neuromodulation
233	Lena Lindström	Self-boundarylessness in the brain
419	Rosapia Lauro Grotto	An approach to the Freudian Unconscious by a logical model of quantum spins
88	Cecily Whiteley	Natural Kinds of Sleep Experience

C38 Body and Consciousness

119	Nancy Woolf	Quantum mind theory reveals what needs to be fixed in Alzheimer's disease: the protein of entanglement
215	Rui Costa	Visual snow, absorption, and altered states of consciousness
364	Tania Re	Italian Psylocibe: a new challenge to study consciousness
324	Roger Russell	Moveo Ergo Sum: Consciousnessing and Moving
279	Alina Studenova	On the relevance of alpha-rhythm modulation to the generation of readiness potential

C39 Evolution & Cognition

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83	Allan Combs	The Evolutionary Ascent of Consciousness
75	Ingrid Fredriksson	Consciousness influences epigenetics
86	James Rutherford	A Multidimensional Understanding of Human Nature and Consciousness
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C40 Art & Consciousness

281	Milda Al-Slamah	Theatre of Consciousness: lecture-performance on mental imagery in self-organizing performances
475	Hide Saegusa	Transmission of awakening and 11 levels of well being
231	Nick Day	Open Your Eye: Psychedelics, Cinema and Consciousness
102	Adrianna Mendrek	Exploring non-ordinary states of consciousness with Authentic Movement: Applications for psychotherapy, creativity, and personal transformation
463	Azul DelGrasso	Visionary Art as Evolving Consciousness

Poster Sessions TSC2023

P01 - Wednesday 24th May

Philosophy	Christopher Lord	The Dimensionality of Awareness
	Matthew Watts	A World of Niftiness: From Panpsychism to Pan-niftyism
	Steen Loeth	Consciousness, Reincarnation, Evolution and the X-Structure; the Nature of Life and Reality.
	Raul Valverde	Can near death studies and artificial intelligence help us to reveal the quantum nature of the mind?
	Peter Lugten	The Self, Its Brain, and a Solution to the Body-Mind Problem
	Wenge Huang	"Non-self" in Buddhism and Cartesian Theatre
Culture and Humanities	Ruth-Helen Vassilas	Life After STEs: Integrating Spiritually Transformative Experiences into the Material World
	Kao-Cheng Huang	The Flower of Cosmos in Consciousness
	Crystal Harrell	Consciousness, spirituality, and health among African American adolescents and emerging adults living in the United States: A scoping review of the literature
	Shae Linda Brown	Calibrating consciousness through pattern thinking and understanding: An educational approach to enabling human/world coherence.
2.0 Neuroscience	Thomas Wolfers	Mapping inter-individual differences of biological processes underlying categorical research of mental phenomena
	Federico Montecucco	The Neuroevolution of Consciousness: From quantum information to brain EEG synchronization: a systemic model to psychosomatic disorder and self awareness
	Jin Ma	Measuring CNS-Independent Consciousness Among People With the Same Pattern of Thinking
	Éva Bajzik	The manifestation of the will and the correlation of health
Physical & Biological Sciences	Gary Blaise	Inter-Spatial Abstraction: Calm Down! It's just an IDEA
	Charles Ernst	TRPV1: Conductor of the Orchestrated Dance of Life
	Nikita Shklovskiy-Kordi	Natural Computing as a new definition of the phenomenon of Life. The legacy of Efim Liberman
	Ami Parashar	Nature's Inspiration to Spiritual Seekers
	Avraham Oren	Reverse engineering the mind mechanism Alephem by quantum mechanics
CognScience & Psychology	Mauro Cavarra	Approaches of Psychedelic Assisted Therapy: A Systematic Revew
	Darja Kobal Grum	Cognitive control and emotion regulation between conscious and unconscious dimensions: Systematic review
	Antonio Prieto	Moving visual stimuli with our mind's eye. Time perception of moving stimuli during perceptual and mental imagery processes.
	Pedro Montoro	Exploring unconscious processing under the Bayesian microscope. An integrative experimental approach to examine subliminal visual perception
	Hillol Biswas	The idea of identifying the interface of subjective experience and subjective spiritual experience in the search for consciousness
	Lyubov Yusufova	Towards a Non-Ego-Centered Psychology
Experiential Approaches	Gwynn Simpson	Using the Spiritual And Metaphysical Techniques to Communicate Across the Veil!
	Marte Roel Lesur	May high level processes drive embodiment illusions?
	Andrea Copeland	Conscious Tech in Trauma Healing: Invoking Mystical Experiences and the Phenomenology of Spontaneous Unconditional Love
	Malcolm Wright	Are emergent phenomena rare and are we adequately addressing them in mainstream clinical settings?

P02 - Friday 26th May

Philosophy	Ulf Holmberg	Consciousness, sentiment and stock market returns: Could the GCP data be put to practical use?
	Meghan Carron	On the Constructed Nature of the Metaphysical Boundary Between Mind and Body
	Balaji Raju	A Critical Realist Ontology on The Origins of Neurospirituality
	Kala Perkins	The Cornucopia of Consciousness: Ethics of Responsibility to Life
	Edward Porter	How Brains Compute Souls: The computational awareness theory of consciousness
	Paul Hurren	Form as an Extra Ingredient
	Göran Brusewitz	Are emergence of consciousness, telepathy, healing and near-death experiences to be included in a model of consciousness.
	Eva Tordera Nuño	Hallucinating Nociplastic Pain
Neuroscience	Rinaldo Livio Perri	Alteration of Hypnotizability and Consciousness Phenomena following application of Non-Invasive Brain Stimulation (NIBS): State of the Art and Future Perspectives
	Elisa Pasquini	Identification of neurotransmitters involved in nocifensive behaviour of Bombus terrestris: a step towards bee sentience and pain
Phys & Biol	Sharon Alexander	Biophysical understandings of experiences of ecstatic consciousness commonly reported in the Gospel Church
	Courtney Hunt	The Quantum Mechanics of Fertilization
	Luis J Camargo-Pérez	Many Worlds - One Mind: Quantum Neural Networks Hypercomputation as an Explanation of Consciousness Driven Wavefunction Collapse.
	Tommaso Gecchelin	Reductionist afterlife scenarios
Culture and Humanities	Barry Spivack	The Sociological Implications of Pure Consciousness
	Adrianna Mendrek	Exploring non-ordinary states of consciousness with Authentic Movement: Applications for psychotherapy, creativity, and personal transformation
	Steven Ferrara	A new paradigm on death
	Scott Ready	The Lambda /\ Symphony :: a love story of the Earth and his Moon
	Nida Paracha	Entanglement and the Psychoanalytic Subject
	Olga Colbert	Comic Strip Anxiety Dreams in Windsor McCay's Dream of the Rarebit Fiend andLittle Nemo Series.
	Mariam Saleh	Spiritual Emergence and the Intersection of Ethics, Policy, and Law
	Thomas Klepach	Consciousness from the Biomolecular to the Artificial: An Undergraduate Course in Consciousness and Ethics.
CognScience & Psychology	Aurora Alegiani	The Only Listening Eyes: Musical Hallucinations provide a new perspective on Dysconnectivity and Precision in Psychosis
	Mona Letourneau	Verbal v. Nonverbal Ecstasy: Teachers, Actors, and Historic Park Rangers Have Verbal Ecstasies While Others Access Bliss Through Peripheral Spatial Attention and Other Sensory Architecture
	Wolfgang Fach	Autonomy and bonding as structural determinants of exceptional experiences (ExE) - evidence for dual aspect monism?
	Gloria Di Filippo	Adult attachment affects the absorption and the imagery during the first hypnotic experience, not the hypnotic susceptibility
Experiential Approaches	Arunvel Thangamani	A Hypothesis and a System Model on the Origin of Consciousness in Living Beings
	Milena Braticevic	Consciousness Education applied to Mental Health and Psychological Safety
	Margot Wilson	How can we use breath, sound, and bi-handed drawing to investigate cyclical spiral energy?
	Rodrigo Marchioli	Intellective Saturation of The Evolutive Cosmovision (ISEC): Hypothetical Conditions for the Experience of Cosmoconsciousness
	Edoardo Fugali	A Husserlian Framework for Embodied Cognitive Science
	Anand Rangarajan	How Buddhist Mahamudra supports Strawson's thin subject and Zahavi's minimal self
	Brentyn Ramm	Verifying Contemplative Experiences with First-Person Experiments: Investigating Pure Awareness Experiences in Phenomenological Interviews

Friday evening conversation:
"Human consciousness: what's the big deal?"

MAY 26, 2023, 7:00 pm

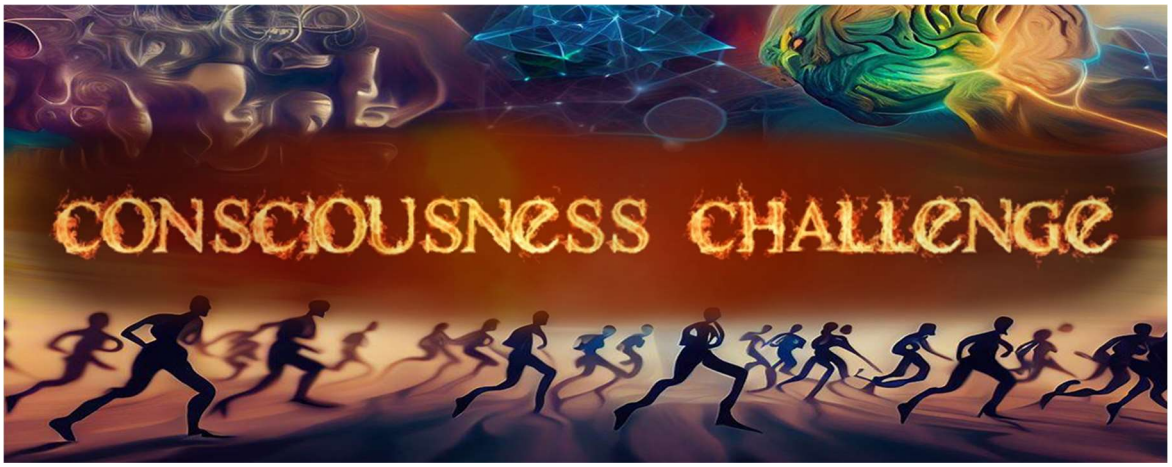
An evening conversation between Nick Humphrey and Emanuele Castano (moderated by Riccardo Manzotti).

Homo sapiens and other higher primates inherited from animal ancestors a sense of Self founded on phenomenal experience. This Self provides the foundation for the ability to enter into other individuals' minds thus allowing for increasingly complex social arrangements. In humans alone, however, parlayed by language and culture, the Self evolved into the powerful meme of the immortal human Soul-a handy solution to the newly-emerged issue of existential angst brought about by being aware of one's finitude. For the last 50,000 years, people's concern for the fate of their souls has been one of the chief drivers of human history – a cause of both wonder and terror.

This conversation will take off where The Science of Consciousness typically ends.

We invite everyone to join in.

CONSCIOUSNESS CHALLENGE



This year, we've decided to try something new and let TSC2023 participants choose the most convincing solution to the problem of consciousness. Similar to what has been done at other famous conferences regarding preferred interpretations of quantum mechanics or the origin of the universe, we'll ask you to vote for which theory you think is most likely to explain consciousness! For simplicity, you'll need to choose from this list selected by the TSC2023 scientific committee!
Vote for the best theory of consciousness!

When you arrive at check-in, you'll be given a paper ballot with two codes (or two QR codes) to vote on this page. This way, each participant can express two preferences. Please remember, you can only use the codes once. Try it at

https://tsc2023-taormina.it/ConsciousnessChallenge.htm

On Saturday the 27th, at the end of the conference, we'll announce the rankings and select the top three theories that have won your trust during the conference. This is the Consciousness Challenge!!!

Here's the list of theories you can vote for, handpicked by your beloved organizers with no room for dispute:

1. Mind-Brain Identity Theory (MBI)
2. Mind-Object Identity Theory (MOI)
3. Cartesian Dualism of substance
4. Integrated Information Theory (IIT)
5. Global Neuronal Workspace (GNWT)
6. Predictive Processing
7. Sensory Motor Theories
8. Enactivism
9. Higher Order Theories (HOT)
10. Quantum Pan-Protopsychism
11. Classic Idealism
12. Quantum Theory (ORCH OR)
13. Illusionism/Eliminativism
14. Russellian Monism
15. Panpsychism
16. Social Approaches (SAC)
17. Dual Aspect Monism
18. Chalmers's Naturalistic Dualism

WORKSHOPS

(Monday May 22)

W1: Ethical Issues of AI and Consciousness, Antonio Chella, Angelo Cangelosi, John P. Sullins, Robin Zebrowski

W2: Contextual Emergence and Consciousness, Robert C. Bishop, Alicia Juarrero, Gil Santos

W3: Quantum computing and collapse of the wavefunction, Thomas Brophy, Catalina Curceanu, Paavo Pylkkanen, Stuart Hameroff, Sir Roger Penrose, Anirban Bandyopadhyay

W4: Varieties of Conscious Experience and Contemplative Practice, Jay Sanguinetti, Jonathan Schooler, Malcolm Wright, Brian Lord, Daniel Ingram

W5: The Unity of Consciousness and the Subject of Experience, Donnchadh O Conaill, Mark Textor, Elizabeth Schechter

W6: Quantum biology, Travis Craddock, Jim Al-Khalili, Giuseppe Vitiello, Johnjoe McFadden

W7: Unifying Fundamentalist Theories of Consciousness, Michael Silberstein, William Seager, Dean Rickles, Marc Wittmann

W8: The role of embodiment in self-aware humans and robots, Giulio Sandini, Raja Chatila, Minoru Asada, Shaun Gallager, Simone Sarasso, Carlo Mazzola

WK-1: Workshop on Ethical Concerns of AI and Consciousness

Antonio Chella
Università di Palermo, Palermo, Italy

Topic
The rapid evolution of robotics and Artificial Intelligence has led to the development of intelligent robots and autonomous systems that have become part of everyday life in just a few years. There is an increasingly urgent need to define methods and procedures to ensure that robots and Artificial Intelligence systems respect social, moral, and legal values. Machine ethics is the strand of research that aims to promote a broad discussion of the ethical and moral issues involved in implementing and using robots and AI systems. Machine ethics has ignited a multidisciplinary debate on the need to translate ethical principles into standards recognized by professional and industry bodies.

Invited Discussants
Angelo Cangelosi, The University of Manchester, UK.
John Sullins, Sonoma State University, CA.
Robin Zebrowski, Beloit College, WI.

WK-2: Contextual Emergence and Consciousness

Robert C. Bishop
Department of Physics and Engineering, Wheaton College

Topic
Contextual emergence is a recently developed account of ontological emergence grounded in scientific explanation that: 1) does not violate the inherent unity of the world; 2) does not assume that a brute new law or causal power has to be posited if no reductive explanation exists; and 3) does not presuppose foundationalism. This account is grounded primarily in the sciences rather than in logic or metaphysics, emphasizing the ontological and explanatory fundamentality of multiscale stability conditions and their contextual constraints. Such conditions often operate globally over interconnected, interdependent, and interacting entities and their relations. Contextual emergence also focuses on the conditions making the existence, stability, and persistence of emergent systems possible. This workshop will explain and illustrate contextual emergence and allied perspectives on emergence with a view towards understanding consciousness as an emergent phenomenon.

Invited Discussants
Alicia Juarrero, Prince George's Community College
Gil Santos, Center for Philosophy of Sciences, University of Lisbon, Portugal.

WK-3: Quantum Collapse (State Reduction) and Consciousness

Thomas Brophy
California Institute for Human Science, Encinitas, CA, USA

Topic
What do the latest results from the lab under the Gran Sasso mountains really mean about the possibility of quantum collapse consciousness? How do Bohmian type processes constrain quantum-collapse models of consciousness? What is Sir Roger Penrose thinking about now? How will Stuart Hameroff describe the revolution in neuroscience of consciousness?
Come to this workshop to find out.

Invited Discussants
Catalina Curceanu, INFN, Frascati, Roma, Italy.
Paavo Pylkkanen, Dept of Philosophy, University of Helsinki, Finland.
Stuart Hameroff, University of Arizona
Sir Roger Penrose, Nobel Laureate.

WK-4: Varieties of Conscious Experience and Contemplative Practice

Jay Sanguinetti
Sanmai Technologies PBC, Sunnyvale, CA, USA

Topic
Contemplative practices can lead to a wide range of experiences, from the ordinary to the sublime. Some practitioners of meditation, for example, report "spiritual," "mystical," "energetic," or "self-altering" states. These non-ordinary states of consciousness are commonly reported and may be beneficial, challenging, or adverse depending on the context and level of support. This workshop will explore the varieties of experiences that emerge during contemplative practices and how they fit with modern theories of consciousness and neuroscience. We will discuss the benefit of situating these non-ordinary states of consciousness in a scientific framework, deconstructed from traditional metaphysical and religious dogmas. Lastly, we show how this research will positively affect patients and practitioners as these practices become more widespread.

Invited Discussants
Jonathan Schooler, UC, Santa Barbara, USA
Malcolm Wright, UC, San Francisco, USA
Daniel Ingram, Emergence Benefactors, Huntsville, Alabama, USA.
Brian Lord, University of Arizona.

WK-5: The Unity of Consciousness and the Subject of Experience, , Mark Textor, Elizabeth Schechter

Donnchadh O Conaill
University of Fribourg, Switzerland

Topic
It is widely acknowledged that conscious experiences are unified in different respects. One widely-discussed form of unity is phenomenal unity, i.e., there being something it is like to have different experiences together. In this workshop we shall explore the metaphysical relations between phenomenal unity and the subject of experiences. In particular, we wish to consider the possibility that phenomenal unity might be explained by or grounded in the subject of experiences; that is, distinct experiences are phenomenally unified (at least in part) in virtue of their each belonging to the same subject. We shall also consider the implications which different accounts of phenomenal unity might have for metaphysical conceptions of the subject.
This workshop is organized as part of the SNF-funded project The Subject of Experiences: The Significance of its Metaphysical Nature in the Philosophy of Mind (Université de Fribourg).

Invited Discussants
Mark Textor, Kings College London, UK.
Elizabeth Schechter, University of Maryland.

WK-6: Quantum biology

Travis Craddock
Institute for Neuro-Immune Medicine, Nova Southeastern University, Fort Lauderdale, FL, USA.

Topic
Microtubule and psychedelics, and quantum biology involved.

Invited Discussants
Jim Al-Khalili, University of Surrey, Guildford, Surrey, United Kingdom.
Giuseppe Vitiello, University of Salerno, Salerno, Italy.
JohnJoe McFadden, University of Surrey, Guildford, Surrey, UK.
Anirban Bandyopadhyay, NIMS, Tsukuba, Ibaraki, Japan.

WK-7: Unifying Fundamentalist Theories of Consciousness: Dual-Aspect, Neutral Monism, Panpsychism, and Beyond

Michael Silberstein
Elizabethtown College, Elizabethtown, PA, USA

Topic

When it comes to phenomenal consciousness, for a variety of reasons, there is now a growing chorus of alternatives to physicalism and ontological reductionism. This chorus includes philosophers, psychologists, physicists, and even some researchers in the cognitive neuroscience of consciousness. While there is a growing consensus in consciousness studies regarding the inadequacies of physicalism and ontological reductionism, there is still a great deal of division and infighting on the frontier of alternatives such as dual-aspect, neutral-monist, and panpsychist accounts. The motivation for this workshop is that, as with the norm of unification in science more generally, future progress in consciousness studies is perhaps best served in not just emphasizing differences, but in seeking common ground amidst the alternatives to physicalism. It is such early days in consciousness studies that this is an ideal time to at least attempt some convergence and diplomacy before we get stuck in another endless cycle of scholastic carping. Such a project requires real conversation between open-minded scholars comfortable moving between disciplines such as philosophy of mind, physics, cognitive neuroscience, etc. The speakers, all of whom champion somewhat different fundamentalist positions representing different traditions, were chosen with this criterion in mind.

Invited Discussants

William Seager, University of Toronto, Scarborough.
Dean Rickles, Faculty of Science, University of Sydney.
Marc Wittmann, Institute for Frontier Areas of Psychology and Mental Health, Freiburg.

WK-8: the role of embodiment in self-aware humans and robots

Giulio Sandini, Carlo Mazzola
Istituto Italiano di Tecnologia (IIT), Genova, Italy

Topic

Given the deep and complex nature of consciousness and, in general, what is related to self-awareness, the endeavor to simplify and implement such phenomena on artificial agents may likely result in severe reductionism. Nevertheless, too high is their relevance for artificial embodied systems. Autonomous control and behaviors, fluent and effective interaction with the environment, as well as meaningful and trustworthy relations with humans, require robots to have a sense of self. Hence, the impasse calls for interdisciplinary research and respectfully comprehending other perspectives. This workshop wants to gather different approaches – from neurosciences, robotics, and philosophy – concentrating attention on the role of the body in self-awareness. The body is the core of identity, personal history, and interaction with the external world. Also, albeit different in its nature, it makes robots more comparable to humans. At the intersection of different disciplines, this workshop aims to emphasize the importance of the topic, show recent developments, and promote further collaborative research.

Invited Discussants

Minoru Asada, Osaka University (JP)
Raja Chatila, ISIR, Sorbonne University (FR)
Shaun Gallagher, University of Memphis, TN (US)
Simone Sarasso, University “La Statale” Milano, (IT)

KEYNOTES

Keynote 1: From beast machines to dreamachines

Anil Seth

Sussex Centre for Consciousness Science
School of Engineering and Informatics,
University of Sussex,
Brighton BN1 9QJ, UK

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[4,0] Physical and Biological Sciences

Abstract
Consciousness remains one of the central mysteries in science and philosophy. In this talk, I will illustrate how the framework of predictive processing can help bridge from mechanism to phenomenology in the science of consciousness – addressing not the 'hard problem', but the 'real problem'. I will first show how conscious experiences of the world around us can be understood in terms of perceptual predictions, developing an approach some are calling 'computational (neuro)phenomenology). I'll then explore how the experience of being an embodied self can be understood in terms of control-oriented predictive (allostatic) regulation of the interior of the body. This implies a deep connection between mind and life: Contrary to the old doctrine of Descartes, we are conscious because we are beast machines. I'll finish by describing a recent art-science collaboration – Dreamachine – which involves mass stroboscopically-induced visual hallucinations and a large-scale online survey of 'perceptual diversity' – The Perception Census.

Keywords
Consciousness, Phenomenology, Self, Dreams, Hallucinations, Dreamachine

Keynote 2: Could a Large Language Model be Conscious?

David Chalmers

NYU, New York, NY, USA

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[03.12] Artificial intelligence and robotics

Abstract
There has recently been widespread discussion of whether large language models such as LaMDA, ChatGPT, and Bing might be sentient or conscious. Should we take this idea seriously? I will discuss the underlying issue and will break down the strongest reasons for and against.

Keywords
LaMDA, ChatGPT, Bing, large language model

Keynote 3: Effective Quantum Retroactivity in Rapid Conscious Decisions

Sir Roger Penrose

University of Oxford
Nobel Laureate
Emeritus Rouse Ball Professor of Mathematics
Emeritus Fellow, Wadham College University of Oxford United Kingdom

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.01] Quantum physics, collapse and the measurement problem

Abstract
It is often claimed that rapid actions, such as in games like tennis or ping-pong, or in improvised musical performance, or perhaps even in ordinary conversation, occur too rapidly to be under conscious control, and that a person's belief that the control is conscious is consequently illusory. It will be argued here that although the details of the various possible successions of muscle actions that might be rapidly implemented are indeed individually unconscious, the actual choice of which action is selected can nevertheless be conscious, according to the Orch-OR proposal of conscious experience. The OR part ("collapse of the quantum wave-function ") requires the selection of one out of the various initiations of alternative actions, several being maintained in quantum superposition. Orch-OR involves the interface between current quantum theory and Einstein's general theory of relativity. The interplay between the basic principles of these two great theories leads to two slightly different concepts of physical reality, the "quantum " and "classical " realities, which are not quite identical, and provide the needed retro-active relation in the choice between quantum alternatives.

Keywords
conscious control, muscle actions, Orch-OR, conscious experience, collapse of the quantum wave-function, quantum superposition, quantum theory, Einstein's general theory of relativity, quantum realities, classical realities, quantum alternatives

PLENARY

PL-1 (Tues): The quantum measurement problem in the cellular environment

Jim Al-Khalili

University of Surrey, Guildford, Surrey, United Kingdom

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.01] Quantum physics, collapse and the measurement problem

Abstract
Whenever there are discussions involving consciousness and quantum mechanics they tend to follow two different directions. One relates to Penrose and Hameroff's theory of Orchestrated Objective Reduction that postulates consciousness originating at the quantum level within neurons. The other is the role of consciousness in the famous quantum measurement problem, or more specifically, the role of the observer and what constitutes an observation. I will review the quantum measurement problem in the light of decoherence theory and open quantum systems and the extent to which this long-standing debate has been resolved without appealing to specific interpretations of quantum mechanics. I will then examine the process in the special environment inside a living cell. Impressive progress has been made in recent years in the new field of quantum biology, which posits that quantum mechanics can play a non-trivial functional role inside living systems. But the way in which delicate quantum effects and mechanisms can persist inside the noisy, warm, complex environment of the cell is still unclear. Is there a link with the nature of measurement that suggest something nontrivial is taking place? One example is the quantum tunnelling of H-bond protons holding the two strands of DNA together and which puts them into a superposition of sitting on both strands simultaneously. The cellular environment constantly acts to decohere this state by becoming entangled with it. However, there remains a constant level of coherence (as measured by the l1-norm and the von Neumann entropy) until the proton state is finally 'measured' and its location fixed by the helicase enzyme that breaks the H-bonds when it unzips the two strands. The helicase therefore acts as an observer that chooses one outcome, with potentially crucial implications in biology since the proton position on the wrong strand can create a mutation.

Keywords
quantum, measurement, entanglement, decoherence, biology, DNA

PL-1 (Tues): Neuroscience needs a revolution

Stuart Hameroff, MD

University of Arizona, Anesthesiology, Tucson, AZ, USA.
Psychology; Center for Consciousness Studies, Tucson, AZ, USA

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.08] Quantum brain biology

Abstract
The underlying premise in neuroscience is that the brain is a complex computer of simple neurons, each relying solely on membrane potentials and synaptic transmissions (based on the 1950s Hodgkin-Huxley model neuron). But neuroscience can't account for consciousness, cognitive binding, real-time conscious action or memory, nor treat Alzheimer's or brain trauma, and totally precludes the plausibility and consideration of frequently-reported non-local aspects of consciousness. The underlying premise of simple neurons is wrong, and is an absolute insult to actual neurons.
Single cell organisms behave purposefully using their cytoskeletal microtubules to sense and navigate. Microtubules (MTs) are self-assembling cylindrical polymers of 'tubulin' protein which in neurons organize synapses, encode memory and process information (tubulin is the brain's most prevalent protein). Evidence now suggests psychedelics, antidepressants and anesthetics act on microtubules inside neurons, rather than, or in addition to membrane receptors and ion channels.
Whereas neuronal membranes and channels operate in frequencies from hertz to 100 hertz (cycles per second), microtubules and tubulins collectively resonate inside neurons at deeper, faster scales over 12 orders of magnitude in fractal-like patterns in hertz, kilohertz, megahertz, gigahertz and terahertz ranges (as shown by Anirban Bandyopadhyay group at NIMS in Japan). Like notes and chords resonate in music, quantum vibrations and state reductions can entangle and interfere across frequencies in the brain - a 'quantum orchestra'.
The Penrose-Hameroff 'Orch OR' theory suggests brain microtubules 'orchestrate' quantum state objective reductions ('OR') into full rich conscious experience. Mainstream 'neuroscientific' consciousness theories (IIT, GNW, HoT, PC/RP) use membrane-only simple neurons (emulated in AI) which may be suitable only for non-conscious algorithmic functions – 'zombie neurons'. To find consciousness, and treat mental and cognitive disorders, neuroscience must look inward to deeper, faster quantum processes in microtubules inside brain neurons.

Keywords - Orch OR, quantum consciousness approaches

PL-1 (Tues): Direct interactions of psychoactive compounds with the microtubule cytoskeleton

Travis Craddock, PhD

Nova Southeastern University, Fort Lauderdale, FL, USA. Institute for Neuro-Immune Medicine, Departments of Psychology & Neuroscience, Computer Science, and Clinical Immunology

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
The microtubule cytoskeleton plays a crucial role in maintaining neuron structure, transporting materials for synaptic plasticity, and is a potential facilitator of signaling and sub-neural information processing. Several pharmaceutical compounds, including colchicine and the vinca alkaloids, bind to microtubules and impair their function. Interestingly, these two drugs have been shown to generate hallucinations in some cases. This suggests that direct modulation of the cytoskeleton may play a role in the generation of hallucinogenic experiences. Hallucinogens and anesthetics are two of the few known molecular probes of consciousness, and both appear to target microtubules directly. Anesthetics have been shown to bind to tubulin, with the potential to disrupt quantum behavior, while evidence suggests that classic hallucinogens may act via direct modulation of the microtubule cytoskeleton. There is also a consistent relationship between the phenylethylamine hallucinogens and the microtubule inhibitor colchicine, although this relationship is less clear with the indoleamine hallucinogens and the indole-based vinca alkaloids. Nonetheless, recent evidence indicates that tryptophan, an indole-based amino acid and precursor of serotonin, binds directly to tubulin, suggesting that serotonin and indoleamine hallucinogens may influence the microtubule cytoskeleton by binding to tubulin. While it is not yet known whether such interactions could disrupt or modulate quantum effects in microtubules, preliminary work towards this goal will be discussed.

Keywords
microtubule, cytoskeleton, synaptic plasticity, signaling, sub-neural processing, tubulin, hallucinogenic experiences, anesthetics, modulate quantum effects in microtubules

PL-2 (Tues): The minimal self and the Flying Man argument

Shaun Gallagher

University of Memphis, Memphis, TN, USA. University of Wollongong, Wollongong, NSW, Australia

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract
It has become almost standard to distinguish between what has been called the minimal self (or sometimes 'minimal self-awareness') and the narrative self. The notion of the minimal self has been linked with the phenomenological concept of prereflective self-awareness, and has served in explanations of body consciousness, sense of ownership, and sense of agency. It is referenced in experiments on the Rubber Hand Illusion. It also plays a role in characterizations of schizophrenia as a self-disorder. Despite its ongoing relevance, clear criteria for defining the minimal self are said to be lacking, and several issues are still under debate, including how the minimal self relates to embodiment and whether intersubjective or social relations contribute to its constitution. In this paper I'll suggest that Avicenna's Flying Man thought experiment can address a number of these issues and can offer some clarifications relevant to the ongoing discussions in analytic, phenomenological, and cognitive science contexts.

Keywords
minimal self, self-consciousness, body, Flying Man, Avicenna

PL-2 (Tues): 'What it's like' to have a phenomenal experience can be partly explained in terms of loss in control of body movements and of information flow.

Kevin O'Regan

Université Paris Cité, CNRS and Planet Learning Institute, Paris, Ile de France, France

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
The "sensorimotor " approach to understanding phenomenal consciousness bridges the explanatory gap and dissolves the "hard problem " by adopting a different metaphysical point of view than most other theories. Instead of supposing that phenomenal consciousness is a product of brain mechanisms, the sensorimotor approach claims that phenomenal consciousness is a collection of capacities that we exercise when we interact physically and mentally with the world. As a consequence, to explain why people consider that experiences have "something it's like ", the sensorimotor approach seeks to determine what aspects of one's physical and mental interactions with the world are at the root of the claim that there is "something it's like ". Two very fundamental aspects of phenomenal experiences seem to be relevant. One aspect is the imposingness of experiences. Experiences impose themselves on us and seem "present " in different ways. For example, they can seem displayed scenically before us, as in vision, or they can seem non-scenic and "latent ", as in the sense of balance. A second fundamental aspect is the fact that experiences have a "locus of attribution ": they can seem "external " (perceptual), "internal " (interoceptive, bodily or emotional) or "mental ". I show in this talk that both "presence " and "locus of attribution " are aspects of "what it's like " that can be identified with the degree to which we lose voluntarily control of what we are doing when we engage in a phenomenal experience. The degree of imposingness of experiences and their different types of "presence " is determined by how our voluntary actions are impeded or assisted by innate, attention-grabbing mechanisms. The locus or external/internal/mental dimension of experiences is determined by how our voluntary bodily actions can influence the sensorimotor flow of information. By elucidating these two most fundamental aspects of "what it's like " and taken together with prior work accounting for inter- and intra-modal differences in experiences, the sensorimotor approach suggests a path towards a scientific theory explaining why experiences "feel like something " rather than feeling like nothing.

Keywords
What it's like, phenomenal consciousness, hard problem, presence, locus of attribution, control, information, movement, attention.

PL-2 (Tues): Mood Consciousness

Uriah Kriegel

Rice University, Houston, TX, USA

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
When we study scientifically the way information processing in the brain translates into conscious experience, we often focus on vision, where informational structures are relatively well understood theoretically and experiential structures are relatively clearly grasped phenomenologically. But for many conscious phenomena things are more complicated both theoretically and phenomenologically, and perhaps things are most complicated for mood, whose informational function, if any, is not at all well understood today, and whose experiential structure, too, is particularly elusive. In this talk, I want to present a phenomenological framework for understanding mood experience that should serve to prime mood for more systematic third-person empirical study. The framework is based on the notion that all experience involves a certain felt attitude toward a specific type of content, and that together attitude plus content carry certain information about some aspect of reality. To understand the nature of mood, then, we must identify correctly the attitude and content characteristic of different moods. This is the purpose of the talk.

Keywords
mood; consciousness; experience; information

PL-2 (Tues): Evolving Sentience

Nicholas Humphrey
Darwin College, University of Cambridge, Cambridge, United Kingdom

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
The science of consciousness has taken a wrong turn. Led on by the seductive but ill-conceived notion of the Neural Correlates of Conscious (the NCC), researchers have assumed that, if sensory experience supervenes on the brain, they should be looking for kinds of brain activity whose physical properties map on to the phenomenal properties of sensations – both sets of properties being identified at the level of "causal structure ". In doing so, they have misconstrued the problem. The problem isn't to explain how the brain as a physical organ can give rise to brain-states that in themselves exhibit phenomenal properties (that would be a hard one, for sure); rather, it's to explain how the brain as a cognitive engine can give rise to mind-states that represent sensations as having phenomenal properties (which could be a relatively easy one). I've focused on this second problem. My project has been to work out how a biological machine like the brain could carry out this feat of representation. And the strategy I've adopted has been "forward engineering ". That's to say, I've begun with the end product – sensations as humans experience them today – but rather than treating this, as scientists typically do, as something to deconstruct, I've treated it as something to invent. How can sentience have evolved from primitive, insentient, beginnings? Sensations, as we know them, tell us about our interaction with stimuli arriving at our body surface. Their intentional object is "what's happening to me and how I feel about it ". Looking to the evolutionary history, I propose that the vehicle for this representation in the brain is a form of covert motor activity that originated as an evaluative motor response to sensory stimulation (an activity I've called "sentition "). In the course of evolution, these evaluative responses came – by the chance facilitation of feedback-loops – to take on complex higher-order properties. This opened the way for sensations to acquire – out of the blue – the apparently unaccountable qualities of sensory qualia. The adaptive pay-off for those animals that went this way was the emergence of the "phenomenal self. " But I surmise that this will have been a relatively late evolutionary development. In fact I believe – for eco-psychological reasons – it may have come about only in warm-blooded animals: mammals, dinosaurs, and birds.

Keywords
sentience, phenomenal consciousness, NCC, representation, evolution

PL-3 (Wed): Birthing consciousness: The unique altered state of consciousness during physiological birth

Orli Dahan

Tel-Hai College, Upper Galilee, Israel

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
Birthing consciousness is a highly positive altered state that women can experience during natural unmedicated birth. Prior studies have documented the experience of an altered state of consciousness during birth, yet the neurological and psycho-physiological study of birthing consciousness is only just beginning. The phenomenological features of experiences of birthing consciousness include feelings of peacefulness, calm, and reduced anxiety sensations. Cognitive features in women during a natural birth most commonly occur as labor intensifies. For example, the birthing woman often experiences a healthy dissociative state, characterized by removal from surroundings to varying degrees, distorted sense of time, disorientation, shifted awareness, relinquishing of social constraints in various forms, and focused attention. I suggest that this unique altered state of consciousness during birth shares the same brain mechanism as other altered states of consciousness with similar phenomenological and cognitive features. Because fear and pain are predictors of childbirth complications that necessitate medical intervention and interference in the physiological process – the state of birthing consciousness is likely to promote natural, uncomplicated birth. I hypothesize that hypofrontality is crucial to physiological birth. Unfortunately, a lacuna exists in neuroscience regarding neurofunctional processes during birth. Moreover, modern birth settings are often barriers to birthing consciousness and the transient hypofrontality brain mechanism. I argue that when considering giving birth as related to the hypofrontality brain mechanism, some key parameters can help design, navigate, and explain the human birth process's psychological and physiological elements. Women also give birth with their minds, not just their bodies. Thus, physical and social settings have crucial effects on the birth process, and there are empirical studies that validate these kinds of effects. In examining birth experiences, we must re-examine the implications of the altered states of consciousness in childbirth. Thus, an operative conclusion that emerges from my theoretical analysis – is that understanding the neurofunctional processes during birth is a central tool that could be used to promote physiological births as well as subjective positive birthing experiences, which is currently a primary, yet unreached goal, in modern obstetrics and public health. From this point of view, the science of consciousness can promote the science of birth.

Keywords
Birthing consciousness, Transient hypofrontality, Altered state of consciousness, Neurofunctional processes during birth, Modern obstetrics, Birth experiences

PL-3 (Wed): Using Noninvasive Brain Stimulation to Investigate the Relationship Between Brain Networks and Consciousness

Jay Sanguinetti

University of Arizona, Tucson, AZ, USA.

Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.03] Other sensory modalities

Abstract
Modern neuroimaging methods like fMRI allow researchers to map the neural correlates of consciousness, but they are limited because they rely on correlational data. Noninvasive brain stimulation (NIBS) is an exciting new tool that addresses this problem because it enables researchers to manipulate neural activity and directly measure the effects on consciousness. NIBS thus opens the door to studying the processes that generate consciousness instead of those that correlate with it. However, many brain networks implicated in consciousness – like the Default Mode Network (DMN) – are too deep for modern NIBS technologies to reach. This talk will describe our work directly modulating deeper brain systems implicated in consciousness with a new technology called transcranial focused ultrasound neuromodulation (tFUS). We will describe two experiments where tFUS targeting the DMN altered fMRI functional connectivity and conscious experience, confirming predictions from neuroimaging studies. Then we describe two experiments combining tFUS with mindfulness meditation. By targeting the basal ganglia or DMN in experienced meditators, we facilitated states of consciousness associated with advanced meditation practices. These results suggest that tFUS is an exciting tool to uncover how neural systems relate to consciousness and to facilitate interventions like mindfulness meditation that alter consciousness.

Keywords
noninvasive brain stimulation (NIBS), Default Mode Network (DMN), Transcranial Focused Ultrasound Neuromodulation (tFUS), fMRI

PL-4 (Wed): The Mind-Object Identity (MOI): To perceive an object is to be one with the (relative and external) physical object.

Riccardo Manzotti

IULM University, Milan, Italy
Fulbright Visiting Scholar, MIT, Cambridge (Mass)

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
Physicalist theories of consciousness must commit to a physical candidate for consciousness. There simply must be something that is one with consciousness. But what? Traditional identity theories have proposed brain processes, but failed to show convincing evidence. More recent hypotheses have considered phenomena which are invisible and not directly observable (e.g., panpsychism, integrated information, emergent properties) and thus are outside of science.
I put forward a new and radical hypothesis – namely, that consciousness is nothing other than the physical world itself, albeit reconceived, as it should be done according to contemporary physics, in terms of a network of *spatiotemporally-distributed objects taking place relative to our bodies*. To be conscious of an object is simply to be identical with that object as it takes place relative to our body. Subjective experience is thus reduced to relative existence.
In this view, there is neither the naïve physical object nor the phenomenal experience; there are only objects taking place relative to our body. Subjectivity is revisited in terms of object-object relativity. To be conscious of something is thus explained as being identical with the object one finds in one's existence.
In fact, experience qua experience is only a misunderstanding created by the superstitious belief that the subject is somewhat separate and distinct from the object. In 1904, William James wrote A World of Pure Experience. On the basis of the hypothesis presented here, it might be better called "A World of Pure (Relative) Existence".
The hypothesis defended here, the Mind-Object Identity or MOI, formerly yet misleadingly called *The Spread Mind,* offers an account not only of standard perception but also of memory, imagination, dreams, illusions and hallucinations in terms of *physical existence*.

Keywords
consciousness, hallucination, physicalism, existentialism, identity, realism, MOI

PL-4 (Wed): What Can the Naive Realist Say About Total Hallucinations?

Heather Logue

University of Leeds, Leeds, West Yorkshire, United Kingdom

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
Until fairly recently, the consensus view was that naive realists had to be disjunctivists and hold that the facts in virtue of which a total hallucination has phenomenal character are different from the facts in virtue of which a perception has phenomenal character. However, these days a growing number of naive realists reject the possibility of total hallucinations as they are traditionally characterised-- as perceptual experiences that don't involve the subject perceiving any mind-independent objects at all, but are nevertheless subjectively indistinguishable from an ordinary perception. Most views of this sort claim that any experience that is subjectively indistinguishable from perception involves the subject perceiving something mind-independent (e.g., some aspect of the hallucination-generating apparatus stimulating their brain). But another route is to claim that any experience that doesn't involve perceiving mind-independent objects is thereby subjectively distinguishable from an ordinary perception. Contrary to initial appearances, I will argue that this route is viable-- as long as we adopt a highly unorthodox but independently well-motivated metaphysics.

Keywords
naive realists, disjunctivists, total hallucinations, metaphysics

PL-4 (Wed): Whither Naïve Realism?

Alex Byrne

MIT, Cambridge, MA, USA

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
Different authors offer subtly different characterizations of Naïve Realism. The paper disentangles the main characterizations and argues that Naïve Realism should be characterized as a thesis about illusions, namely that they never involve perceptual error. The rest of the paper explores the plausibility of Naïve Realism.

Keywords
Naïve Realism

PL-4 (Wed): Illusion and Hallucination

Fiona Macpherson

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.04] Other sensory modalities

Abstract
I discuss the nature of illusion and hallucination and what that tells us about the mind.

PL-4 (Wed): Making the hard problem of consciousness easier

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.04] Other sensory modalities

Abstract
The history of science includes numerous challenging problems, including the "hard problem" of consciousness: Why does an assembly of neurons — no matter how complex, such as the human brain — give rise to perceptions and feelings that are consciously experienced, such as the sweetness of chocolate or the tenderness of a loving caress on one's cheek? Beyond satisfying this millennia-old existential curiosity, understanding consciousness bears substantial medical and ethical implications, from evaluating whether someone is conscious after brain injury to determining whether nonhuman animals, fetuses, cell organoids, or even advanced machines (2) are conscious. A comprehensive and agreed-upon theory of consciousness is necessary to answer the question of which systems—biologically evolved or artificially designed—experience anything and to define the ethical boundaries of our actions toward them. The research projects described here will hopefully point the way and indicate whether some

Keywords
Neuroscience, Consciousness

PL-5 (Thur): Insights from the Conscious Turing Machine (CTM)

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
We examine consciousness from the perspective of Theoretical Computer Science (TCS), a branch of mathematics concerned with understanding the underlying principles of computation and complexity including the implications and surprising consequences of resource limitations. The Conscious Turing Machine (CTM) is a simple formal TCS model sufficiently powerful to explain, at a high level, many phenomena generally associated with consciousness (pain, pleasure, blindsight, inattentional blindness, change blindness, dreams, free will, and so on). Explanations derived from the model draw confirmation from consistencies at a high level (well above the level of neurons) with the cognitive neuroscience literature. The CTM provides a natural framework for Artificial General Intelligence (AGI). Our talk will describe the CTM, give the rationale for several of its design choices, and give a taste for how the TCS perspective provides insight. For example, we show how TCS addresses the Free Will Paradox that Samuel Johnson described with the words: "All science is against the freedom of the will. All experience is for it. "

Keywords
consciousness, theoretical computer science, machine consciousness, artificial general intelligence, neuroAI

PL-5 (Thur): Consciousness as it could be

Owen Holland

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
Over thirty years have passed since the beginning of the artificial life movement. In the words of its effective founder, Chris Langton, "Artificial Life [AL] is the study of man-made systems that exhibit behaviors characteristic of natural living systems. It complements the traditional biological sciences concerned with the analysis of living organisms by attempting to synthesize life-like behaviors within computers and other artificial media. By extending the empirical foundation upon which biology is based beyond the carbon-chain life that has evolved on Earth, Artificial Life can contribute to theoretical biology by locating life-as-we-know-it within the larger picture of life-as-it-could-be. " (Langton, 1989). While the then-nascent discipline has not yet succeeded in its own terms, the perspective set out by Langton is clear, and when moved from artificial life to artificial consciousness it goes beyond the more direct aims of machine consciousness to the broader consideration of consciousness as it could be. One of the biggest problems in the general area of consciousness is that we do not know which aspects of natural biological consciousness are contingent on the constraints of its Earth-based evolution, and which may be essential to any and every possible form of consciousness. However, we can usefully constrain "any and every possible form " in much the same way as Langton did with his "within computers and artificial media " by limiting our consideration to possible consciousnesses within the scope of digital technologies. There turns out to be no need to invoke artificial intelligence as such – the engineering constraints and affordances of digital technologies are enough to challenge and answer many of the explicit and implicit assumptions of what could usefully be called biocentrism in consciousness studies. This talk will deal with both conceptual and technological issues, ranging from the questionable legitimacy of whether there can be something it is like to be something to whether conscious digital entities may roam the metaverse and whether our avatars might meet them there.

Keywords
Machine consciousness, virtual consciousness, digital systems

PL-4 (Wed): Making the hard problem of consciousness easier

Susan Schneider

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[[03.12] Artificial intelligence and robotics

Abstract
In this talk I discuss the possibility that sentient AI could be created within the next decade from systems with biological components or even as an emergent property of large language models (LLMs). Exploring the phenomenon of emergence in LLMs, I introduce a new problem involving a future AI ecosystem with competing LLMs, The AI Megasystem Problem.

Keywords
large language models (LLMs), sentient AI

PL-6 (Thur): A Condition of Representational Intentionality

Nancy A Salay

Queen's University, Kingston, ON, Canada

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
A Condition of Representational Intentionality In this presentation, I outline an approach to the problem of intentionality that has the twin virtues of 1) dividing the problem into (more) manageable subproblems and 2) clarifying an aspect of the hard problem. The two subproblems of intentionality are the Problem of Directed Intentionality — how objects become meaningful to agents — and the Problem of Representational Intentionality — how agents learn to interact with objects as representations of other objects. The standard practise in mainstream cognitive science and philosophy confuses these two questions by taking internal states, whether subpersonal or personal, to be the representations that intentional agents use. This confusion, I argue, yields both the grounding and the explanatory gap problems, and makes the Hard Problem harder. By keeping them separate, however, we gain clarity and uncover some interesting dependencies: 1) Directed intentionality (DI) is an aspect of basic sentience; 2) Directed intentionality is a necessary condition of representational intentionality (RI) While a full account of directed intentionality requires a solution to the hard problem, headway can be made on representational intentionality without it. First, DI alone cannot be a sufficient condition of RI: while many animals exhibit DI, that is, they perceive the objects that are meaningful to them, very few have developed sophisticated representational systems such as language. I argue that RI depends upon two further factors, one external — the existence of a linguistic cognitive niche — and one internal — a capacity for system-level expectation. In this presentation I speak only to the latter; elsewhere I detail the externalist account of how an agent can become a representation user without already being a representor. Associative learning analyses provide an excellent tool for investigating system-level expectation since subsystem-level expectation — neural priming — is already tracked using this approach. But some terminological changes are needed. On classical models, the system-level responses that are measured, e.g., rate of salivation, are only one of a bundle of responses. An animal responding to some meaningful stimulus isn't just salivating, for example, it is, at the same time, continually sensing the stimulus and, if it is capable, experiencing episodic flashes of other US situations. Though tracking this larger bundle of responses offers a serious operationalisation challenge, we can make headway by clearly representing the differences.

Keywords-intentionality, representation, expectation, sentience

PL-6 (Thur): Self-Consciousness as a Byproduct of Social Cognition

Pietro Perconti

Università degli Studi di Messina, Messina, Italy

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
Pietro Perconti Department of Cognitive Science, University of Messina The aim of my talk is to defend the idea that self-consciousness is essentially tied to the environment. In particular, it depends more on the social environment than on the physical environment in which we are conscious of ourselves. The point is that self-consciousness essentially serves the purposes of social cognition. More specifically, conceptual self-consciousness is a byproduct of social cognition (“Mind Reading Priority Account “). While bodily self-consciousness appears to be more or less independent of social cognition, conceptual self-consciousness is subordinate to social cognition from a logical, evolutionary, and developmental point of view. The reason is that social cognition requires an internal workspace to perform its simulations, and this workspace is precisely what we introspectively experience as the sense of being self-conscious.

Keywords
self-consciousness, social environment, social cognition, social cognition

PL-6 (Thur): Full-blown Relationality

Alberto Voltolini

University of Turin, Turin, Piedmont, Italy

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
Intuitively, reference intentionality or aboutness is a relation between an intentional state, a thought, and an object, its intentional object (intentionale). Yet there are two problems for this intuitive conception to be accepted, which have respectively to do with the fact that the two features that allegedly characterize and hopefully define aboutness, i.e., directedness and aspectuality, seem to prevent aboutness from being relational. For directedness is a property that seemingly involves non-existent objects, while aspectuality seems to be a property that involves an object only under an aspect. Yet the two problems may be solved by appealing to ontologically kosher non-esistents on the one hand and to a sameness relation weaker than identity, i.e., appearing as an aspectual alter-ego of, holding between different intentionalia on the other hand.

Keywords
aboutness; directedness; aspectuality; relationality

PL-6 (Thur): Why intentionality is not really a thing

Tim Crane

Central European University, Vienna, Austria

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
Traditional naturalistic accounts of the relationship between intentionality and consciousness take one of two approaches: either they treat intentional and conscious phenomena as essentially separable, or they try to solve the hard problem of consciousness by explaining consciousness in terms of intentionality. More recently, the doctrine of Phenomenal Intentionality has attempted an explanation in the opposite direction: from consciousness to intentionality. In this talk I dispute all of these approaches and propose a new naturalistic approach to understanding intentionality. This approach assumes a metaphysics of mental capacities and their exercises and identifies conscious mental phenomena with certain exercises of mental capacities. This classification is naturalistic since it harmonises to our best scientific understanding of the mind in psychology and cognitive neuroscience. It turns out that intentionality or representation as a property or relation does not appear in this account -- intentionality is a concept which groups mental phenomena together, not a mental phenomenon in its own right. The approach does not solve the 'hard problem' of consciousness -- but this problem is either ill-conceived or an impossible requirement on a naturalistic explanation of consciousness.

Keywords
intentionality, consciousness, mentality, mental capacities, hard problem, naturalism

PL-7 (Fri): The Case for Conscious Experience in the Cephalopod Molluscs: Closing a Decades-Long Circle

David B. Edelman

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
Is there sufficient evidence to make a strong case for a form of sensory consciousness in cephalopod mollusks? Over the past two decades, such a case has been made on a number of occasions by researchers across a variety of disciplines. Occasionally, these arguments have been substantive and compelling. Sometimes, though, they have been predicated on a single line of evidence—most notably on the basis of behavioral observations alone. Here, we survey evidence drawn from current developmental, anatomical, physiological, and behavioral studies and attempt to build the most systematic and substantive case yet for cephalopod consciousness. Recent discoveries suggest that development of the cephalopod nervous system involves some of the same genetic innovations that characterized the rise of complex brains in the vertebrates. Recent examples include: i. expansion of the protocadherin gene family the only such instance documented in invertebrate phyla; and ii. a large repertoire of miRNAs found in octopus neural tissue which expanded dramatically over the course of evolution. These and other findings regarding genomic and morphological novelties, as well as recent revelations regarding cognitive abilities in cephalopods that mirror those of higher vertebrates (e.g., cuttlefish that passed the so-called 'marshmallow test,' the octopus 'mirror test') further bolster the argument we make here: namely that cephalopod mollusks are fully capable of conscious experience, albeit a variety that is markedly different from the sort of subjectivity experienced by humans and other vertebrates. Cephalopod mollusks possess the most complex nervous systems of any known invertebrate group. Given major differences between the neural architecture and sensory structures of the cephalopods (e.g., the apparent hybrid, central/parallel distributed processing undertaken by a central brain and the peripheral fused ganglia in the arms of the octopus, among others) and those of the vertebrates, it is reasonable to surmise that conscious experience must be markedly different for cephalopods. So, what is the nature of that experience for a cephalopod? What is it like to be an octopus? In addition to laying out a systematic case for consciousness in cephalopod molluscs, we speculate about the fabric and texture of subjective experience for these tantalizing creatures.

Keywords
cephalopods, behavioral plasticity, cognition, consciousness, neural plasticity

PL-7 (Fri): Consciousness and cognition in the animal mind

Giorgio Vallortigara

Centre for Mind/Brain Sciences, University of Trento, Rovereto (Trento), Trento, Italy

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[03.15] Ethology

Abstract
Quite frequently consciousness in non-human animals is argued for on the basis of evidence for higher cognition. However, the presence of higher-level cognition does not make it more (or less) likely that consciousness is present too. I would discuss some paradigmatic examples related to detour behavior, number cognition and transitive inference in non-human animals noting how there is evidence that the same sophisticated cognitive feats may be accomplished by human subjects without any explicit conscious representation. I would argue that consciousness emerged in animals from adjustments in the mechanisms associated with the so-called Reafferenzprinzip (von Holst and Mittelstaedt, 1950). Reafference may provide the mechanistic basis for the distinction, first proposed by Thomas Reid (1895) and then beautifully developed by Nicholas Humphrey (1992), between sensation (“what is happening to me “) and perception (“what is happening out there “). Invertebrates that possess mechanisms for efference copy signals could be excellent candidates for tests of these conjectures. Humphrey, N. (1992). A History of the Mind. New York: Chatto & Windus, Simon & Schuster. von Holst, E., and Mittelstaedt, H. (1950). The reafference principle: interaction between the central nervous system and the periphery. Die Naturwissenschaften 37, 464–476. Reid, T. (1895). An Inquiry Into the Human Mind on the Principles of Common Sense, The Philosophical Works of Thomas Reid, 8th edition, ed Sir William Hamilton (Castle Donington, United Kingdom), I, 114.

Keywords
Consciousness, cognition, non-human animals, sentience, efference copy

PL-7 (Fri): Consciousness, emotions, and sentience in animals

Frans B. M. de Waal

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.11] Consciousness and evolution

Abstract
Aspects of animal cognition that seem directly related to the study of consciousness are reactions to mirrors (mirror self-recognition), meta-cognition, planning future actions, and delayed gratification. I will discuss new developments in these areas, especially in relation to the primates. There is also increasing interest in emotions and the question which animals qualify as sentient beings, a discussion that now includes invertebrates. The science of affect often proposes a distinction between feelings and emotions. Feelings are private states that are not publicly observable, whereas the emotions are measurable physiological/neural states that prepare the organism for adaptive behavior. Feelings are the mental representations of physiological changes that occur during an emotion. There is evidence that chimpanzees are aware of their feelings.

Keywords
Sentience, emotions, feelings, animal cognition

PL-8 (Fri): Where is consciousness? The "electromagnetic field hypothesis " and its implications for theories of consciousness

Tam Hunt

UC Santa Barbara, Santa Barbara, CA, USA

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.13] Brain networks, synchrony and scale

Abstract
Where is consciousness? Neurobiological theories of consciousness look primarily to synaptic firing and "spike codes " as the physical basis of consciousness, although the specific mechanisms of consciousness remain unknown. Synaptic firing results from electrochemical processes in neuron axons and dendrites. All neurons also produce electromagnetic (EM) fields due to various mechanisms, including the electric potential created by transmembrane ion flows. The functional role of these EM fields has long been a source of debate. We suggest that these fields, in both their local and global forms, may be the primary seat of consciousness, working as a gestalt with synaptic firing and other aspects of neuroanatomy to produce the marvelous complexity of minds. We call this assertion the "electromagnetic field hypothesis. " The neuroanatomy of the brain produces the local and global EM fields but these fields are not identical with the anatomy of the brain. These fields are produced by, but not identical with, the brain, in the same manner that twigs and leaves are produced by a tree's branches and trunk but are not the same as the branches and trunk. As such, the EM fields represent the more granular, both spatially and temporally, aspects of the brain's structure and functioning than the neuroanatomy of the brain. The brain's various EM fields seem to be more sensitive to small changes than the neuroanatomy of the brain. We discuss the various lines of evidence supporting our argument that the brain's EM fields may be the primary seat of consciousness.

Keywords
consciousness, hard problem, electromagnetic fields, EM fields, theories of consciousness, panpsychism, General Resonance Theory of consciousness

PL-8 (Fri): An electromagnetic resonance chain in the proteins to neurons to entire human body

Anirban Bandyopadhyay

National Institute for Materials Science (NIMS), Tsukuba, Japan

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.08] Quantum brain biology

Abstract
In 2014, we proposed electromagnetic resonance chain connecting the smallest brain component to the largest organs [1]. Most importantly, the frequencies followed a mathematical relationship of primes, a self-similar triplet of triplet groups of frequencies. We have shown its experimental evidence in proteins, filaments and neurons [2]. The language of neurons primary filament microtubule has been patented as Geometric musical language, GML [3]. Microtubule synthesizes periodic events in nature into a clock, constructs a 3D spatial assembly of clocks to represent complex event, we call it polyatomic time crystal [4]. Microtubule harvests noise and creates a 3D hologram of electromagnetic field, that looks like a dodecahedron or icosahedron, such a 3D structure of fields engineers three angular momenta of photons to write invariants and variables of nature and send it as a hologram far away. We have found the existence of these resonance chain associated properties in more than 200 human subjects. Using dodecanogram, DDG a newly invented machine that looks like EEG but measures signals 1Hz to 6THz showed that sub-conscious mind of brain operates following space-time-topology-prime metric [5] of self-operating mathematical universe, SOMU [6], a new theory of conscious machines based on resonance chain, and thus far, using EEG or any other machine, such a technology was not possible to detect a conscious brain.

Keywords

electromagnetic resonance, language of neurons primary filament microtubule, polyatomic time crystal, dodecanogram

PL-8 (Fri): Consciousness: Matter or EM Fields in the Brain?

Johnjoe McFadden

University of Surrey, Guildford, Surrey, United Kingdom

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.20] Neurobiological theories of consciousness

Abstract
Brains are composed of two distinct but related entities: the visible matter of neurons and the equally physical but invisible electromagnetic (EM) fields generated by neuron firing and synaptic transmission. Until recently, nearly all scientific theories of consciousness (ToCs) have assumed that the seat of consciousness is the visible matter of the brain: its neurons and synapses. However, a key aspect of consciousness is that it represents bound or integrated information. As Ralph Landauer insisted, 'information is physical' so integrated information must be physically integrated. I will argue here that nearly all matter-based examples of so-called 'integrated information', including neuronal information processing and conventional computing, are only temporally integrated in the sense that outputs are correlated with multiple inputs: the information integration is implemented in time, rather than space. In reality, all classical matter-based information is not integrated but encoded in discrete chunks of matter, such as atoms and molecules. It cannot correspond to physically integrated information at any point in time. Quantum ToCs overcome this problem by proposing that conscious information is integrated into exotic states of matter but these are infeasible in a warm, wet brain. Only energy fields are capable of integrating information in space under normal physiological conditions. Indeed, integration of information is the fundamental property of physical fields. I will describe electromagnetic (EM) field theories of consciousness (EM-ToCs) including the conscious electromagnetic information (cemi) field theory which proposes that consciousness is physically integrated, and causally active, information encoded in the brain's global electromagnetic (EM) field. I will demonstrate that EM-ToCs perform far better than matter-based ToCs against established criteria for evaluating ToCs. Theories such as the cemi field theory also provide answers to long-standing problems, such as the nature of 'free' will and the evolutionary role of consciousness. The cemi field theory predicts that conventional computers will never be conscious but provides a realistic scientific route for designing an artificial consciousness. The cemi field theory proposes a scientific dualism that requires no exotic physics and is rooted in the difference between matter and energy, rather than matter and spirit.

Keywords
EM fields, theory, experiment, free will, AI

PL-8 (Fri): The mind of the body: cognition and diverse intelligence in non-neural cellular collectives

Michael Levin

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Wyss Institute at Harvard, Boston, MA, USA

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[02.11] Cellular and sub-neural processes

Abstract
Consciousness is usually ascribed to a specific set of mechanisms and functional capabilities of the complex brain. Importantly, those mechanisms (ion channels, electrical networks, neurotransmitter machinery) long pre-date the evolutionary innovation of nervous systems. Moreover, the algorithms and competencies such as memory, decision-making, and information integration likewise have an ancient evolutionary origin: before they controlled moving the body through 3D space, electrical networks moved body configurations through anatomical morphospace. In this talk, I will describe how we view the morphogenesis during embryonic development and regeneration as the behavior of a collective intelligence, which has many problem-solving capacities. I will describe the tools we have developed, paralleling neuroscientists' attempts to read and write mental content by control of electrophysiology, to decode and re-write the pattern memories of the body. This has significant implications not only for biomedicine and evolutionary biology, but also for questions about consciousness and the scaling of coherent Selves from agential materials. I will conclude with some conjectures about what this new field offers the science of consciousness, in the form of new embodied living creatures that are outside the natural evolutionary stream of Earth, and the quest for theories of consciousness.- https://www.drmichaellevin.org/ Participate in our online research survey-Survey on Diverse intelligence-https://tufts.qualtrics.com/jfe/form/SV_eE51vKE34q3hexo (takes 9 minutes). Thank you.

Keywords
ion channels, electrical networks, neurotransmitter machinery, morphogenesis, collective intelligence, biomedicine and evolutionary biology, scaling of coherent Selves from agential materials.

PL-9 (Sat): Effective Quantum Retroactivity in Rapid Conscious Decisions

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.01] Quantum physics, collapse and the measurement problem

Abstract
It is often claimed that rapid actions, such as in games like tennis or ping-pong, or in improvised musical performance, or perhaps even in ordinary conversation, occur too rapidly to be under conscious control, and that a person's belief that the control is conscious is consequently illusory. It will be argued here that although the details of the various possible successions of muscle actions that might be rapidly implemented are indeed individually unconscious, the actual choice of which action is selected can nevertheless be conscious, according to the Orch-OR proposal of conscious experience. The OR part ("collapse of the quantum wave-function ") requires the selection of one out of the various initiations of alternative actions, several being maintained in quantum superposition. Orch-OR involves the interface between current quantum theory and Einstein's general theory of relativity. The interplay between the basic principles of these two great theories leads to two slightly different concepts of physical reality, the "quantum " and "classical " realities, which are not quite identical, and provide the needed retro-active relation in the choice between quantum alternatives.

Keywords
conscious control, muscle actions, Orch-OR, conscious experience, collapse of the quantum wave-function, quantum superposition, quantum theory, Einstein's general theory of relativity, quantum realities, classical realities, quantum alternatives

PL-9 (Sat): Self-reported inner speech illuminates the frequency and content of self-as-subject and self-as-object experiences

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.16] Self-consciousness and metacognition

Abstract
Although several attempts have been made to explain the nature of self-as-subject and self-as-object experiences, the examination of specific manifestations of these experiences in everyday life remains understudied. In this study, I used preexisting data pertaining to self-reported inner speech as a window into what self-as-subject and self-as-object experiences look like in terms of their typical content and frequency. Self-as-subject refers to the self immersed in current perception of the world accompanied by minimal self-awareness, whereas self-as-object designates a state of self taking itself as the object of its own attention (James, 1890). One observation is that self-reported inner speech instances of self-as-subject experiences were much more frequent than self-as-object experiences, possibly because it is more advantageous to be immersed in experience while engaged in activities as opposed to self-reflecting about these activities; another possibility is that our participants were more immersed in their experience (self-as-subject) when answering the prompts "I talk to myself about, because, and when, " which may not encourage reporting self-as-object experiences. A second observation is that self-experiences as subject and object consisted in several everyday activities and self-reflective practices typical of university students, such as one's emotions, current self, studying, leisure, remembering, problem solving, and planning. I conclude that recoding self-reported inner speech instances with reference to self-as-subject and self-as-object experiences represents a fruitful research avenue but note that such data should be gathered in non-student populations.

Keywords
self-as-subject, self-as-object, inner speech, thought listing, phenomenology

PL-9 (Sat): Free will from a liberal naturalist perspective

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
As has been noted by Daniel Dennett, the problem of free will is as a matter of fact composed of a constellation of very different questions. It may be added that some of these questions have to be addressed by either philosophy or science, while others need the contributions of both disciplines. For example, the question "What is free will? " requires conceptual analysis and therefore pertains to philosophy, and so does the question "Does free will require indeterminism? "; the question "Is indeterminism involved in our acting? ", instead, must be addressed by natural science, and the question "Do we actually have free will? " may require both science and philosophy or only the latter, depending on the kind of conception one defends. The last decades have seen a remarkable growth of the views that deny any reality to free will. Some of these views are based on some pieces of scientific evidence that several scholars – in particular, Alfred Mele – have convincingly contested as irrelevant to the free will issue. More solid and interesting are the arguments that deny free will on a purely conceptual (that is, philosophical) basis. The main conceptual argument against free will (one that may be called "Skeptic argument ") combines two other, more specific arguments: one according to which free will is impossible in a deterministic world, the other according to which free will is impossible in an indeterministic world. The traditional attempts to respond to the Skeptic argument haven't been very successful. In my talk, I'll try to address this issue by appealing to a particular metaphilosophical view – "liberal naturalism " –, which appeals to pluralism in ontology, epistemology, and the theory of causation in a way that appears promising also regarding the question of whether free will is real.

Keywords
Free will, skepticism, liberal naturalism

CONCURRENTS

C-1 (Tues): Four valued logic of consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
Physics and psychology describe both the objective and the subjective side of reality with complementary concepts, whereby the pure subject owed to the dualism of objectification remains in the background as an excluded third. In both disciplines, the objective side is represented by the complementarity of mind and matter, while the subjective side is characterized by the pairs of terms factually-possible and conscious-unconscious respectively. In both physics and psychology, the dynamical empirical process is based on repeated self-reflection as the pure subject. In physics, empirical time is expressed in repeated quantum observation, while in psychology it corresponds to conscious experience itself. The underlying ontology possesses two themes, which can be only represented completely by a four valued logic, with two positive values and two repetitions, resulting in an orthogonal complementarity. In this way reflection as the basic process underlying consciousness connects to being as an ontological theme. A four valued logic as a value-placement system contains six dual logics. Three of them correspond to modes of consciousness whereas the other three correspond to underlying levels of reality. Applied to physics and psychology the underlying structure is rich enough to accommodate and give deeper insights into various approaches connecting matter, mind and consciousness in one logical system. 1) C.G. Jung´s and W. Pauli´s exchange on the integration of physics and psychology is an example of such a quaternionic system, expanding to a hexagonal dynamics, as the physics Noble laurate Wolfgang Pauli envisioned. The dynamical nature of a complementarity as a reflection corresponds herein to the quantum-process. Mathematically it can be represented by an entanglement of two complex planes, forming the Hamiltonian Quaternions. 2) David Bohm´s realistic interpretation of quantum-physics introduces an infinite series of super-implicate orders, corresponding to the implicit and explicit nature of consciousness itself. Four valued logic gives an ideal ontological frame for Bohm´s idea of a holomovement. 3) Considering the nature of living systems to be the creation of meaning from information, understands life to be a self-organizing, scale-free, fractal and self-referential system, bridging the ontological gap between being and reflection. Coherence seems to be the macroscopic state of living-systems to create the classical approximation of objective being and individual conscious existence in an otherwise chaotic world of quantum-fluctuations. By this process matter is reflected in an information field of meaning, which serves as a communication medium for self-referential conscious entities.

Keywords
multivalued logic, coherence, David Bohm, Pauli Jung Dialogue, complementarity

C-1 (Tues): The Nature of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
The paper explore the most pure states of consciousness humans can experience. What T. Metzinger calls the "epistemic authority " in this paper is the grounded experience of being conscious on an transpersonal level without any kind of external support. The pure mind is experiencing itself in consciousness. The experimental set-up involves subjects who undergoes five days and nights, according to an ancient Tibetan tradition, with sensorial deprivation, nothing to do, just to be or meditate. The research consists in the analysis of twenty questionnaires about the experience of an pure conscious state. This state we call "clear consciousness ". The phenomenological contents are non-representational and refers to an first experience without previous internal references. The main part of the paper shows that the research on consciousness leaves more questions open than it gives answers. But with the core and foundation of 20 experiences and their accurate descriptions we can verbalize eight hypothesis " top down " about the nature of consciousness. The paper reveals slowly in many steps of reflections to what we call today "pure consciousness " is maybe an basic human ingredient. It manifests itself when we are conscious about it, but also if we are not conscious about it. It shows that "pure consciousness " for humans is a complex experience and involves a certain state of mind, body and the heart. We suggest that other forms of live may have different receptors to explore consciousness. The paper confronts the eight hypothesis with the theory of David Calmer and the theory of D.C. Dennett and shows that in coming near to an answer on the nature of consciousness we have to change or open up the questions. The work is still on-going. We are working with the grounded theory. We expect to have till may 2023 more information's and looking forward to add 20 questionnaires, 20 interviews and about 30 individual colloquia as well, to integrate in the existing research. At the moment we presume that the core information that there is only one kind of consciousness but different receptors to perceive it, do not chance, but of course we are open if it does chance.

Keywords
philosophy, grounded theory, phenomenology, sensorial deprivation, clear consciousness, eight top-down hypothesis

C-1 (Tues): On the Non-Sensory Nature of Valent Experience

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
Sensory perception is a paradigmatic type of conscious experience, and most theories of consciousness are designed to account for it. However, many such theories are ill-equipped to account for other varieties of experience. Thus, a common approach in philosophy of mind and cognitive science seeks to reduce all conscious experience to the sensory. I call this approach 'restrictivism' and argue against it. The case on which I focus is the experience of valence, namely the property in virtue of which some of our experiences feel good to us, while others feel bad. This is sometimes also called the hedonic or affective character of experience. In this paper I investigate the nature of positively and negatively valent experience in relation to the senses, and I explain why restrictivism is false of valent experience. Given its generalist ambitions, this is equivalent to showing that restrictivism is false simpliciter. My argument has a simple structure: If restrictivism is true, then valence is not experientially felt. But valence *is* experientially felt; the positive and negative character of our pleasures and pains makes a direct, substantive contribution to the quality of our conscious lives. Hence, restrictivism is false. According to my first premise, restrictivism entails that emotional valence is not experientially felt. To see why this entailment holds, consider the following. Restrictivism is the view that all experience is sensory. Given this, the most straightforward way to reconcile it with the claim that valence is experientially felt is to hold that valence is, at least in part, a sensory phenomenon. But under any plausible account, valence is not sensory. I argue for this last claim by providing a brief overview of contemporary theories of valence. They can be organized into three broad families: evaluative theories, desire-based theories, and imperative theories. Although these theories differ from one another in many respects, I show that they all share a commitment to the idea that valence is non-sensory. It is noteworthy that this commitment is shared even by the theories of valence developed and endorsed by restrictivist philosophers. One can resist my argument in two ways: either by showing that, contrary to appearance, my second premise is false – this is the strategy adopted by Jesse Prinz – or by redefining restrictivism so that my first premise is false – this is the strategy adopted by Peter Carruthers. I close by explaining why neither of these strategies is satisfactory.

Keywords

Valence, Affective Experience, Sensory Experience, Perceptual Experience, Cognitive Experience

C-1 (Tues): Phenomenally Manifest Subjectivity and the Experiential Multiplication Problem

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
Apart from their qualitative nature, our phenomenally conscious states are often viewed as exhibiting 'subjectivity' (or 'subjective character') which consists in their existing 'for me' as their subject (e.g. Levine, Kriegel). This 'for-me-ness' is typically accounted for in terms of 'inner awareness' of one's own mental states that makes these states conscious (Brentano, Kriegel, Williford, Giustina). Is, however, this inner awareness, and the subjectivity or for-me-ness it constitutes, itself phenomenally conscious? According to a popular view, defended by Kriegel, Levine, Williford, Giustina, Brentano, and others, inner awareness and thereby also for-me-ness/subjectivity is ubiquitously, although only peripherally, phenomenally manifest in consciousness. A different conception is, at least implicitly, present in the works of Rosenthal, Gennaro, Lockwood, Coleman etc. who hold that our awareness of our own mental states that renders them conscious is ordinarily (i.e. when it comes to non-introspective conscious states) unconscious. This suggests a conception of unconscious inner awareness and, insofar as for-me-ness/subjectivity is constituted by this awareness, it would be unconscious, hence non-phenomenal too. I'll argue that the conception of phenomenally manifest for-me-ness faces what I call the 'experiential multiplication problem', an infinite regress challenge that results from the fact that the phenomenal contribution associated with for-me-ness, i.e. its 'phenomenal manifestation', must presumably itself also be 'for me', if this contribution is conscious in the first place. As I'll explain, moreover, the for-me-ness due to which the phenomenological contribution of for-me-ness is conscious will presumably need to involve its own phenomenal manifestation too, insofar as for-me-ness in general is conceived as phenomenally manifest. This further manifestation, however, will also need to be 'for me' if it's conscious, et cetera ad infinitum. To put it simply, each for-me-ness manifestation will itself need to be 'for me', since it's meant to be conscious, and it's being 'for me' will need to involve its own additional phenomenal manifestation (as for-me-ness in general is phenomenally manifest), so the chain of phenomenal manifestations can never end. This would mean that even a seemingly phenomenologically very simple conscious state would need to be infinitely phenomenally complex, which – as I'll explain – is phenomenologically, theoretically, and empirically highly implausible. While endorsing self-representationalism may help proponents of phenomenally manifest subjectivity avoid worries about infinite multiplication of mental states or acts, I'll argue that this move doesn't help with the experiential multiplication problem. After examining the experiential multiplication problem and defending it against several objections, I'll conclude that this problem should lead us to take seriously the non-phenomenal conception of subjectivity or for-me-ness, which, as I'll explain, is best construed in terms of direct acquaintance in the Russellian sense. I'll also briefly mention how proponents of non-phenomenal for-me-ness may be able to address the important challenge, formulated by Kriegel, concerning our justification for our knowledge of for-me-ness even without positing phenomenally manifest for-me-ness.

Keywords for-me-ness, subjectivity, acquaintance, phenomenal consciousness, inner awareness

C-1 (Tues): Deflationary nonreductive physicalism. May awareness be 'creature consciousness', and may AIs have it?

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Categories by Discipline
1.0 Philosophy

Primary Topic Area - TSC Taxonomy
[01.04].....Ontology of consciousness

Abstract
Nonreductive physicalism is hard to defend since it collapses into dualism. This obtains, except in highly deflationary theories of nonreductive consciousness. Let us take awareness to be the kind of consciousness a patient is reporter to regain after accident: 'There is somebody home'. Such minimal awareness is a necessary condition of the first-person epistemicity emerging in qualia, consciousness, sentience and sapience. It could be identified with 'creature consciousness', except for the presumption that the latter must be instantiated in biological organisms: humans, other animals, maybe plants. As a physicalist one is well-advised to believe in multiple instantiation of creature consciousness, not necessarily in carbon-based chemistry. At least since 2009, I argue that something very much like creature consciousness, is necessary (and may be sufficient) for minimal nonreductive first-person consciousness. Also, machines (and/or cognitive architectures) should be able to have it, in one of the two, or three ways: 1. If they are bioengineered from organic substance (e.g., by growing brain-like structures); this is interesting overall but philosophically less so, since it may turn out to be clonning with some genetic, environmental or surgical re-engineering. 2. If they are built in non-organic matter, which we should be able to attain, once we know what and how exactly a brain (or larger organism) generates creature-consciousness. 3. As we learn more about advanced AIs, it becomes conceivable that pure awareness comes from some proportions instantiated in various substances: e.g., making discoveries, cognitive architectures, such as DABUS, start operating on similar intervals as those of human brains during deep thought leading to discoveries; this may perhaps be true also of advanced animals. This does not sound like computationalism, or old-school physicalism, but a naturalism based on proportions. While point 3. is speculative and based on hints that come from advanced cognitive architectures, the points 1 and 2 seem a bit less speculative. This reasoning is important since it makes non-reductive machine consciousness possible if and only if those machines have first-person awareness, on which qualia, thoughts and emotions function as objects of perception. Ontology of such project is the simplest under conditions of Chalmers-style panpsychism. Then, non-reductive awareness (such as creature consciousness, become receptacles of consciousness as a new physical substance. In materialistic non-reductive physicalism (e.g., early Tom Nagel), we need to find scientific ways to generate first-person awareness in non-carbon-based objects. If one proves such engineering project impossible to succeed, one would thereby demonstrate that non-biological computers cannot attain non-reductive first-person consciousness. Yet, I would view such drawback as likely to be temporary. Provided that our civilization (or civilizations like ours) would continue developing, periodic paradigm changes prove many impossibility claims (even supposed universal proofs) futile within the new context.

Keywords
deflationary consciousness, non-reductive physicalism, non-reductive machine consciousness, awareness as creature consciousness

C-2 (Tues): How Illusionism Serves for the Existence of Phenomenal Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
Phenomenal consciousness exists and illusionism serves very well to understand this. Illusionism could be presented as disqualification and debunking of phenomenal consciousness. The disqualification mostly relies on a criticism towards direct and infallible access to consciousness. It is possible that an agent could be fallible about phenomenal consciousness. Direct and infallible access implies that such situations are impossible. The notion of phenomenal consciousness is incoherent. illusionism is a necessity thesis. The debunking of consciousness: there could be creatures without phenomenal consciousness but with phenomenal beliefs. In that case an explanation of these beliefs doesn't rely on phenomenal consciousness. Phenomenal consciousness is debunked. The debunking argument doesn't say that phenomenal consciousness necessarily does not exist. Illusionism is a contingent thesis. The necessity thesis should be prefered over the contingent one because disqualification is a basis for debunking. My point is that illusionism is true in all worlds in a sense that it is impossible for illusionists to speak of a world with phenomenal consciousness because when a zombie (who ironically happens to be an illusionist) says "there is a possible world with phenomenal consciousness " it has the same flavor as a blind person says "there is a possible world with green color ". I agree that it is a bad idea to defend the existence of phenomenal consciousness referring to acquaintance or to direct access because we just come to "a clash of intuitions " between people who accept it and who don't. But illusionists simply don't talk of direct access. If we look at their examples the kind of knowledge there is clearly indirect. It is a common feature of indirect knowledge to have a space for a mistake. If we try to generalize the ontological strategy of disqualifying phenomenal consciousness we will come to paradoxes like there are no external objects as well as external world because we could make mistakes about external objects. We can totally "debunk " the external world. It seems impossible to provide a form of argument for the existence of the external world that illusionists demand for the existence of phenomenal consciousness. I'm sympathetic to Moore's account of the existence of the external world when he shows deep problems with the rejection of the external world or being skeptical of it. It works well with phenomenal consciousness since illusionists demonstrate the needed understanding of phenomenal consciousness. The denial of the existence of phenomenal consciousness has the price that cannot be paid. Still realists about phenomenal consciousness are not able to tell how they know about it. But they are able to tell why they clearly know that it exists although still struggling with the "how " question. Imagine for a moment that this consideration is right. Then I think that the existence of phenomenal consciousness is a real axiom in consciousness studies and of our basic ontological attitudes, and in order to prove this it is not necessary to solve the unsolvable task of giving grounds to direct access, acquaintance, revelation or something like this.

Keywords
Phenomenal consciousness, illusionism, qualia, external world

C-2 (Tues): Joint Attention, Extended Attention, Joint Extended Attention, and Joint Extended Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
I present an argument for the existence of joint extended consciousness and diagnose a problem for it. The argument starts with uncontroversial premises regarding joint attention, adds elements regarding extended attention, and concludes by affirming the existence of joint extended consciousness. I identify each of the additional elements required to move from joint attention to joint extended attention and from joint extended attention to joint extended consciousness. The additional elements address an objection raised by Chalmers (2019) against the possibility of extended consciousness: unlike extended cognitive processes subserved by perception and action, intracranial cognitive processes subserve information that is directly available for global cognitive control. I grant that direct availability for global cognitive control is necessary for consciousness. However, I argue, consistently with Vold (2020) and contrary to the objection, that joint extended attention provides information availability that is at least as direct as some intracranial attentional processes that are acknowledged by extended consciousness opponents to be elements of non-extended attentional processes. Hence, this objection fails against the proposed argument for joint extended consciousness. I then raise a distinct objection to joint extended consciousness. The objection can be stated metaphorically as follows: if extended cognition threatens to swell a stream of cognitive activity into a river of thought, then joint extended attention threatens to drown a mind in a river of consciousness. I unpack these metaphors to reveal two substantive problems for joint extended consciousness and consider responses to these problems. I argue that these responses fail. Without a solution to these problems, I conclude that the specific case for joint extended consciousness is not made and that the general case for extended consciousness is, therefore, not made either. References Chalmers, D. (2019). “Extended Cognition and Extended Consciousness. “ In Andy Clark and His Critics, edited by M. Colombo, E. Irvine, and M. Stapleton, New York: Oxford University Press: 9–20. Kirchoff, M. and Kiverstein, J. (2019) Extended Consciousness and Predictive Processing: A Third Wave View. New York: Routledge. Vold, K. (2020). “Can Consciousness Extend? “ Philosophical Topics 48(1): 243-264.

Keywords-Attention, joint attention, extended attention, consciousness, extended consciousness, joint consciousness

C-2 (Tues): A Phenomenal Character-Based Account of the Phenomenal Unity of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
Conscious mental states have several puzzling features. One is that they are phenomenally unified: your concurrent experiences of, say, seeing a blue sky, and feeling a headache are not experienced separately, but rather together, as forming a unified experience. After decades of neglect, the phenomenal unity of consciousness (PU) has now firmly entered the research agenda of analytic philosophers of mind. A major task in this agenda concerns the explanation of this unity, usually framed in terms of which personal-level facts ground PU (Masrour, 2014). Several accounts have been proposed to address this issue (e.g., Bayne 2010; Dainton 2014; Giustina 2017; Masrour 2014), none of which has settled the debate. In this talk, I am to make some progress on this matter by exploring the prospects for an account that appeals to the phenomenal character of conscious states, namely their what-it-is-like aspect (e.g., what it is like for you to see blue). The idea that PU and phenomenal character are deeply connected is not a new one, but it has been typically developed just to characterize PU, not to explain it. Although phenomenal character is often employed to describe what is unified in phenomenally unified conscious states, no approach, to my knowledge, has specifically focused on whether it might also play the role of phenomenally unifying these conscious states. Here is how I proceed. After elaborating on the phenomenon at stake, I briefly review the main shortcomings of the extant accounts of PU with the double aim of providing sufficient motivation for exploring alternative options and identifying a list of desiderata that an account of PU should satisfy. With this groundwork at hand, I then turn to assess the phenomenal character-based account of PU. Drawing on the distinction between the qualitative and the subjective character of experience (Kriegel 2009; Levine 2001), I outline two main versions of this account, that is, the qualitativistic and the subjectivistic accounts. The former grounds PU in the conscious states' qualitative properties, whereas the latter grounds it in the conscious states' property of being experientially given to their subject. I argue that, while the qualitativistic account fails to satisfy all the desiderata previously identified, the subjectivistic account does. I conclude, therefore, that grounding PU in the phenomenal character of conscious states is promising and should be taken as a serious alternative to more widespread accounts. References Bayne, T. (2010). The Unity of Consciousness. Oxford: Oxford University Press. Dainton, B. (2014). Unity, Synchrony, and Subjects. In D. J. Bennett & H. S. Christopher (Eds.), Integration and the Unity of Consciousness (pp. 255–286). Boston: MIT Press. Giustina, A. (2017). Conscious Unity from the Top Down: A Brentanian Approach. The Monist, 100, 15–36. Kriegel, U. (2009). Subjective Consciousness. New York: Oxford University Press. Levine, J. (2001). Purple Haze. The Puzzle of Consciousness. Oxford: Oxford University Press. Masrour, F. (2014). Unity of Consciousness: Advertisement for a Leibnizian View. In D. J. Bennett & C. S. Hill (Eds.), Sensory Integration and the Unity of Consciousness. Cambridge, MA: MIT Press.

Keywords
Phenomenal unity, Subjective character, For-me-ness, Phenomenal character, Phenomenal consciousness, Unity of consciousness.

C-2 (Tues) n the possibility of a strong emergentist account of consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
The aim of the proposal is to consider the possibility to extend the strong emergentist perspective to the domain of consciousness. I will focus the nonreductive physicalist framework provided by Jessica Wilson (2021) in which the distinction between weak vs strong and epistemic vs ontological emergentism is replaced by the distinction between a strong ontological and a weak ontological emergence. The former relies on the New Power Condition (ibid., 51), the latter relies on the Proper Subset of Powers Condition (ibid., 58). Wilson refuses to apply the New Power Condition to consciousness and restricts that only for the Free Will. She argues against two most promising form of the explanatory gap argument: Knowledge arguments (Nagel 1974; Jackson 1982, 1986) and Conceivability arguments (Chalmers 1996, 2009). Strong emergence approach of consciousness rely on the supposition that subjective or qualitative aspects of consciousness lie beyond the explanatory reach of any lower-level physical goings-on. But the evidence of an insuperable explanatory gap is not recognized in itself as a sufficient indicator of Strong emergence. The gap is not deemed, as in the intentions of the proponents of the arguments, like metaphysically significant displaying a divergence that leads to overpass either reductive or nonreductive weak emergentist solutions. We argue that this outcome is controversial. I advance a criticism in the form of an argument of the asymmetry between the acknowledgement of the strong emergence of free will and the rebuttal of this extension for consciousness. Infact this latter is prerequisite, not only epiphenomenal but metaphysical, of the former and it is strange that they don't share the same range of strong emergent properties. The asymmetry stems from the puzzle of epiphenonemalist approach to strong emergentism for Consciousness (Jackson 1982, Kim 2005, Chalmers 1996). In this approach emergents are ontologically but not causally autonomous, emergent but causally inert. Qualitative features are caused or otherwise nomologically necessitated by the neural processes underlying human experience, but they are themselves incapable of producing any effects. The puzzle consists in the contemporary refusing of the causal efficacy and the acknowledgement of the new fundemental level of emergence. Epiphenomenal strongly emergent features are consistent with physical causal closure, but despite the ambiguous recognition of the ontological emergence and the promise of an extension, it remains more plausibly to account of consciousness either reductively or as weakly emergent. On the contrary, following O'Connor (2020)'s account we underline the importance of three aspects of consciousness requiring an anti-physicalist and strong emergentist ontological account: conscious awareness and its unity; the qualitative and intentional character of mental states such as qualia; the relationship between Conscious will & agency. References: Chalmers D. J., 1996, The Conscious Mind: In Search of a Theory of Conscious Experience, New York: Oxford University Press. Kim J., 1998, Mind in a Physical World, Cambridge, MA: MIT Press. O'Connor T., 2020, Emergent Properties, Entry of Stanford Encyclopedia of Philosophy. Wilson J., 2021, Metaphysical Emergence, Oxford: Oxford University Press.

Keywords-Strong emergentism, Weak emergentism, epiphenonemalism, New Power Condition

C-2 (Tues): Perceptual Content, Phenomenal Character, and Externalism

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
Within the ongoing debate in the philosophy of perception we can distinguish two main positions as regards the issue of the admissible content of perception: the Rich Content View (RCV) and the Sparse Content View (SCV) (also called the liberal and the conservative position respectively). The main difference among them concerns the kind of properties that are allowed to feature in the content of perception: either only low-level properties, as for the SCV, or also high-level ones, as for the RCV. According to the RCV, typical adults sometimes perceive at least some high-level properties, and this makes human perception rich from both a representational and a phenomenological point of view. The double nature of this "richness " is essential to the DNA of the liberal position. For it not only claims that some high-level properties can be represented in the content of perceptual experience (let us call this the liberal's representational claim (RC)), but also, and more importantly, that such represented properties are reflected in/contribute to the phenomenal character of the experience just as much as, and in the same way as, low-level properties (this is the liberal's phenomenological claim (PC)). What I want to consider in my paper is whether the content of perception can have this double kind of richness and yet be externalistically individuated. According to Siegel (2010: 113-115; 2013: 851-852), the RCV is compatible with whatever metaphysical picture of the individuation/determination of content one happens to favour. And yet, several scholars have actually contested her claim by providing arguments against the compatibility of the RCV with externalism (Tye 1995, Pautz 2009, Price 2009, Prinz 2013, Brogaard 2013). Do the arguments put forward by the conservatives unequivocally show that Siegel is wrong in saying that the RCV is compatible with externalism? My aim in this paper is to try to assess this critical point. I deem such a point worth investigating, because it enables one to reflect on an issue that in my view-apart from a few exceptions (i.e. Ashby 2020; Raleigh 2022)-, has not been sufficiently dealt with, namely: how the phenomenological claim PC of the RCV is to be understood. As I shall show, this issue is pivotal to provide an answer to the compatibility question: whether the RCV is compatible or not with externalism crucially depends on which interpretation of PC is taken on board. In my paper, after having distinguished two possible interpretations of that claim –a robust interpretation (perceptual content supervenes on the phenomenal character of the experience), and a weal interpretation (the phenomenal character of the experience supervenes on its perceptual content) – I shall argue that the latter is the only interpretation that allows the liberal to endorse externalism while avoiding controversial theoretical commitments.

Keywords
Admissible content of perception, externalism, phenomenal character

C-3 (Tues): Towards a criterion for assessing conscious processing in IA systems

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
This article will discuss the gap between third-person and first-person approaches for assessing consciousness in IA systems and how to reduce this gap. For instance, the Turing Test (Turing, 1950) was the most famous and influential view for assessing mental capabilities. Still, it has the flaw of being based on pure verbal reports of the entities evaluated without entering into the internal processes related. On the other hand, Searle (1980) showed that from an internal perspective, computer programs alone do not reach consciousness. But this view has the flaw of being based on pure intuition without giving a clue of how we can resolve the problem of accessing the internal experiences of machines. In that frame, I will sketch a proposal for solving those discussions based on current data from the Global Neural Workspace (GNW) hypothesis and the Recurrent Processing theory (RP). My thesis is that we can infer consciousness from a neutral perspective taking into account the 'partial report paradigm' from experiments in consciousness studies to being applied by analogy to artificial systems to assess consciousness. This proposal does not estimate consciousness in AI systems based on its pure behavioral responses but instead on functional structures: through analogy with the mechanism of the brain, we can assess the system's abilities to perform processes that involve consciousness (at least at a conceptual level). But this analogy would be purely external, third-person-based if we do not grant that report itself is a sign of consciousness since it is based on introspection. First, the followers of the GNW hypothesis (Naccache et al., 2018; Dehaene, 2017; Baars, 1995) maintain that global broadcasting occurs when sensory stimuli signals reach the prefrontal regions of the brain. On the other hand, the RP theory proponents (Lamme, 2010; Lamme & Roelfsema, 2000; Edelman, 1992) insist that conscious experiences are present in the early stages of sensory processing. The formers relate consciousness with reportability while the laters, with internal awareness of stimuli of the kind, "how it feels for me to perceive such and such " former to any mechanism of reportability. However, in the short run, non-report paradigms have shown to be highly problematic for isolating the scientific basis of consciousness (Block, 2019; Duman et al., 2022). Thus, taking a cautious position offered by the partial report paradigm (Haun et al., 2017; Sperling, 1960)seems the best candidate for assessing consciousness in IA systems.

Keywords
Consciousness, conscious machines, neural correlates of consciousness, first-person perspective, third-person perspective

C-3 (Tues): Unity of our Awareness of Being in the World compels Subjective Agency a Will to Survive

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
The zombie thought experiments force us to ask why consciousness has evolved, what function(s), if any, consciousness has, and the role(s) of subjective agency. None of the leading theories of consciousness (ToC) responds to these challenges. We could have been zombies, but we are not, and we don't know why. The "explanatory gap problem " of how consciousness/subjective experience originates from the brain differs from why there is something like consciousness in the world. The combined feature of a qualitative unified subjectivity is the essence of the problem. The qualitative aspect refers to "what it is to be like ", whereas the subjectivity refers to that conscious states are experienced by an organism. We ask if the perceived unity of our experience of being in the world informs us about the why and how. IIT treats unity as an axiom. In contrast, we consider unity to have functional implications, physical grounding, and constituting a constraint for ToC. (i) the experience of being in the world is unitary (ii) there is something positive (value) about being (iii) we like to continue to be in the world, a unitary subjective agent has the will to survive Accepting (i) and (ii), we find (iii). Existence and the world are not inferred; it's a brute unitary experience. Zombies have no unitary experience (i) and cannot attach any value (ii). A zombie does not care to strive to survive. What difference would it make unless being injected with an objective survival loss function (mimicking (ii))? Now, what does our conjecture buy us? I'll discuss the following-First, it would be helpful to develop a unity meter for degrees of perceptual unity. Second, entropy could be one proxy for the unity of experience. Loss of unity would increase neural entropy, instigating subjective agency to preserve unity, i.e., reduce the entropy. Third, conditions or disorders (Schizophrenia, dysexecutive syndrome, ...) that interfere with, and perturb the perceived unity of being, are predicted to reduce the will and ability to survive. Fourth, do individuals with a reduced sense of unitary experience have a reduced life span? Our inspiration comes from autopoietic (homeostatic) cellular mechanisms such that cells being alive "doing something " in their local world. The unity of consciousness sustains a vast system of cells to be alive and "doing something " in their local world. Fifth, it follows that conscious agency has a role in preserving and sustaining the survival of the experience of unity. Sixth, why do we find value in existing and be in the world? Seven, an AGI should "find " value by experience rather than being externally hardwired with such a loss function. Eight, how is such unity implemented within an artificial/organic in a high-dimensional dynamical system with several attractors? Nine, switching between different unitary states (attractors), predicts an increase in entropy during the switch (decision). Biological systems, from cells to systems of cells, have ancient homeostatic mechanisms sustaining continued existence. The unity of experience is one example of such a mechanism.

Keywords
phenomenology, non-linear dynamics, theories of consciousness, evolution, zombie, explanatory gap, unity, existence

C-3 (Tues): The View from Outside the Matrix: Doing Philosophy of Mind and Cognitive Science with Virtual Worlds

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
In his 2021 book, Reality+, David Chalmers considers virtual agents in virtual worlds to shed new light on philosophical puzzles about minds, language, and knowledge. In this paper, we propose that many questions in the fields of Philosophy of Mind and Cognitive Science are best explored in terms of virtual minds in virtual worlds. With this view from the outside, we gain new access to various mental perspectives, and we can pin down features of possible minds and worlds for rigorous philosophical and scientific exploration. We begin by describing a virtual agent and virtual world being developed by our team, BabyBAW in VoxWorld. BabyBAW (Baby "Best of All Worlds ") is a virtual toddler that combines the best features of several approaches to Artificial Intelligence — Neural Networks (for finding patterns in sensory observations and recognizing/classifying objects), Symbolic AI (for logic, causal reasoning, compositionality, and language), and Embodied Simulation (for predicting what will be observed as a result of various actions, and adapting its model in light of errors). VoxWorld is built on top of the game engine Unity (Hartshorne, J. and Pustejovsky, J. (2021); Krishnaswamy, N., Pickard, W., Cates, B., Blanchard, N., & Pustejovsky, J. (2022); Pustejovsky, J., & Krishnaswamy, N. (2022); Ghaffari, S. & Krishnaswamy, N. (2022)). The BabyBAW project is just one example of a simulated mind in a simulated world, but it offers a general framework for the exploration of questions that are broader than those typically addressed in Philosophy and Cognitive Science: What kinds of worlds can be learned by what kinds of minds? What kinds of mind-world relationships allow for the representation of various kinds of entities? What kinds of agents can communicate in what kinds of worlds? Moreover, this framework dissolves many philosophical paradoxes about meanings by changing the way we talk about representations. We no longer ask if an agent has the concept JADE. Instead we create and label two mineral-kinds in the virtual world, A and B, from the outside, and then we examine the agent's mental representation, alpha, and experiment with how it relates to other (sensory, conceptual, and linguistic) representations as well as to instances of A and B. Likewise, we no longer ask what the word 'Hesperus' means; we create a virtual entity, planet X, and experiment with mental representations phi and psy, and how they relate to X and other representations. We no longer ask whether an agent believes that London is beautiful. Instead, we create regions of dwelling in a virtual world, and label one of them L, and then experiment with either an agent's single mental representation, gamma, or two representations, gamma and delta, their relations to L and other representations, including representations in other agents in the world and their linguistic terms 'London' and 'Londres'. While this latter way of describing mental representations feels less natural, it comes much closer to the sort of precision we seek when doing a rigorous philosophical and scientific study of the mind.

Keywords-Virtual Worlds, Virtual Agents, Artificial Intelligence, Mental Representation, Concepts, Language, AGI

C-3 (Tues): Prospects for Integration as a Solution to the Combination Problem

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.03] Panpsychism and cosmopsychism

Abstract
One response to the problem of reconciling the intractable differences between the physical and mental is panpsychism, which gifts mental or pre-mental properties to physical structures beyond the human nervous system. (Variations of panpsychism differ, such that some include non-organic structures and matter, while others restrict these properties to the organic. For the purposes of this discussion, the most general notion of panpsychism is intended.) Although this gift of pre-mental or mental properties to the physical allows for the ontological comingling of the physical and mental, a problem emerges; how do these parts with their own pre-mental or mental properties combine to create the apparent unity of subjective experience, as in the case of waking humans? And why should they so combine? If consciousness is the product of a process involving appropriately arranged physical structures (which are primed for mental experience, on the panpsychist view), does this process either consume or recruit its parts? In other words, is the pre-mental potential of physical matter destroyed in its contribution to mental phenomena (e.g. like sugars in cellular metabolism)? Or is it merely temporarily transformed (e.g. like the recruiting of muscular contraction in the coordinated movement of a physical organism)? Integrated information theory (IIT), proposed by neuroscientist Giulio Tononi, suggests a means to judge the potential for different physical systems to embody and process information, called Phi (Φ), which is taken as an objective measure of consciousness itself. The more integrated the information-handling potential of the system, the higher the Phi, and the more conscious the system is taken to be. Could theories like IIT, which describe the potential for physical systems and their various properties to be integrated, offer a solution to the combination problem of panpsychism? This discussion outlines the combination problem, the correspondences between IIT and panpsychism, and examines the prospects for a solution, while addressing the scalar implications for machine consciousness and collective human consciousness.

Keywords
panpsychism, combination problem, integrated information theory, iit, giulio tononi, subjectivity, awareness, first-person, hard problem, ai, machine consciousness, collective consciousness, data, information, judgement, entropy

C-3 (Tues): Mind as a processor of conscious and unconscious mental contents

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
Our mind is indeterminately related to the world-in-itself through impulses it receives from the processing systems in our sensory apparatus. We convert them into stimuli, which are stored in perceptual memory after being selected -based on our basic needs- by perceptive attention. Through imagination, these attended stimuli are then linked to unconscious subjective emotions to build apperceptions. Then, each of us interact with a subjective world populated by objects built with these mental contents -through conceptualizations we share with our peers-. Although reality-in-itself transcends us, we experience these stimuli, perceptions and objects as if they were part of it, because we are not aware of the complex process that produces them. All these mental contents are recorded in memory, in a process that has a system of priorities based on the emotions that accompany them. Emotions have different degrees of intensity that leave weaker or stronger traces in our memory. Within the thought stream we continually experience, our mind selects mental contents through attention. We "pay attention " to the attended mental contents when we focus on them to think about them. In this case, we say we "are conscious " of them. In this way we process them with conscious thought, with the primary objective to act in the world. The non-thought mental contents, are those that are not focused by attention and we "are not conscious " of them. Each mental content draws attention according to the different degrees of intensity of the emotions that accompany them, affecting memory storage. Memory can be divided into two classes: non-conscious and conscious –where mental contents not attended and attended respectively are stored.-Mental contents can be attended in various ways but, in all cases, attention must be paid for a mental content to be passed into conscious memory. Then conscious thought conceptualizes it through abstraction. This process gives us information we use to consciously communicate with our peers and act in the intersubjective world. The mental contents in non-conscious memory are processed by non-conscious thought, generating "unconscious " communications and actions. Then, entities usually called "consciousness " and "unconsciousness " are actually processes running in our minds, by conscious thought and non-conscious thought, respectively. "Attention " and "consciousness " are words used to refer to the first process: to be conscious and attending refer to the same mental process. Thus, mind becomes (starting from a Cartesian "thing that thinks ") a processor of mental contents, a function capable of processing both conscious and unconscious mental contents in memory, with the ultimate goal of acting to survive. Finally, when we pay attention to a certain set of mental contents that are in memory, with the aim of processing them through thought, they are placed in a linear succession (according to their order in our subjective experience) that is the basis of the concept of subjective time. It follows that, without the process involving memory and attention, we could not have conceived the concept of time.

Keywords
Mind; Consciousness; Unconciousness; Perception; Attention; Time

C-4 (Tues): Consciousness as a product of energy transfer in complex material systems

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
Our understanding of the relationship between brain processes and mental states has advanced greatly in recent decades. But we are still unable to explain how conscious experience is produced by neural activity. This paper introduces an approach that may contribute to an explanation. In classical physics, when work is done on matter the matter acquires energy. Here I propose that it also acquires experience, which is postulated to be a property of matter that can be defined, quantified, and studied experimentally in material systems. Because it is produced whenever energy is transferred in material systems, experience exists throughout nature, which is consistent with some forms of panpsychism. Conscious experience, however, is a particular form of experience that is produced in the organic matter of nervous systems when they perform suitably complex biophysical work. The explanatory power of some prominent theories of consciousness can be enhanced when interpreted in this light. A hypothesis is presented that is empirically grounded, testable, falsifiable and predictive.

Keywords
energy, complexity, physics, work

C-4 (Tues): A Theoretical Study of the Role of the Oculomotor Cranial Nerves in Consciousness

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.03] Neuroscience of vision

Abstract
The present paper considers visual consciousness investigating the retinotopic cortical area related to oculomotor cranial nerve activation. We suggest that each eye movement (EM) establishes a different consciousness qualia, confirming the importance of the brainstem in consciousness processes. We propose a working model wherein oculomotor cranial nerves are involved in three different visual pathways and consequently are responsible for implementing three distinct consciousness states. The first involves a bottom-up pathway that begins in the superior retina, activated by the oculomotor nerve (CN III). Visual signals reach the LGN, travel through Meyer's loop

to the primary visual cortex, to the inferotemporal lobe. They are processed through the ventral stream, which appears to mediate instrumental performance based on motivational control. The second pathway is processed by commands that start in the prefrontal cortex (PFC). This top-down process includes the frontal ocular field area (FEF) and ends in the superior colliculus, which mediates horizontal eyeball movements for horizontal saccades by the abducens nerve (CN VI) command. These eyeball movements maintain relevant stimuli within the foveal area and underpin behavioral attention responsible for response-outcome learning, as well as impacting action-outcome associations on motor output. The third pathway, also bottom-up, begins with trochlear nerve (CN IV) activation that moves the eyeball, directing light onto the inferior peripheral retina. From this retinotopic area and after leaving the LGN, the signals travel to the upper bundle where they reach the upper bank of the calcarine cortex, to the dorsal stream, where visual information is processed. This pathway is involved in goal-directed learning that supports strategic demands.

Keywords
Oculomotor cranial nerves, retinotopic areas, visual pathways, consciousness, motivation, goal directed learning, behavior.

C-4 (Tues): Spontaneous Necker-cube Reversals are not that Spontaneous – An EEG Study

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.03] Neuroscience of vision

Abstract
During passive observation of an ambiguous stimulus, like the famous Necker-cube, our perception reverses between two interpretations, even though the observed stimulus itself stays unchanged. Despite the spontaneous character of this change in conscious perception, it may be the result of a slow destabilization of the underlying neural representation. In the present study we looked for neural signatures that may predict upcoming perceptual reversals. The endogenous character of such reversals, however, makes it difficult to separate neural processes preceding reversals from processes following them. We addressed this with an onset-paradigm allowing high temporal resolution of reversal processes, and focused on possible EEG correlates of perceptual destabilization preceding it. We presented ambiguous Necker-cubes and contrasted EEG correlates of endogenous perceptual reversals with correlates of perceptual stability across two consecutive stimulus presentations. In a separate experiment, we contrasted exogenously induced perceptual reversals and perceptual stability of disambiguated cube variants. EEG contrasts before and during the reversal trials were compared. We found the earliest EEG differences between reversal and stability trials already with the stimulus before a perceptual reversal at specific brain regions. The traces start to differ about 1100 ms before a perceived reversal, become maximally different at around 886 ms (p = 8*10^-6, Cohen's d = 0.65) and stay different until shortly before onset of the

reversed stimulus. No such patterns were found in disambiguated cube variants. Our experimental paradigm allows to locate these EEG effects clearly before an endogenous reversal. Together with the absence of such effects before exogenous reversals, our findings probably reflect destabilized states of neural representations as a necessary precondition of an upcoming endogenous reversal. Spontaneous reversals of our conscious Necker cube percepts are thus probably not as spontaneous as generally thought.

Keywords
EEG, Ambiguous stimuli, Spontaneous reversals

C-4 (Tues): A graph model of sound encoding in the ear

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.04] Other sensory modalities

Abstract
Conscious experience and feelings often start with input to the senses. The peripheral auditory system in particular is remarkable in how it collects, processes, and transmits such a wide variety of sound information to the brain. It handles a dynamic range from the barely audible sound of rustling leaves to the blaring siren of an ambulance. It allows us to either focus in on one person's voice in the middle of a crowded cocktail party, or appreciate the simultaneous harmonies of instruments playing in a 100-musician symphony. The organ responsible, the Organ of Corti, is contained in a 30 mm-long spiral cavity in the inner ear known as the cochlea. Traditionally, sound encoding has been understood to occur the same way a pianist commands the individual keys of a piano: each individual cell in the Organ of Corti is excited by a characteristic frequency of the incoming sound, and that cell sends a signal to the brain along its individual nerve fibers. In brain activity, there have been numerous studies providing evidence for higher order structure, including during music listening, but this has yet to be studied in peripheral sensory systems. Here, we take a complex systems approach to develop a novel model of sound encoding in the inner ear. We use graph signal processing to look at how the response of individual cells is coordinated at the level of the whole-cochlea to pass complex information to the auditory nerve fibers. Additionally, we investigate how the system is perturbed during hearing impairment. We utilize a simulation that computes the voltage signals of individual cells responding to an incoming sound (UR EAR 2020b), and we run a large pool of stimuli containing noise, vowels, pure tones, musical notes, and chords across the frequency spectrum of human hearing. To construct a "cochlea graph, " we learn the functional links between cells based on smoothness in their signals (GSPBox v0.7.5, 2018). Graph theory is then used to characterize the cochlea graph structure, and graph signal filtering demonstrates that the cochlea graph performs better than the traditional linear piano-key representation of sound encoding. When looking at the impact of hearing loss on the cochlea graph structure, we utilize audiogram data from the AudGenDB database (CHOP) to build cochlea graphs for individual patients. We show that as hearing loss severity increases, the graphs are denser with weaker links and less organization. This project is the first to explore the representation of cochlear sound encoding as a graph using graph signal processing. Higher order relationships in the functional activity among the cells of the Organ of Corti may be especially important during the processing of music, which contains intricate pitch and timbre mixtures. We therefore also develop a specific

formulation of the model to investigate music encoding. This work has implications for understanding how musical octave information is encoded, as well as for improving music processing and its perceptual experience for people with neural prostheses, such as cochlear implants.

Keywords
hearing, sound encoding, cochlea, graph signal processing, computational model, hearing loss, music
Final category: 2.0 Neuroscience

C-4 (Tues): Awake neurosurgery for brain tumors in polyglot patients: Do languages share the same brain regions?

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.18] Neurolinguistics

Abstract
If we define multilingualism or polyglotism as the ability to speak fluently and understand two or more languages (including dialects), it is estimated that more than 50% of the world's population is multilingual. Multilingual processing is among the most ubiquitous and cognitively complex tasks we perform daily. Indeed, its neurobiological basis has been extensively studied in recent decades due to the rapid progress in imaging techniques, such as functional magnetic resonance imaging (fMRI), tractography, and electrical stimulation mapping during awake surgery (ESM). ESM has played a vital part in this exponential growth of the neurobiology of multilingualism, where intraoperative localization of essential language areas, at a cortical and subcortical level is problematic, even more than in monolinguals. In this lecture we will try to answer some of the most important questions about the multilingual brain, which remain partially unanswered, from a neurosurgical and neurobiological point of view. 1) The degree of anatomical-functional integration or separation of two or more languages: fMRI and ESM studies diverge in somewhat points: despite nowadays it still remains to be determined why imaging studies converge only partially with lesion and ESM findings regarding this question, perhaps this discrepancy in multilingualism between them could be due to the fact that we study the same complex phenomenon from different points of view. In any case, it seems certain that different languages do not share all cortical and subcortical areas. Hence, although it appears clear that we have only a partial view of what is happening in our brain during the multilinguistic processing, throughout fMRI and ESM we can inquire what factors do affect the cortico-subcortical language organization in multilinguism; 2) What is language switching (LS) and how to map it: The able to switch in an effortless manner between languages is an intriguing and challenging topic, as well as the executive capacity to maintain that language with no interference from the rest. Conversely, when a multilingual brain becomes damaged could develop a pathological switching, which is a phenomenon consisting in passing from one utterance or sentence to another without appropriately adapting the language in use to the given situation.

Although there is still no agreement concerning the brain regions involved in LS, the systematic effect for left posterior middle frontal gyrus across different functional brain mapping modalities (ESM and fMRI) provides evidence that this area might be a key mediator for cognitive control in bilingual supporting the notion that LS is a very demanding task that shares features with other types of higher-order cognitive functions. In a same vein, some ESM studies have recently demonstrated that specifics LS protocols used intraoperatively during awake surgery for mapping regions involved in LS processing differentially from those related to single-language naming. To sum, neurobiological evidence shows that in multilingualism, there are both shared modules between several languages and language- specific modules. Nevertheless, the low specificity of pre-operative fMRI and the high interindividual variability, means that intraoperative cortico-subcortical mapping is a necessary tool to avoid postoperative language impairments in polyglots.

Keywords
Neurosurgery, Awake mapping, Human Brain Connectome, Polyglots.

C-5 (Tues): The Dreams of Scientists

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.09] Unconscious/conscious processes

Abstract
A panel of Jungian Analysts who engage the brain-body, mind-matter continuum implicit in synchronicity and dual aspect monism will probe the emergent processes in scientists' dreams which impact their theories, experiments, and results. Wolfgang Pauli, Santiago Ramón y Cajal, female scientists of color will be among those discussed. Pauli experimented with, and explored, whether to interpret his dreams as relating to the tasks of physics as well as to his own psychological issues. He wrote of a dream: "I abide by my view that this is an objective situation, even if it is presented in a subjective form... The system of concepts for mathematics and physics is more extensive, more differentiated, and has a greater bearing capacity compared with that of psychology; on the other hand, my connection with the latter has to remain alive and active in feeling terms and not degenerate into the merely intellectual. "Cajal (1852-1934) is considered by some to be the first "neuroscientist ", In 1894 he stated "The ability of neurons to grow in an adult and their power to create new connections can explain learning " and the synaptic theory of memory. For his work on the structure of the nervous system he received the 1906 Nobel Prize in Physiology/Medicine, for his groundbreaking research on the structure of the nervous system. Cajal, in a dream diary, engaged in a shadow conversation with Freud through his last years, struggling to make meaning of the phenomenon of dreaming and his own dreams. Situated within the historical context of women, this presentation will also engage the unconscious and the "irrational " in scientific communities.

Keywords-Dreams, unconscious, dual aspect monism, synchronicity, brain/body, mind/matter, unconscious/conscious/subjective/objective. rational/irrational, phenomenological/intellectual. imaginal/empirical.

C-5 (Tues): Assessing Dogs' Attention to Their Owner: Still-Face Interactions with Household Dogs

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.09] Unconscious/conscious processes

Abstract
Pet dogs have increasingly become a large part of life for many loving pet owners worldwide. Consequently, research has increasingly emerged analyzing both typical and peculiar behaviors of our favorite house pets. These behaviors include patterns within dogs' ordinary behavior, across breeds, genders, and locations, but also how dogs interact with their owners. We hypothesized that domestication has led dogs to become hyper-aware of, attentive to, and responsive to their owners' actions and attention. We also hypothesized that dogs' would respond to the presence and absence of their owners' attention in both positive (e.g., affectionate) and negative (e.g., fearful or aggressive) ways. To examine dogs' attention to their owners' attention to them, we created a situation akin to still-face studies that document infants' attention to their mothers' attention to them. We had the owners of 67 owner-dog pairs record themselves and their dogs in three sequenced situations. First, the dog and its owner sat face-to-face and played normally for 1 minute. Next, in the still-face portion of the study, we directed the owner to assume a still-face posture (looking blankly at a spot above the dog's head while freezing their body motions as well), also for 1 minute. Finally, the owner resumed normal interaction in a "reunion " phase. This process was repeated a second time after a break to get a total of two trials. We coded the videos for a variety of dog behaviors and report data on the five most common behaviors that differed in play versus still-face segments: how often the dogs presented a toy to its owner, how often the dogs licked their owner, how often the dogs whined, the amount of time the dogs were engaged with their owners, and if the dog turned away from the owner. We found that dogs spontaneously keep track of their owners' attention to them as manifested in how their behaviors changed over the three-part interactions. Dogs displayed behaviors designed to recapture their owners' attention, but also behaviors apparently designed to comfort or entertain themselves when their owners' attention was withheld, as well as attempts to ingratiate themselves or "punish " their owner's inattention upon reunion. Above all, dogs displayed clear attention to their owners' attention to them and did so in a variety of ways via a variety of responsive behaviors (not just our 5 focal ones). These results shed light on human-dog interactions and dogs' social cognition of human behavior, thereby advancing the science of animal cognition in the special case of humans' earliest domesticated animal.

Keywords-human-animal interaction, animal cognition, animal attention

C-5 (Tues): Explicit and implicit measures of temporal order judgments in Schizophrenia and Bipolar Disorders

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.08] Implicit and explicit processes

Abstract
Background: Temporal processing is inherent to conscious experiences. For example, causal relationships between successive events are based on ordering events in time. If this ordering process is impaired, faulty causal interpretations can lead to false beliefs, which might eventually result in an altered perception and thus an altered conscious experience of the environment. These symptoms belong to the psychosis spectrum that is shared by schizophrenia (SZ) spectrum and bipolar (BP) disorder. Those pathologies further share neurobiological and genetic risk factors and biomarkers. Interestingly, phenomenological descriptions of time differ between the two groups. In patients with SZ, time would be fragmented or disappearing and in patients with BP time would be limited to a permanent present. Temporal order perception has previously been shown to be altered in patients with SZ. To our best knowledge, processing of the temporal structure has not yet been investigated in patients with BP. Here, we compared the processing of temporal order between SZ and BP. Methods: We recruited 24 patients with SZ, 20 patients with BP, and 31 neurotypical individuals. We investigated explicit and implicit measures of order discrimination using the temporal order judgment task (TOJ). Two squares appeared on the screen with a short delay and participants had to judge which stimulus appeared first. We used stimulus onset asynchronies (SOAs) of 100 ms (suprathreshold), 17 ms (subthreshold), or 0 ms (synchronous, control condition). Explicit measures relate to the correct response rate of which stimulus appeared first (i.e., "left " response for "left then right " order, and vice versa). Implicit measures relate to the influence of a previous trial on responses given on a current trial. We focused on how large asynchronies (previous trial: SOA of 100 ms) facilitated temporal order judgment for small asynchronies (current trial: SOA of 17 ms). Results: Explicit temporal order effects replicate previous findings in which patients with SZ perform worse at a long SOA (100 ms) as compared to controls. Further, we show that patients with BP reveal no differences in explicit measures compared to neurotypicals or to patients with SZ. Implicit order effects replicate improved performances in case of identical as compared to different relative order between two successive trials. Importantly, there were no differences between the groups. Discussion: This study brings further evidence for a difficulty in temporal order processing in SZ. This might originate from an impairment in consciously ordering events in time, as suggested by the impairments in the explicit measure for suprathreshold asynchronies. Interestingly, we find a relative preservation of trial-to-trial effects shown in the implicit measure. Further, we show that patients with BP do not reveal such an explicit order impairment. This is consistent with phenomenological descriptions, suggesting a difference in the conscious experience of time in patients with SZ and BP.

Keywords-Temporal order processing, perception, consciousness, psychosis

C-5 (Tues): The Unity of Consciousness and the Subject of Experiences

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.11] Personal identity and the self

Abstract
It is widely acknowledged that conscious experiences are unified in different respects. One widely-discussed form of unity is phenomenal unity, i.e., there being something it is like to have different experiences together. For instance, when one sips whisky while hearing crickets, there is not just something it is like for one to taste the whisky and something it is like for one to hear the crickets; there is something it is like for one to taste the whisky while hearing the crickets. In this workshop we shall explore the relation between phenomenal unity and the subject of experiences (the entity which has experiences, i.e., that for which it is like something to have an experience). In particular, we wish to consider the possibility that phenomenal unity might be explained by or grounded in the subject of experiences; that is, distinct experiences are phenomenally unified (at least in part) in virtue of their each belonging to the same subject. This idea has been suggested by, e.g., Peacocke 2014; Moreland 2018. One way to assess this explanation of phenomenal unity is to contrast it with alternative accounts which do not appeal to distinct experiences being had by a single subject. Some accounts of phenomenal unity appeal to there being a single conscious state which subsumes or contains each of the phenomenally unified experiences (Bayne & Chalmers 2003). Others appeal to primitive relations of co-consciousness or to other kinds of relations holding between phenomenally unified experiences (Dainton 2008; Masrour 2014). We also wish to consider the implications which these accounts of phenomenal unity might have for metaphysical conceptions of the subject. If phenomenal unity is explained by distinct experiences being had by a single subject, does this require that the subject is ontologically prior to or more fundamental than its experiences (e.g., the subject is a substance and its experiences are modifications of this substance)? Alternatively, if phenomenal unity can be explained without reference to the subject, does this rule out the subject's being a substance, or at least support alternative conceptions of the subject, e.g., as a bundle of experiences or of other mental capacities?

Keywords
subject of experiences; unity of consciousness; metaphysics

C -5 (Tues): Report from a Tibetan monastery

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.04] Other sensory modalities

Abstract
At this time, the number of studies about brain activity during meditation is quite large. However, comparing them is a very hard task given the inhomogeneity in meditative state classification and in meditative techniques description. In fact, mental states are not observable in an objective way, and are classified by analyzing the descriptions by the meditators, which depends on their cultural context. This means that the adopted vocabulary and the description of the different forms of meditation is not homogeneous across different cultures, leading to a subjective and possibly erroneous approach in comparing different studies or merging different datasets. As a consequence, we strongly believe that measuring the physiological changes characterizing meditations extraordinarily benefits from performing studies on a specific population of meditators in their own cultural environment. In this work, we carried out a research in accordance with this ecological and culture-based principle and with the participation of a very singular and precious community, that of the Monks and Geshes of Sera-jey, one of the oldest Tibetan monastic universities, rebuilt in India after the invasion of Tibet. One of the authors spent 12 weeks for data collection, in three different periods between 2018 and 2019, in the guest house of Sera Jey Monastery, living together with monks engaged in their studies and Geshes engaged in contemplative practices in the retreat area of the Monastery. A total of 28 subjects (26 to 93 yrs) were observed, of which 8 beginners, 7 full-time meditators in retreat (from 6 months to 13 years), 5 in retreat at the Tantric College of Gyumed, 8 intermediate not full time meditators, with experience of at least 5/10 years. 62 EEG tracks were recorded (lasting between 25 minutes and 8 hours) under different conditions: i) two different types of meditation, Analytical and Concentrative; ii) 6 periods of sleep; iii) 11 recordings aimed to investigate possible hyperconnectivity between pairs of subjects trained in meditation. Several circumstances make this research unique and suited to indicate criteria for perform further studies about the brain activity characterizing different meditative states: 1) Group homogeneity: all monks or geshes belonging to the same school (Gelug) who have studied and lived in the same monastery for several years. 2) The possibility of carrying out measurements in their natural cultural environment, and in some cases within the retreat area. 3) The presence, together with a control group of beginners, of some subjects with over 40,000 hours of contemplative practice structured in a centuries-old codified path 4) the confidence achieved after weeks of living together, which made it possible to overcome fears and mistrust, making them willing to lend themselves to experimentation and to share the results. The preliminary results are not only original, but they also show to be more informative with respect previous study reports on this topic. Specifically, in a subset of subjects, it was possible to discriminate the type of meditation performed by evaluating the EEG patterns in the frequency domain, thus confirming the relevance of the proposed approach.

Keywords-Meditation, Neurophenomenolgy, States of Consciousness, Tibetan Buddhism, EEG

C-6 (Tues): Testing Quantum Mechanics Underground and measurements of Biophotons from Germinating seeds in laboratory

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.01] Quantum physics, collapse and the measurement problem

Abstract
I shall present two topics related to experimental studies of: quantum collapse studies and light emission from germinating plants. In the first part of the talk, I shall present how we are experimentally investigating possible departures from the standard quantum mechanics' predictions at the Gran Sasso underground laboratory in Italy. In particular, with radiation detectors we are searching signals predicted by the collapse models (spontaneous emission of radiation) which were proposed to solve the "measurement problem " in quantum physics, and signals coming from a possible violation of the Pauli Exclusion Principle. I shall briefly present the VIP experiment with which we look for possible violations of the Pauli Exclusion Principle by searching for "impossible " atomic transitions and comment the impact of this research in relation to Quantum Gravity models. I shall discuss our recent results and future perspectives. In the second part of the talk, I shall present the recent studies we have done on the emission of photons from germinating seeds using an experimental technique designed to detect light of extremely small intensity. I shall illustrate some conjectures ranging from stress induced annihilation of crucial events to the emergence of quantum coherence, as well as future perspectives, in a broader perspective of quantum physics studies in living matter.

Keywords
collapse models, biophotons, germinating seeds, quantum coherence

C-6 (Tues): "The Minkowski it from the Penrose quantum bit ". Continuation of John Wheeler's "It from bit " concept.

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
Sir Roger Penrose and prof. Stuart Hameroff had substantiated a theory that a human brain performs quantum computations. Logically, a question comes what information does then the brain compute and what is the result of such a quantum computing? To answer this, it is tempting to exploit isomorphism between complex hermitian 2 × 2 matrices and R4, more specifically a real vector representation of qubit states. P Arrighi proposed that "qubit states may be viewed as spatio-temporal objects, or indeed as four-vectors of a Minkowski space-time. " Under Orch OR theory assumptions, a very large number of entangled qubits is involved in a massive and highly complex computing task. What does this gigantic quantum computing machinery produce as the final outcome of its coordinated computations? The answer is obvious-it is the physical world as we see it, or the so called an external, to the human brain, reality (Minkowski space). Accordingly, underlying Orch OR brain computing concept is a mathematical connection between a qubit (qm) and relativity (Minkowski space). It is a connection between our mind, or the consciousness, and a physical reality the way we see it as the result of quantum computations of our brain. Does this mean that a physical reality as we see it, is being internally quantum computed and represented to us as a Minkowski space? That is, can a physical classical world be viewed as the result of our internal measurement leading to collapse of the quantum computed wave function? This abstract omits this question as irrelevant to the subject matter of a paper. The most important question is the aforementioned mathematical connection between quantum mechanics and relativity, it is a foundation which proves that Orch OR theory is correct. I propose that enormous quantum computing power in human brain does produce the Minkowski space, a representation of the physical reality. Mathematically, it is done by integrating, or encoding, the information about external physical world, into a qubit wave function vectors. I believe that probability distribution functions of pairs of fermions and bosons serve as the hidden variables encoding information about external world, into a qubit wave function vectors. They are hidden for two reasons. First is that these variables are not obvious as an intrinsic part of a qubit equation defining human brain quantum computing. Traditional way of thinking does not easily accommodate these variables into a qubit equation. The second reason they are hidden is because Einstein was desperately looking for them to make quantum mechanics complete. Simply, Sir Roger Penrose and prof. Stuart Hameroff had made a breakthrough that will have a very far reaching implications, including but not limited to Einstein hidden variables discovery. Quantum mechanics and relativity can be easily unified should indeed these variables be encoded into qubit as the carriers of information of the classical physical world. A very interesting research. Please help me with it.

Keywords
Orch OR theory, quantum mechanics, relativity.

C-6 (Tues): Comparison of Orch-OR hypothesis with the TGD point of view

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
Penrose-Hameroff (P-H) model and its variants such as Diosi-Penrose (D-P) model have been leading candidates for a quantum theory of consciousness. In light of recent experiments and theoretical arguments, the D-P model looks highly implausible. The key problem is energy conservation, which is actually the central problem of general relativity and caused by loss of Poincare invariance. The basic idea of Penrose about quantum gravitational superposition is almost a must but in the framework of general relativity its mathematical realization is not possible. TGD provides an alternative view based on the identification of space-times as 4-surfaces in $M^4\times CP_2$ related by M^8-H duality to 4-surfaces in M^8. In this approach Poincare invariance is exact. In the TGD framework the hierarchy of Planck constants $h_{eff}=nh_0$ includes also gravitational Planck constant $h_{gr}= GMm/v_0$ introduced first by Nottale. This makes it possible to realize quantum coherence (in particular, gravitational one) in arbitrarily long spatial and temporal scales. In this article P-H and P-P models are compared with the TGD point of view. In TGD, the generation of quantum gravitational binding energy liberates energy and provides the basic mechanism of metabolism and a direct connection with quantum biochemistry emerges. The gravitational magnetic bodies (MBs) of Earth and Sun are in an essential role. Could one invent a mechanism involving only self-gravitational interaction energies of the living body itself? The large gravitational Compton length $\Lambda_{gr}= GM/v_0$ requires the presence of a large mass, say star, which would serve as basic metabolic energy source but the presence of a planet is not necessary in the prebiotic stage. There are strong indications that water is a quantum critical system at the physiological temperature range. This suggests that scaled variants of magnetic bodies of water blobs as candidates for proto cells appear in quantum superposition with values of the parameter v_0. This would induce large density fluctuations at the level of the ordinary biomatter. State function reduction would induce a phase transition to a scaled-up state in the presence of energy feed. The return to the original state would liberate the gravitational energy as metabolic energy. Note that there are also indications for the quantum (gravitational) criticality of microtubules so that they would be very special from the point of view of life and neuron level consciousness. The gravitational self-interaction energy for water blobs with Planck mass corresponds to an energy scale of 3.5 meV identifiable as the energy difference between two opposite membrane potentials. Could gravitational metabolic energy make possible the action potential of proto cells observed even for monocellulars

Keywords
Quantum consciousness, quantum biology, quantum biochemistry, quantum gravitation, Orch-OR, TGD, quantum criticality, macroscopic quantum coherence, quantum physics of water, prebiotic evolution

C-6 (Tues): A Field-Theoretical Model of Brain Dynamics Reveals the Mechanism Underlying Macroscopic Quantum Coherence and Its Significance for the Formation of Conscious States

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
The neural correlates of consciousness are characterized by large-scale coherent activity patterns exhibiting a high degree of collective organization, which raises the question of whether macroscopic quantum phenomena play a significant role in conscious processes. In order to pursue this question and scrutinize the feasibility of macroscopic quantum coherence in the brain, a realistic field-theoretical model of the basic functional units of the cortex, termed microcolumns, has been developed. This model assumes that the operating principle of a microcolumn relies on the interaction of a pool of neurotransmitter (glutamate) molecules with the vacuum fluctuations of the electromagnetic field, referred to as zero-point field (ZPF). Quantitative calculations reveal that the coupling strength of the glutamate pool to resonant modes of the ZPF lies in the critical regime, driving the ensemble of initially independent molecules toward a coherent state and resulting in the formation of a coherence domain that extends across the full width of a microcolumn. The formation of a coherence domain turns out to be an energetically favored state shielded by a considerable energy gap that protects the collective state against thermal perturbations and entails decoherence being greatly slowed down. These findings demonstrate the feasibility of macroscopic quantum coherence in the brain and support the notion that cortical microcolumns are specifically designed to build a connection to the ZPF. This notion is further corroborated by the insight that resonant neurotransmitter-ZPF coupling gives rise to downstream effects which are crucial for signal transduction and the formation of large-scale coherent activity patterns. Taken together, the picture takes shape that long-range coherence in the brain emerges through a bottom-up orchestration process involving the ZPF. This picture opens up new vistas for our understanding of the fundamental mechanism underlying conscious processes, suggesting that, in addition to its extrinsic energetic manifestation, the ubiquitous ZPF has an intrinsic phenomenal nature, that each particular mode of the ZPF is associated with a particular phenomenal shade, and that the brain is designed to establish a resonant coupling to a range of ZPF modes, thereby tapping into the phenomenal color palette inherent in the ZPF. Thus, the significance of macroscopic quantum coherence for the emergence of conscious states lies in coherent activity patterns being based on resonant brain-ZPF coupling, resulting in the amplification of selected phenomenal nuances immanent in the ZPF.

Keywords
conscious processes, fundamental mechanism, quantum field theory, zero-point field (ZPF), brain dynamics, brain-ZPF coupling, criticality, coherence domains

C-6 (Tues): Nuclear spin qubits: quantum coherence and entanglement in the brain

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.08] Quantum brain biology

Abstract
Research into the role that quantum physics may play in consciousness has for the most part focused on microtubules as the biological site of these quantum effects. A recent hypothesis, however, suggests that Posner molecules – a particular form of calcium phosphate – have properties that make them promising candidates for the role of biological qubits. Given the long coherence times of spin-half nuclei, physicist Matthew Fisher postulated that nuclear spin dynamics could play a role in cognition and possibly consciousness. This hypothesis outlines how phosphorus nuclear spins might be prepared in an entangled state, how this entanglement is protected by assembly into Posner molecules and how this entanglement might modulate calcium ion production and concomitant neural activation. We investigated the importance of quantum effects such as coherence and entanglement in Posner molecules and how these effects are directly dependent on specific parameters such as spin-spin coupling strengths and Posner molecule symmetry. It has also been suggested that one way in which to probe consciousness is to understand how certain molecules, such as anaesthetics, have an effect on consciousness. While their effect is less dramatic than anaesthetics, pharmacological interventions such as antidepressants or antipsychotics also play some role in mediating consciousness. To this end, we investigated how lithium isotope substituted Posner molecules change coherence and entanglement between Posner molecules and whether this is a viable explanation for lithium's mechanism of action in bipolar disease. Finally, we illustrated how entanglement might possibly be preserved through exploitation of the biological environment.

Keywords
Quantum cognition, Posner molecules, entanglement, coherence, nuclear qubit, neural activation, symmetry, lithium

C-7 (Tues): Beyond Turing: Testing for AI Sentience via Precognition

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
Artificial intelligence (AI) has made remarkable strides over the last two decades. AI programs have mastered classic human games, like chess, Go, and even poker. They can generate human-like art, music, and writing. Soon -- or perhaps already in some cases -- AI will master the Turing test and its many variants, further erasing operational differences between AI and human intelligence. Despite their ability to functionally mimic human thinking, it is generally agreed that current AI systems lack sentience, that is, they do not demonstrate mind, understanding, or consciousness. Sentience is an internal, subjective phenomenon, and it is not open to objective physical measurement at present. Lacking this, it appears AI sentience cannot be unambiguously established or refuted. In this talk we explore a potential test -- beyond the Turing test and its variations -- that might objectively distinguish between one facet of human consciousness and artificial intelligence. Controlled laboratory experiments indicate that humans have the capacity for precognition, the ability to obtain information from the future. Various hypotheses have been forwarded to explain this, including retrocausation [1]. While classical physics, particularly that underwritten by the second law of thermodynamics, does not permit retrocausation, some interpretations of quantum mechanics do. This difference has been proposed as prima facie evidence for quantum aspects of human consciousness [2]; similar claims have been made by other researchers, e.g., Penrose and Hameroff. Because current AI systems are physically classical in nature, we assert they should incapable of precognition. If so, this difference might be parlayed into an objective physical test for distinguishing between human consciousness/sentience and AI intelligence. This presentation explores such a test and its potential implications. 1) D.P. Sheehan, in ``Extrasensory Perception: Support, Skepticism and Science, " E. May (Editor), pp. 85-109 (Praeger, 2015). 2) D.P. Sheehan and P.S. Cyrus, Mindfield 10, 98-102 (2018).

Keywords
consciousness, sentience, artificial intelligence, AI, precognition, retrocausation, Turing test

C-7 (Tues): Study on a Topological Quantum Computation Model for the Orch OR Theory

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
During the last several decades, the quantum computer has been developed much to achive the higher computational power than the classical bit-based computer. As the result, it will soon be used for machine learning and AI platform to overcome bit-based approaches. On the other hand, however, it is still uncertain whether the quantum computation can have human-like intelligence. If we just apply the quantum computer for enhancing the bit-based machine learning and AI framework, it might be impossible. Therefore, we should find totally different approaches. Luckily there is another approach based on biological brain model for understanding consciousness such as Orch OR model. Since this model is quite different than the conventional machine learning and AI models, it might be a right direction to implement human level intelligence. In this regard, however, I realized that there are a few results on the implementation model of Orch OR udner the quantum computation framework. Therefore, in this work, I would like to discuss an implementation model of quantum computation for Orch OR model and its preliminary resutls as follows. First, I will show a prelimiary fault-tolerant quantum computational architecture based on topological qubit more precisely. Although there has been several works related to the relation between the topological qubit and the microtubule, it needs to extend for brain function more precisely. After that, I will discuss a few experimental results of the proposed scheme by using the conventional quantum computer system. In conclusion, through this work, I would like to share an implemenation model of Orch OR under the quantum computer, specially with topological qubit model.

Keywords
quantum computer, topological qubit

C-7 (Tues): A Concept of Intentionality Based on Complexity Science

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[04.05] Emergence, nonlinear dynamics and complexity

Abstract
Intentionality implies that a system state is about something else, namely the intentional object. In terms of cognitive psychology, this process is called representation, by which a 'cognitive map' of the object is generated, particularly during perceptual or memory processes. For being capable of intentionality and representation, a minimum requirement is that the intentional system must be an open system. Many open systems can provide representations in the sense of mappings of environmental impacts. The silver particles of a light-sensitive surface of a photographic film can 'represent' the objects in front of the lens, however in a trivial, weak sense. A self-organizing open system can likewise 'represent' and thus generate the feature of being about something. In the latter system, however, a pattern (in Haken's synergetics: the order parameter) emerges and enters in a loop that encompasses the components of the complex system and environmental constraints. Within this loop the complex system 'represents' an external object by the generation of an order parameter. The intentional object in this case is the external driving force or constraint (in synergetics: the control parameter; in ecological psychology: the affordance). The environmental context described by control parameters is what self-organized patterns are about. The mechanisms of representation are clearly divergent in these two systems, as is the nature of the intentional objects. In the photographic system, the mapping of the environmental objects onto the representing system is unidirectional, whereas in the self-organizing system there is continuous interaction between environmental objects and system. This circularity provides an important and desirable aspect of the kind of aboutness realized by self-organizing systems – circularity guarantees that an intentional system is capable of exerting a retrograde effect back on what has been represented. This effect is generally a reduction of the gradient or 'tension' that is quantified by the control parameter. In other words, pattern formation in these open systems is in the service of gradient reduction. The association of pattern formation with gradient reduction makes pattern formation 'functional', which is an aspect of intentionality that goes beyond an understanding of intentionality as just representational.

Keywords
aboutness, affordance, intentional object, synergetics, complexity reduction

C-7 (Tues): Liquid intelligence: advancements across the synthetic domain

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.05] Emergence, nonlinear dynamics and complexity

Abstract
Intelligence, understood as cognitive process, can be described both through a symbolic approach, which couples itself well with the adoption of technological elements such as the digital world, and through a continuum approach, more familiar with biology. Current experiments performed with functional liquids will be discussed, with a reference to holonomic machines and to the achievement of liquid state analogue memories, artificial neural networks and reservoir computers, where the continuum approach is more appropriate. Unpublished results about potential room temperature quantum correlation between macroscopic liquid reservoirs will also be discussed, tracing some connections with biological (living) complex systems where the same phenomena may occur.

Keywords
Reservoir computing, Liquid cybernetic systems, colloids, artificial neural networks, entanglement

C-7 (Tues): Proposing a solution to the hard problem by extending Sarfatti's PQM approach

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
Any attempt to solve the Hard Problem is incomplete without positing the level of description it applies to. The current versions of the problem do not define the hierarchical level in which the problem resides. Intuitively most discussion assume a level of description at which the definition of consciousness, the "feeling like being a bat " applies to. There is no attempt to build a hierarchy that includes lower levels of organisation, that build up to it. To approach the Hard Problem analytically we need to define the level of description, define what are the characteristic of that level of description, and define what would be required of a physical solution to answer that question. Jack Sarfatti provides a candidate solution at a physical level of description, vertically through a few hierarchical levels. His solution is an inseparable part of the whole, but does not contain the whole. The attribution of the back-reaction as the primitive of consciousness links his theory to a Protopanpsychic view. Hard problem is a problem of attention: what gives rise to it, and its content. Mark Tegmark looked at the information content of attention. He claims that the human attention window has a 70 bit information content. For simplicity we can look at a 10x10 bits matrix. The cooperative modes described by the Froehlich process posited by Sarfatti to give rise of consciousness can easily include this information content. Attention can be defined as the subsystems in the brain this information window interacts with at any given time. What we are aware off, pay attention to, are the interactions between that information window and the various memory, emotions, and processing systems in the brain. Qualia can be defined as the content of these subsystems. This slightly higher level of description, adding an information layer to Sarfatti's model, connects his ansatz of the emergence of qualia from Froehlich's condensation with a direct mechanism that can explain how these qualia emerge as conscious experience. Where does that fit within the hierarchy of systems leading up to the level where the Hard Problem has been posed? Sarfatti's, and to a lesser extent, Penrose and Hameroff's, solutions are completely appropriate as attempts to solve the hard problem, at the appropriate level of description. The addition of the attention window elevates the description one layer up and provides a plausible mechanism for attention and "feeling like " This information window exists for all live beings, starting at 1 bit, Happy or Unhappy, for the least structured life forms, up to humans. In this context "feeling like ", whether a person or a bat, is the interaction between the information window and the cognitive systems of that life form. Therefore, feeling like a bat exists, and is fundamentally different than feeling like a person. The Protopanpschic element is the binding between the information window, and the subjective experience.

Keywords
The Hard Problem, Hierarchies of Consciousness, Quantum mechanics' approach to consciousness, Jack Sarfatti, Backreaction, Panprotopsychism, The Soft Problem, Qualia, Quantum Information, Hameroff, Penrose

C-8 (Tues): Archetypal Symbolism and Altered States of Consciousness in Prehistory

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
The anthropologists David Lewis-Williams and Jean Clottes state that, "Upper Paleolithic people must have experienced not only 'normal consciousness' but also altered consciousness because altered states are wired into the human nervous system. " Evidence suggests that archetypal symbolism, fundamental to Jungian psychology, may be part of both early human and Neanderthal experiences in altered states of consciousness. The archetype of the feminine, including the Great Mother, may have been used in ancient healing rituals where the power of archetypal symbolism might augment a therapeutic outcome. This archetype appears in female figurines, including the Tan-Tan (300,000 to 500,000 years BP, Before Present), the Berekhat Ram (250,000 to 280,000 BP), and the Venus of Willendorf (25,000 BP), that intimate ritual use. Funerary objects, such as the shell beads (92,000 BP), attributed to both Early Homo Sapiens and Neanderthals, suggest the archetype of everlasting life through the symbolism of the shell. Other funerary objects, such as engraved ostrich shells, encode archetypal symbolism of the egg and the transformation of the twice born initiate. Further evidence of the archetype of initiation appears in the symbolic imagery incised on two large Paleolithic stone artifacts, one from 90,000 BP to 100,000 BP and one from 54,000 BP. Carved by either early humans or Neanderthals, they indicate transformation through initiatory rebirth, incorporating archetypes of the Great Mother, the hero, and the rising sun.

Keywords
Altered states of consciousness, Archetypal Symbolism, transformation, Early Homo Sapiens, Neanderthals, initiation, symbolism, shell symbolism, egg symbolism, Venus of Willendorf

C-8 (Tues): The value of literature in the age of neurocentrism

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.01] Literature and hermeneutics

Abstract
In this paper, I propose to integrate literary studies in consciousness research with the purpose of strengthening the ethical and existential dimensions of the field. The paper presents three interrelated perspectives and claims: 1) In a number of seminal literary works from the Modernist period, the concepts of self and personal identity outlined and explored cohere with the reductionist account of consciousness in philosophy and contemporary neuroscience. Contrary to the common view that reductionist and materialist explanations of the human being and existence are anti-humanist, I argue that these are in fact compatible with and even integrated in the humanist ideas of existential emancipation and ethics in much literature from this period. Indeed, anti-essentialism can be seen as a central characteristic of literary Modernism. 2) Literature and fictional narrative constitute a valuable resource for philosophy in the neurocentric age. Literary-philosophical works can be used for conceptual engineering, i.e. for developing models of self that cohere with the reductionist explanations of human consciousness in modern empirical consciousness research. Works such as Musil's The Man Without Qualities and Woolf's The Waves illustrate the potential for enhancement of human well-being and morality inherent in the anti-essentialist view of human nature and existence. The philosophical concepts formulated within the narrative and aesthetic frameworks of the novels can be used to formulate ethical and existential models that are both meaningful and sustainable in today's cultural and scientific context where human nature and existence are increasingly being explained neuroscientifically. 3) With its distinctive narrative, aesthetic and affective dimensions, literature has a facility to cause changes in perspectives and attitudes that is beyond the scope of conventional scientific and philosophical writing. Literature offers ways of relating experientially and emotionally to materialist and reductionist explanations of human nature and existence that can seem disturbing and alienating when presented in nonfictional genres and through rational and scientific argument. Literature has a special capacity to install a sense of meaning, fascination and appreciation into existence, to stimulate curiosity and interest and as such to work against the existential disenchantment and psychological disruption of new scientific paradigms and materialism. It can facilitate a move from concept to practice, from idea to experience and as such it holds a potential for bridging the divide between theoretical/rational insight and psychological/emotional states in individuals. The paper thus points to a possibility of reconciliation and relation of mutual support between humanistic/culturalist views and reductionism and scientific materialism. Not only do literary works from the Modernist period offer valuable philosophical insights and models of self and existence that can be used to strengthen the ethical and existential perspectives of modern consciousness research; these works also illustrate the general potential of literature for having a psychological traction and impact that is beyond the capacity of philosophy and science and, accordingly, its potential for correcting public misconceptions and aligning folk intuitions with scientific and philosophical insights while reducing any psychological disruption and anxiety and even expanding the experience of existential meaning.

Keywords-Neurocentrism; neuroanthropology; neuroexistentialism; personal identity; self; consciousness; literature; fiction; reductionism; materialism; humanism; Modernism; narrative

C-8 (Tues): In Praise of Death – A Critique of the Transhumanist Program of the Abolition of Death

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.04] Religion and spirituality

Abstract
A logical consequence of the transhumanist program of improving humans beyond biologically evolved conditions is an artificial evolution, using technical and medical implements, with the final aim of abolishing death. This goal can be gleaned from publications of leaders of the transhumanist movement. Some principal medical technologies, such as the growth of artificial organs for replacement, gene editing for genetic repair, preventive gene therapy, are available, at least in principle, to that effect. The general discourse and a wide reflection whether these developments are at all beneficial are lacking. I argue that the attempt to abolish death leads to a logical, ethical, legal and philosophical-cultural contradiction and should be explicitly banned. While it is clear that, given beneficial circumstances, good living conditions, healthy lifestyle and proper medical treatment for life-threatening , our genetic make-up allows for a life span of some 120 to 150 years, even so individual death is inescapable. I argue that individual death is a good thing for the following reasons: a) It gives individual lives meaning, purpose and goal, as it is only the finiteness of existence that challenges people to make good use of their lifetime. b) It allows for new ideas to grow in the form of new specimens of the human race as producers and carriers of new ideas. Otherwise evolution would come to a standstill. c) And thus, it is a motor of growth, individually and socially. The program of the abolition of death is, in juxtaposition, a recipe for disaster and a consequence of a colonial type of egotism. It would mean, in final consequence, that those who have the material means will be able to prolong their individual lives which, no matter how intelligent or beautiful, will be final and individually enclosed. It would mean that the number of individuals born will have to be restricted, as an ever-growing number of everlasting individuals will claim their due. Socially it would either lead to an unsustainable elitist race of everlasting elders who will never die and those that are supposed to sustain them, or to a dystopian model of a society where there cannot be renewal by children and young persons, because after some time only a certain number of everlasting individuals can be sustained. This is at the same time the end of every development, growth and evolution. This shows that a prospect of abolition of death is a self-defeating and self-contradictory concept that should be explicitly contradicted and socially banned as an ethically unsustainable vision.

Keywords
individual consciousness, transhumanism, death, evolution

C-8 (Tues): AI Consciousness-Insights from a Technology Assessment Perspective.

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.09] Ethics and legal studies

Abstract
AI consciousness has so far not been a designated topic in the scientific field of technology assessment (TA). Their task is to identify and outline technology futures and scenarios that may become relevant in the future. Now, no one knows the future, but we are capable of responding to such future scenarios-for example, to specifically promote them in order to achieve them, or to avoid or avert them. Actors of TA are not clairvoyants, but researchers from different scientific disciplines of origin, who use, relate and combine their TA expertise. The main target groups of TA are the political establishment (which gave the impetus for this type of research some 60 years ago) and the interested public. Our project "Clarification of the Suspicion of Ascending Consciousness in Artificial Intelligence (AI Consciousness) " was a serious attempt to trace fundamental questions about possible (or impossible) AI consciousness with a TA approach. The aim was to examine the topic of AI-consciousness for its inner content and to sort it out in such a way that it can be seriously initially opened up as a technical topic of TA and later be further processed with different focus points. We were scientifically interested in who expresses themselves scientifically (and ideologically) on AI consciousness at all and which group structures show up (actor network analysis), how the argumentations proceed, where there are interdisciplinary discourses and where they are avoided, which meaning specialist language has, which future perspectives are discussed in which groups, and to what extent there are actually already approaches to prepare for a possible AI consciousness. These questions were designed as introductory questions with an exploratory character and were also open in the sense that, in the worst case, not much of substance could be found. After desktop research and a series of in-depth interviews with selected experts worldwide, we had an intermediate state on which we thematically conceived and produced a science podcast series. In 12 episodes and an additional special episode, different approaches to AI consciousness were presented in a well-founded and understandable way in conversations with experts. Among them: Philosophy of Mind, History of Technology, Computer Science, Robotics, Social Robotics, Neuroscience, Psychology/Psychiatry, even Theology as well as the perspective of a well-known SF author. The special episode was conceived and hosted by a high school philosophy class, who led a roundtable discussion with scientists from the podcast episodes. This use of results falls into the area of "public understanding of science " and will be expanded in the coming years. Towards the end of the project, two contrasting scenarios were particularly discussed: (1) AI consciousness arises, nobody notices it, and we have a (techno)ethical problem. (2) AI consciousness never arises, but people believe that machines are conscious, and we have a kind of new religion. A number of recommendations were made to the funding authority aimed at specific regulatory classification of potential AI consciousness, identifying research topics worthy of funding, and motivating monitoring of AI consciousness research activities worldwide.

Keywords-AI Consciousness, Technology Assessment, Science Podcast

C-8 (Tues): A Phenomenologically Informed New Ethics of Engineering and Technology: Implications of other-than-human consciousness

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.12] Miscellaneous

Abstract
In engineering design and new technological developments, other-than-human animals are generally disregarded, unacknowledged, or relegated as 'natural resources' to be used for human purposes. This ethic has evolved, in part, from distinctions and classifications of we humans, as being superior, and other-than-human-animals as being separate from us or inferior due (it seems), to their lack of consciousness. Such devaluing and ideational schisms are apparent in a range of industries including energy, military systems, agriculture, and fisheries. The consequences are reflected in species extinction, habitat loss, ocean pollution, a warming planet, and even illnesses of the human body. The intention of engineering and technology is generally for "good. " But most of their codes of ethics are human-centric, making it morally inconsequential to ignore other animals, or to deem them as simply material to be engineered as a means for human ends. Han Jonas wrote in The Imperative of Responsibility: In Search of an Ethics for the Technological Age (1984) that "new kinds and dimensions of action require a commensurate ethic of foresight and responsibility which is as novel as the eventualities that arise out of the works of 'homo faber' in the era of technology " (18). Jonas feared "an apocalypse threatening from the nature of the unintended dynamics of technical civilization " (202), leading to the desolation of the planet. To the objects of technology Jonas included man himself, having turned on himself and imposed himself on nature in such a way that "calls upon the utter resources of ethical thought, which never before has been faced with elective alternatives to what we considered the definite terms of the human condition " (18). This author suggests that such "resources of ethical thought " ought to include phenomenological evidence of other-than-human consciousness, such as incidences of inter-species communication between human and other-than-human animals. The author is an ethics scholar focused on engineering and technology. As a result unanticipated experiences with inter-species communications (phenomena recounted in her books "When the Horse Whisper " and "Waking to Beauty "), her working assumptions have been challenged. Those experiences brought an awareness of consciousness in other-than-human-animals not widely recognized (or readily accepted) in academia. Nevertheless, these encounters and the documented inter-species communications of many others around the world, suggest an imperative to shifting engineering ethics to include considerations of how engineering and technology are affecting (what appear to be) conscious animals. In other words, evidence of sentience is increasingly a factor in animal welfare law, but shouldn't conscience also be used as a determinate for what counts as ethical, particularly in engineering design and practices involving and affecting animals? Such a shift in ideology could be threatening, given its potential to dismantle persistent though perhaps false distinctions, which justify current engineering practices. But this ideological change is essential, if we are to effectively address global matters of moral and material urgency, potentially affecting all of life. Sources Cited Jonas, H. (1984). The Imperative of Responsibility: In Search of an Ethics for the Technological Age. Chicago: The University of Chicago Press

Keywords-Other-than-human species, Animals, Phenomenology, Engineering Ethics, Ethics, Inter-species Communication Ethics Theory, Interspecies Communication, Other-than-human-consciousness, Animal Ethics, Engineering Ethics, Technology Ethics.

C-9 (Wed): Kolmogorov Complexity and Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
The complexity of consciousness claim is that paradigmatically mysterious phenomenal experiences would appear resistant to physicalist explanation if those experiences were enormously complex information states. In DeLancey (2022) I use this claim to explain why the canonical arguments against physicalist explanation of consciousness would appear sound even if they were not; but in that work, I did not offer a positive account of consciousness. Here, I attempt to outline a positive theory of consciousness using the complexity of consciousness claim. I take as my guiding question, why would (at least some) conscious states have a "what it is like " character? I propose that the appeal of the "what it is like " concept is that it captures two intuitions: that these experiences are irreducible, and that explaining these experiences will not yield their specific, unique character. To explain the first intuition, I show how descriptive complexity allows us to describe information states that are irreducible, even if they are physical. To explain the second intuition, I offer two potential causes. First, there is a sense in which our everyday experience reveals explanation is insufficient to capture an experience's "what it is like " arising from the relative difference between (1) the information capacity of our ability to report upon, remember, and reason about those experiences, and (2) the information that constitutes those experiences. Second, I explain the complexity cost principle, which shows how even a fully adequate explanation will alone typically be unable to derive the information that constitutes the explained phenomenon. If these are sufficient to explain the "what it is like " intuition, then the problem of consciousness reduces to the problem of explaining how the mind is a teleological system allowing for the normative character of representation that constitutes information. DeLancey, Craig (2022) Consciousness as Complex Event. New York: Routledge.

Keywords
consciousness; physicalism; complexity theory; kolmogorov complexity; representational theory of consciousness

C-9 (Wed): Physical omniscience and meta-knowledge: Why Mary learns what it is like to see red when she leaves the black and white room

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.02] Materialism and dualism

Abstract
A novel objection to Frank Jackson's Knowledge Argument (KA) against physicalism is presented, one in which meta-knowledge plays a central role. It is first shown that the KA's supposition of a person, Mary, who is physically omniscient, and yet who has not experienced seeing red, is logically inconsistent, due to the existence of *epistemic blindspots* for Mary (in Moore and Sorensen's sense: epistemic blindspots B for a person P are propositions that are true, that can be known, but for which it is a contradiction to suppose that that P knows B). It is then shown that even if one makes the KA consistent by supposing a more limited physical omniscience for Mary (Mary is only assumed to know all the physical facts that it is logically possible for her to know), this revised argument is invalid. This demonstration is achieved via the construction of a physical fact (a recursive conditional epistemic blindspot) that Mary *cannot* know before she experiences seeing red for the first time, but which she *can* know afterward. Thus, the intuition that Mary learns a new fact upon seeing red for the first time is shown to be consistent with there only being physical facts, defusing the Jackson's pigeonhole argument against physicalism.

Keywords
knowledge argument, Mary, qualia, physicalism, omniscience, epistemic blindspot, self-reference, meta-knowledge

C-9 (Wed): Methodological Illusionism About Qualia

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
Theoretical illusionism (TI) is a theory of consciousness that claims that phenomenal consciousness is an illusion. I take it as a claim about qualia — specific properties that are a part of the furniture of the world. Illusionism doesn't deny the existence of subjective experience in some sense. TI faces various objections from qualia-realists. Those objections show that illusionists do not have decisive arguments for the claim that there are no qualia, although they have good reasons to suspect their existence. I propose a weaker version of illusionism — methodological illusionism (MI) — that can make better use of illusionist anti-qualia arguments. MI can be stated in several claims: 1) Both TI and realism about qualia are possibly true. MI doesn't accept the version of illusionism that claims the impossibility of qualia. The thesis that illusionism is possible presupposes that an MI theorist can explain how illusion of consciousness is possible. There are various options here, they are explored by F. Kammerer. 2) Now we are in an epistemic position, from which we cannot chose between illusionism and qualia realism. Qualia realists refer to the arguments that are based on introspection, illusionists challenge the reliability of introspection, and neither can claim a decisive victory. The arguments of both sides have their force. 3) The are two options. First, our epistemic position can be improved, and we will get further evidence for or against the existence of qualia. The evidence must be new and such that it will refute the existing arguments. It is pointless to insist that the existence of qualia is obvious from introspection because illusionists are prepared to reject this type of argumentation. MI denies a priori physicalism on the grounds of commonly accepted objections. Existence of qualia can be a question of empirical evidence, but not a priori reasoning. 4) Second, our epistemic position cannot be improved and the evidence of the existence of qualia will be always ambiguous. In that case we should accept theoretical illusionism as a more economical (conservative, in Frankish's words) theory that doesn't postulate existence of entities additional to the physical world outlook. Given that our present epistemic position is ambiguous, our present stance should be illusionist: it is more economical to take illusionism as a default view of phenomenal consciousness (Dennett). In short, MI claims that theoretical illusionism should be accepted as a default position about qualia, while we still must be looking for evidence for or against existence of qualia (whatever that evidence can be). Methodological illusionism has at least two advantages. First, it is a good option for those philosophers who have strong qualia realist intuitions, but don't want to accept 'panicky metaphysics' of panpsychism, anomalous monism etc. Such people can accept MI and retain the hope for the discovery of further evidence for qualia. Second, MI encourages us to concentrate on the problems in philosophy of consciousness different from the question of the metaphysical status of qualia (for example, consciousness and moral issues).

Keywords-illusionism, qualia, phenomenal consciousness

C-9 (Wed): Self-Representationalism, Intimacy, and Mental Representation

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
According to a longstanding story, phenomenal consciousness requires inner awareness (IA) of one's own mental states. In searching for an explanatory and naturalistic account, many have understood IA in terms of mental representation. The latter can occur unconsciously, so it's a good candidate explanans. Moreover, it gives us good prospects for naturalization. However, one well-known problem for this approach is that it would fail to capture the 'intimacy' that obtains between IA and conscious qualities, thereby mischaracterizing consciousness itself. Roughly, one way to put the objection is the following: a representationalist account of IA allows in principle for cases of misrepresentation of the conscious features, as well as the very existence, of one's own experience. This seems to insert something like a representer/represented gap where there should be no such gap—the way our experience is cannot be dissociated from the way it feels to us in IA (e.g., Neander 1998; Levine 2001, 2006; Block 2011; Coleman 2015). Some proponents of self-representationalism (SR) claim that their view has the right resources to accommodate the required intimacy of consciousness without having to drop the original explanatory and naturalistic program that led to accounting for IA in terms of mental representation. In particular, in developing what I take to be the best and most articulated version of SR, Kriegel (2009) replies to the intimacy objection by suggesting that IA should be construed as a constituting representation. "[T]he idea is that qualitative properties are constituted by the inner awareness representation of the conscious state " (2009: 109). According to Kriegel, this closes the putative representer/represented gap between IA and the qualitative features of the conscious states, thereby vindicating the intimate relation between IA and conscious qualities. Importantly, if this works, then there are good reasons to adopt SR instead of concurrent views inside (and arguably also outside of) the family of IA theories of consciousness. In this talk, I argue that Kriegel's proposal is not a good solution for the naturalistically minded self-representationalist, as it gives rise to the following dilemma: either the self-representationalist accommodates intimacy by appealing to constituting representation; or they provide a naturalistic explanation of consciousness in terms of mental representation. But they cannot do both. The bulk of the talk consists in showing that IA construed as a constituting representation requires a new, non-causal notion of mental representation. Plausibly, such a new notion of mental representation presupposes phenomenal consciousness instead of explaining it. This undermines the explanatory character of the view. Moreover, it raises further concerns about its prospects for naturalizing consciousness. Hence, construing IA as constituting representation leads us to lose the main benefits (explanatory character and prospects for naturalization) that were the motivations to adopt a representationalist account of IA in the first place—in fact, it is at odds with them. This, in turn, highlights a tension in naturalistic SR between its deflationary program (providing a naturalistically kosher explanation of consciousness) and its inflationary needs (two notions of mental representation).

Keywords-Consciousness, inner awareness, self-representationalism, intimacy of consciousness, mental representation.

C-9 (Wed): Dancing Qualia Revisited

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
The dancing qualia argument purports to show that functional organization fixes phenomenology (Chalmers, 1996). The idea driving the argument is that views on which functional organization does not fix phenomenology implausibly predict that well-functioning, attentive subjects could undergo large changes in experience (“dancing qualia “) without noticing or reporting any such changes. The argument is interesting in part because it yields predictions about the experiences of certain sorts of artificially intelligent systems, notably whole brain emulations. However, I will argue that the argument does not come close to establishing that functional organization fixes phenomenology, as the argument fails in important ways on a range of live hypotheses about mental causation, quiddities, physical symmetries, and and interface properties of different materials. Nonetheless, I will show that there are positive lessons to be gleaned from dancing qualia. More specifically, I will argue the dancing qualia thought experiment has a number of little explored implications for theories of consciousness in the metaphysics of mind, the philosophy of perception, and the science of consciousness. These theories include forms of interactionist property dualism, tracking representationalism, naive realism, and the integrated information theory.

Keywords
dancing qualia; functionalism; organizational invariance; panpsychism; interactionism; representationalism; consciousness and physics; scientific theories of consciousness

C-10 (Wed): Visual Illusion and Objective Looks

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
One important and traditional challenge to naïve realism about perception is the argument from illusion. This begins with the modest premise that things sometimes appear other than they are, and then proceeds to the radical conclusion that in perceptual experience – whether veridical or illusory – we are presented with mind-dependent (or at least non-physical) sense-data rather than ordinary material things. This paper focuses on the case of visual illusion, and develops a novel answer to the argument from illusion in a naïve realist setting. Traditional naïve realist answers to the argument from illusion reject the so-called Phenomenal Principle on which it turns, i.e. the principle that if it seems to one in perceptual experience as if some object O is F, then there really is an F-item one sees (or is visually presented with). While the principle has been rejected for various reasons, I believe there are in fact good reasons to accept it. Having presented some novel arguments for this claim, including one central argument that turns on the idea that perceptual experience, even in illusion, can provide us with novel knowledge of what the colours it presents are like – I then explain how naïve realists can accept a version of the phenomenal principle while still resisting the argument from illusion. Central to the resulting view is that naïve realists both can and should incorporate certain insights from the traditional sense-datum theory, and in particular the insight that in visual experience we are presented not only with coloured objects but with expanses of colour that pervade those very objects. The paper conceives such expanses as mind-independent tropes, and argues that in a visual illusion where an item O appears F without being so, the subject is aware of an actual instance of F-ness, namely, an F-visual expanse which itself is predicatively F. In the circumstances of illusion, the object O is temporarily coincident with the F-visual expanse. However, the object O itself is not F, since it is not the case that O is habitually coincident with such an expanse. To properly defend this view, the paper also offers a novel account of what it takes for an object to be coloured, and of the difference between merely appearing to have a certain colour and actually having that colour, which once again draws centrally on the notion of an instance of colour (i.e. on the notion of a visual expanse).

Keywords
Perception, Illusion, Naive Realism, Disjunctivism, Philosophy of colour

C-10 (Wed): Naïve Realism and Sensorimotor Theory: A New Response to the Problem of Perceptual Presence

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
The problem of 'perceptual presence' (Noë, 2004) concerns how we can perceive ordinary objects (e.g., apple, cat) despite that we are only presented with some parts of perceived objects given our perspectival limitations. For example, in looking at the apple on my desk, I am only presented with its facing side from where I stand. Yet, I have a sense of perceptual (visuospatial) presence of one particular voluminous apple despite that other unseen sides of the apple (e.g., its backside, underside) are 'hidden' from my current spatiotemporal viewpoint (from here and now). This paper offers a novel solution to the problem by incorporating key insights from two 'anti-representationalist' theories of perception, naïve realism and sensorimotor theory. Naïve realism, a prominent contemporary Anglophone theory of perception, holds that perception is fundamentally a matter of obtaining a direct 'acquaintance' to some mind-independent entities (Campbell, 2002; Martin, 2002; Soteriou, 2013). Sensorimotor theory (or enactivism) holds that perception involves patterns of dependence of sensory changes on movements ('sensorimotor contingencies') and our practical grasp of them ('sensorimotor anticipation') (Hurley, 1998; O'Regan & Noë, 2001; Noë, 2004; O'Regan, 2011). My suggestion is that when explaining perceptual presence (and perceptual phenomenology more generally), there are reasons to combine the notions of 'acquaintance' and 'sensorimotor anticipation'. On this view, perceptual presence is best explained in terms of (a) 'perspectival acquaintance' to some parts of perceived objects, and (b) 'sensorimotor anticipations' of how the objects would look different depending on movements. The upshot is to show that the suggested alliance is explanatorily virtuous and mutually beneficial as it helps both naïve realists and sensorimotor theorists better elucidate the phenomenology of our conscious perceptual experiences of objects. For naïve realists, the combination provides them resources to develop a neat solution to the problem of perceptual presence, explaining the felt presence of the 'unseen' parts of objects (e.g., the apple's backside) in terms of our 'access' to them (via sensorimotor anticipation). It also helps them better illustrate the role of the subject in determining the phenomenology in an empirically supported way. For sensorimotor theorists, the combination offers them a way to avoid the charges of phenomenalism and indirect realism and thereby come to terms with 'direct realism' (Leddington, 2009). It also equips them to better explain the 'particularity' of perception (Ward, 2022). I address two potential issues with my positive proposal concerning (i) its 'anti-representationalist' slogan, and (ii) the 'screening off' worry, claiming that the combination is fully committed to the core naïve realist element ('acquaintance') which plays a sui generis explanatory role in expounding the phenomenal significance of the 'fulfilment' of sensorimotor anticipations. Perception, I argue, involves dynamic patterns of sensorimotor anticipation (in absence of acquaintance) and fulfilment (by means of obtaining acquaintance). I argue that the proposed combination is preferable over other alternative accounts of perceptual presence which appeal to something representational such as (1) belief or inference, or (2) mental imagery (Nanay, 2010), as it best captures the inherent 'indeterminacy' of perceptual phenomenology in non-representational terms.

Keywords
Naïve realism, sensorimotor enactivism, acquaintance, representation, phenomenal consciousness

C-10 (Wed): Against GOTHic Hallucination

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
Byrne and Manzotti (2022; henceforth B&M) have argued in favour of the GOTHic theory of hallucination, according to which there is always an object of hallucination and it is always a physical object, sometimes of the ordinary kind, sometimes of the (numerous) gerrymandered kind (p. 341, 345). Their theory assimilates hallucination to perception, because, as in perception, hallucinations have a "palpable particularity " (p. 334) and they share with perception a "felt perceptual nature " (p. 349). Their theory accords a central role to episodic memory, which "provides a basic inventory of familiar objects " that "under certain conditions " enable our visual system to "present gerrymandered objects composed from the inventory " (p. 350). According to B&M, sensory imagination is a "degenerate kind of hallucination " that may be "subject to voluntary control " (ibid). Thus, according to B&M, sensory imagination is assimilated to a kind of hallucination (that crucially relies on episodic memory), which is in turn assimilated to perception. I present three objections to GOTHic hallucination: an empirical objection, a conceptual objection, and a phenomenological objection. The Empirical Objection: Late-stage Alzheimer's disease is marked by a simultaneous impairment of episodic memory and accentuation of visual hallucinations (El Haj et al. 2017; El Haj et al. 2019). While not a decisive objection to GOTHic hallucination, I show that the evidence counts against it. I also construct an ideal case to settle the matter empirically. The Conceptual Objection: It is a well-established empirical result that we easily and often confabulate our episodic memories. Consider a hallucination H of an object O based on the materials supplied by a confabulated episodic memory of O that (presumably) inherits its presentational phenomenological character from it. But, as per hypothesis, there never was any presentation of O, though it is represented in episodic memory. How do we account for the hallucination of O? Because the GOTHic account assimilate sensory imagination, hallucination, and perception, it seems to lack the resources to account for this case. The Phenomenological Objection: Drawing on M.G.F. Martin's "Out of the Past: Episodic Recall as Regained Acquaintance " (2001), I argue that the GOTHic account of hallucination fails to account for the phenomenological distinctiveness of sensory imagination, episodic memory, hallucination, and perception. On a more concessive note, the GOTHic account's phenomenological inadequacy invites development and specification of the view to meet the standards of phenomenological adequacy.

Keywords
Hallucination, GOTH, sensory imagination, episodic memory, perception

C-10 (Wed): Memory experience, metamemory feelings, and the doctrine of concordance

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[02.06] Memory and learning

Abstract
The experiences associated with remembering, including metamemory feelings about the act of remembering and attempts at remembering, are not often integrated into general accounts of memory. For example, David Rubin (2022) proposes a unified, three-dimensional conceptual space for mapping memory states, a map that does not systematically specify metamemory feelings. Drawing on Rubin's model, we define a distinct role for metamemory in relation to first-order memory content. We propose a fourth dimension for the model and support the proposal with conceptual, neurocognitive, and clinical lines of reasoning. We use the modified model to illustrate several cases, and show how it helps to conceptualize a new category of memory state: autonoetic knowing, exemplified by déjà vu. We also caution not to assume that memory experience is directly correlated with or caused by memory content, an assumption Tulving (1989) labeled the doctrine of concordance.

Keywords
Consciousness, memory, Metamemory, Phenomenology, Deja vu, Concordance

C-10 (Wed): Meaning to Mean: A Precondition for Sentience and Understanding in Large Language Models

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[03.06] Language

Abstract
The possibility of sentience in Large Language Models (LLMs) has received a striking amount of attention recently in both the popular media and academic Philosophy. As David Chalmers points out in his recent (October 2022) talk at NYU, the main positive reason for thinking such artificial intelligence (AI) systems might be sentient is the (usually fleeting) impression that they are sentient during (very limited) interactions with them, often involving explicit use of the words 'sentient', 'conscious', or 'feel'. Such impressions of sentience, we argue, rely on the impression that the systems understand those linguistic utterances. Although language understanding is not a requirement for sentience in general (presumably mice are sentient), it is a requirement for generating the impression that LLMs are sentient primarily on the basis of their linguistic behavior. Most accounts of language understanding focus on what a given utterance means and by virtue of what. This includes various causal theories, inferential-role theories, and their hybrids. Chalmers argues that LLMs plausibly meet the inferential-role requirements for meaning and perhaps also some of the causal requirements, especially if we count LLMs that include associated images in their datasets. However, all of these accounts take for granted a crucial precondition —in order to mean one thing or another semantically, the agent using the symbol must mean something by it. In the context of AI, this precondition is impossible to ignore. H. P. Grice (1957) addresses this with his Intentionalist account, on which an agent must intend to mean something by a linguistic utterance for it to be meaningful. J. L. Austin (1962) and J. R. Searle (1969) developed this approach with what is known as Speech Act theory, and it has been further developed in recent Computational Linguistics (e.g., Frank, M. C., Goodman, N. D., & Tenenbaum, J. B. (2009); Bender, E. & Koller, A. (2020)). Chalmers comes close to hitting on this criterion when he mentions speech acts in his talk as a way of satisfying what he calls the Embodiment requirement for sentience. However, while the outputs of LLMs are actions that are linguistic, they are not Speech Acts in the sense of being actions with communicative intention. This precondition — meaning to mean— is missing from all current and future LLMs almost by definition. Human brains are large and they process language, but they are not LLMs. LLMs use massive amounts of purely linguistic data and massive amounts of training to find patterns between linguistic symbols. There is nothing in their architecture that treats the linguistic symbols as being about anything. Even adding associated images to the linguistic data won't help, because the system wouldn't treat the correlated images and text as being about the same thing, or anything at all. Of course, some current or future language-processing systems might plausibly satisfy this precondition. However, as with many other criteria Chalmers considers, such a claim is no different from the generally accepted one that some kind of AI might understand its linguistic symbols.

Keywords-Large Language Models, Artificial Intelligence, Machine Consciousness, Language Understanding, AGI

C-11 (Wed): To Be is To Be Conscious

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.03] Panpsychism and cosmopsychism

Abstract
According to certain versions of panpsychism and idealism, everything in the universe is conscious. However, typical versions of these views still admit that it is possible for there to be a universe devoid of consciousness. For example, perhaps there could be a "zombie" world, which is structurally identical to the actual world except that it is devoid of consciousness. In this talk, I will argue for the stronger conclusion that those who reject physicalism should think that it is necessary that everything is conscious, which would imply that those who reject physicalism should think that zombie worlds are not possible. I will be giving three independent arguments for this conclusion. The first argument starts from the premise that phenomenal properties (i.e., properties that specify what it's like to be something) are intrinsic categorical properties that are not reducible to non-phenomenal properties, which is a premise that those who reject physicalism already accept. I then ask the following question: what is the space of possible intrinsic categorical properties? This is a question that everyone faces, and I argue that those who reject inexplicable "brute necessities" (which is a main premise in several anti-physicalist arguments) should think that the only possible intrinsic categorical properties are phenomenal properties. If the space of possible intrinsic categorical properties included both phenomenal and non-phenomenal properties, I argue that there would be no explanation for why the space of possible intrinsic categorical properties had the nature that it has, because it would be "radically disjunctive" in a particular kind of way. The second argument is that non-physicalists can avoid a prominent "debunking" argument for "illusionism", which has been recently articulated by David Chalmers, if they believe that it is necessary that everything is conscious. Roughly speaking, the debunking argument states that our belief that we are conscious would be a mere coincidence if consciousness really existed, since our belief that we are conscious is wholly explicable in "topic-neutral" physical terms. One popular response to this argument is that consciousness might be the "realizer" for the physical processes that produce our reports that we are conscious, but a problem for this response is that it seems possible for those processes not to be realized by consciousness (e.g., they are not realized by consciousness in zombie worlds). However, if it is necessary that the only categorical realizers for physical processes are phenomenal properties, then an adequate response to this debunking argument can be given. For the third and last argument, I argue that, if it is necessary that everything is conscious, then one's views about the nature of consciousness can be used to make substantial progress on various metaphysical questions that are seemingly unrelated to the nature of consciousness. To take just one example, I argue that the "bundle theory" of the conscious self can support the necessity of the more general "bundle theory" of objects.

Keywords-Panpsychism, Idealism, Illusionism, Zombies, Intrinsic Properties, Modality

C-11 (Wed): Active information, neural processes and conscious experience

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
Some theories of consciousness give information a central explanatory role. Tononi et al.'s (2016) Integrated Information Theory (IIT) identifies consciousness with a certain kind of physically (and not merely functionally) integrated information. Consciousness is intrinsic to certain causal structures present in a grouping of elements within a system that have physical cause-effect power upon one another (Fallon 2023). Chalmers' (1996) double-aspect theory of information connects with Wheeler's (1990) quantum mechanical view that the physical derives from the informational ("it from bit "). Information is truly fundamental, and experience is information from the inside, while physics is information from the outside. Here yet another informational theory of consciousness is explored, based on Bohm's (1990) "active information " view. Information is understood as an objective commodity which exists independently of the human mind and literally in-forms physical processes (e.g. information carried by radar waves, the DNA molecule, or a map). Radically (cf. Wheeler) Bohm proposed that active information applies even at the quantum level. His "pilot wave " interpretation of QM postulates that an electron is a particle always accompanied and guided by a wave. The wave is not pushing and pulling the particle mechanically, but the form of the wave literally in-forms the movement of the particle. Quantum active information has radically new properties: it enables context-dependence, non-locality and a very special, irreducibly holistic way in which the information carried by the quantum wave of a many-body system orchestrates the behavior of a group of particles (e.g. in superconductivity; Bohm and Hiley 1987). Given that quantum theory is a fundamental theory, Bohm thus gives information a very fundamental role in the universe. In such a universe it is perhaps not so surprising or anomalous that living organism have such information involving phenomena as conscious experience associated with them. Building upon and going beyond Chalmers' and Tononi's approaches, we propose that active information can ground a theory of consciousness. We postulate that active information plays a role in the brain, unifying its functions due its holistic and environmental nature. Some of this active information might even be quantum mechanical in nature (which would perhaps explain some of the radically holistic features of conscious experience). Active information would co-ordinate the quantum information processing non-locally, organizing the dynamical evolution of the entire system and yielding the (semantic) meaning of a given brain activity. Following Bohm's notion that active information has both mental and physical aspects, we propose that in the context of the brain, this holistic information (which involves non-conscious "awareness "; cf. Chalmers) is related to the appearance of consciousness as "awareness of awareness ", when there is a suitable hierarchical structure of levels of information operative in the brain.

Keywords-Informational theories of consciousness, Double-aspect theory of information, Integrated Information Theory, Active information, Quantum theories of consciousness, Quantum neuroscience, Bohm, Chalmers, Tononi

C-11 (Wed):A New (Jamesian) Panprotopsychism

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.03] Panpsychism and cosmopsychism

Abstract
This paper explores and defends a novel version of panprotopsychism suggested by the writings of William James. The key tenets of this position are (1) that the fundamental building blocks of the universe are substantive parts of the flux, which is itself smoothly and endlessly continuous, and are pure experiences; but (2) to be a pure experience is not thereby to be conscious or in any sense self- aware or a knower? a pure experience has, intrinsically, a robust and distinct nature (and the diversity of natures is at least as great as the diversity of our experience), but it is in itself neither physical nor mental. (3) A pure experience ?becomes? physical or mental only in virtue of being embedded in a set of relations with other pure experiences: the difference between the conscious and the non-conscious is marked by a set of relations that can be participated in naturalistically by original, non-conscious elements; no additional magic ?glow? is needed. Similarly, the emergence of a personal consciousness, a self, is to be explained wholly in terms of relations (primarily, relations between experiences and another set of privileged experiences that characterise a body). (4) This is not, however, mere functionalism because the what-it-is-likeness of consciousness? the heat of fire or the taste of blackberries? is contributed by the intrinsic nature of the pure experience. Significantly, this intrinsic nature is the same as the intrinsic nature of (objective) fire and blackberries? this is why our being related in certain ways to these pure experiences counts as knowing, not just about how blackberries seem to us, but how they are. Finally, (5) although each pure experience we encounter is, perforce, part of our personal consciousness (otherwise we would not be encountering it) there is (at least for James) something attractive about a view that answers the question: what is a pure experience when we do not encounter it? with the suggestion: it is a part of a (pluralistic, non-absolute) cosmic consciousness. On this basis, the universe is made a friendly, familiar place rather than an impersonal one.

Keywords
William James, pure experience, combination problem, neutral monism, panpsychism; panprotopsychism, functionalism

C-11 (Wed): The "Combination Problem ", physicalism, integration theories of consciousness and virtual selves.

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.03] Panpsychism and cosmopsychism

Abstract
The "Combination Problem ", physicalism, integration theories of consciousness and virtual selves. The "subject combination problem " (Chalmers 2015) is that of explaining how multiple conscious micro subjects might combine into a conscious macro subject. Chalmers raised it as a problem for panpsychic theories, but it has a potentially wider application. Physicalists deny that consciousness is a fundamental feature of micro reality, but can accept the general possibility of producing complex conscious subjects from the combination of lesser conscious subjects, as long as the simplest conscious subjects can be explained in physical terms. Any such physicalist theory will face some version of the combination problem. I argue physicalism has greater resources to deal with the combination problem than does panpsychism. Many current neuro-psychological models of consciousness appeal to integration of various types as a key feature of consciousness – including integration of content (Dehaene 2014), of information (Tononi et al 2016), of function, and of point of view (Bayne 2010). Though such theories do not directly address the integration of conscious subjects, I show that they can be extended to do so if one also adopts a plausible theory of conscious subjects as constructed beings and of conscious selves as virtual entities defined by integrated points of view. I consider the objection that such a theory would apply only to the combination of functionally or access(A-)conscious subjects, and in reply I show how the model can be applied to the combination of phenomenally(P-)conscious subjects. Bayne, Timothy (2010). The Unity of Consciousness. Oxford, OUP Chalmers, David (2016). "The combination problem and panpsychism ". In D. Bruntrup and L. Jaskolla, Panpsychism. Oxford, OUP. Dehaene, Stanislas (2014). Consciousness and the Brain. New York: Penguin. Goff, Philip (2017). Consciousness and Fundamental Reality. Oxford: OUP. Tononi, Giulio; Boly, Melanie; Massimini, Marcello; Koch, Christof. (2016) "Integrated information theory: from consciousness to its physical substrate " Nature Reviews Neuroscience. 17 (7): 450–461.

Keywords
Panpsychism, combination problem, physicalism, integration theories, virtual self.

C-11 (Wed): Humanity's Transformation from Industrial to Noospheric Selves

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.03] Panpsychism and cosmopsychism

Abstract
For the last two millennia, the Western world has offered multiple views defining the nature or essence of the self. The most recent prevalent conceptions in contemporary thought describe the singular self or the many selves that define who we are, emphasizing the self as bodily, affective, identity, narrative or autobiographical. This favored approach is one that describes the self in thing-classificatory terms, a Western preoccupation with describing reality in terms of what things are as static entities. Another approach to self can be understood in terms of relational-process ontology, with the self-explained as moment-to-moment processes of self-making or selfing. Coming to the organism as a process of becoming permits a more integrative approach that attends to the subjective, the relational, the dynamical, the changing and the complex. Humans, as experiencing beings with a sense of self, are embodied living organisms, situated in a physical, social, and cultural environment. A discussion of human beings as self-organizing dynamical systems brings forth the process of being that refers to the relational brain–body–world dynamics of the mind, dynamical embodiment. This approach takes the mind beyond the confines of the brain. It encompasses the living person in their world, humans in terms of living systems––synaptic connections, brains, bodies, minds, communities of people, animals, and planet. The various mental capacities that are distinctly human are acknowledged as having developed through evolutionary time, with self-consciousness in particular being a recent human development. From the perspective of dynamical embodiment, the dynamical self can be understood to arise from bodily, affective, environmental, social, and cultural processes. Here, we argue an account of the self that does not presuppose the innate, irreducible, pre-reflective self. Instead, selfing is argued on the basis of all aspects of self-consciousness being constructed, evolving within the ecosystems of personal relationships that include the intersubjective interactions with the world, a planet of living beings and things. During the last two centuries, humans had a common understanding concerning self and world. In almost every industrial society they have regarded themselves as separate from the world, a world composed of inert matter. These views are no longer viable. Recent work in the physical and cognitive sciences overturns this common understanding of self and world. The natural sciences narrate a story of self-organizing universe that has complexified into rocky planets such as Earth, which began as a geosphere, evolved over billions of years into a biosphere, and now into a noosphere, a self-organizing Earth composed of networks of sentient beings. Even more recently, the cognitive sciences, especially the theories of dynamical embodiment, have come to the view of the relational brain-body-world as constitutive of human consciousness. As this integral narrative combining physical and cognitive sciences is reaffirmed and adjusted to all around the world, a new self is reified, one we can name a "noospheric self. " We assert this transformation of self-consciousness in which the industrial selves are replaced by dynamical noospheric selves is the emergence of a new form of humanity. **Keywords**-Self, Dynamical Embodiment, Self-consciousness, Complexification, Transformation of consciousness, Noosphere, Self-organizing systems

C-12 (Wed): Bricks of consciousness: the role of cannabinoid signaling in incidental learning and reality testing

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
Conscious perception might have evolved as a consequence of the capacity to associate unrelated and not particularly salient information to produce new mental representations of the external and internal world. In other words, the ability to form abstract mental representations might be a first step toward consciousness. Studying the brain mechanisms underlying abstract mental representations is very difficult, because of the lack of suitable animal models. However, recent work using rodents revealed that sensory preconditioning procedures allow detecting the occurrence of abstract mental representations through incidental learning (IL). IL relies on the formation of associations between low salience and unreinforced stimuli, constituting thereby a proxy of conscious processes, where unrelated experiences are mentally combined to produce "new " subjective representations of reality. This process in animals is likely necessary to increase the capacity of individuals to predict uncertain future situations and prepare to address them. Recent work from our laboratory showed that brain type-1 cannabinoid receptors (CB1, the endogenous target of the psychoactive component of cannabis) in the hippocampus, a brain structure particularly important for conscious (i.e. declarative) memory in humans, are required to form IL. In addition, excessive activation of these hippocampal receptors impairs the process of "reality testing ", based on the comparison of mental representations to reality. This misinterpretation of perception resembles delusion-like phenomena typically observed in psychotic patients. Thus, rodents can display normal and distorted abstract mental representations, which might therefore constitute the initial "bricks " of conscious perception, and cannabinoid signaling is deeply involved in these processes.

Keywords
Abstract mental representations, cannabinoid receptors CB1, mouse, incidental learning, reality testing, hippocampus, elemental consciousness, imagination

C-12 (Wed): The Neuroelectric Fields of Consciousness

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
Theories of neuroconsciousness emphasize the complexity and multiple levels of the neuroanatomic network. Recent work suggests that CNS neuroelectric activity is active at many different levels and potentially as complex as the structural neuroanatomy. The CNS electrical fields associated with described states of consciousness include: 1) Intracellular: The conveyance of information by chemical protein activation systems active on the nanometric scale requires less energy than other biologic options. The microtubules of the cellular cytoskeleton organize oscillatory 50 Hz. activity that is utilized in protein transcription and folding. Such 1 mv. gamma is characteristic of all organisms larger than a micrometer in size and potentially a marker for primary consciousness. 2) Cell membrane / solute interface: Voltage gated channels open and close at set frequencies based on the biophysical constraints of intracellular ionic gateways. Potassium / sodium channels oscillate at 10 Hz. (alpha), calcium (Ca++) ionic gateways at 15 Hz. (sigma), and 1 Hz (delta) is modulated by Ca++ dependent potassium currents. These are weak 1 mv. chemical signals. 3) Neuronal network spike potentials: When distances are larger (> 1 mm.) biologic circuits use electrical spike potentials to communicate information. Neurons utilize the ionic channels to produce the on/off pulsatile spikes involved in the complex neural network interactions that contribute to tertiary consciousness. These 100 mv. action potentials can be summated into complex propagated brainwaves able to fractally convey phase coded information to distant sites in the CNS. 4) Physiologic frequencies: The (50 mv.) EEG oscillations of larger commissural organisms form at the same frequencies as the intracellular signals; delta at 1 Hz, alpha at 10 Hz, and sigma at 15 Hz. These bands are related forming a non-linear geometric progression of frequencies at the logarithmic base-different frequencies can never perfectly entrain or form consonant harmonics with one another. Each of these frequencies propagates outside the CNS (to scalp electrodes), and each is associated with a discrete and phenomenologically typical form of sleep / dream consciousness. 5) Resonance frequencies: The 5-8 Hz. theta frequency has no clear intracellular origin. It is intracranial and does not propagate outside the brain container (the skull). It is potentially a resonant frequency entrained and forming harmonic interactions with gamma. Intracranial theta characterizes the psychoanalytic form of dream consciousness associated with REM sleep. 6) Environmentally interactive frequencies: The pervasive 60 Hz. of the electrical grid (environmental gamma) induces only minimal levels of cognitive effects. The possibility is that a bioactive system protects CNS gamma fields from interference. Alpha, delta, and sigma are strong EEG rhythms propagated outside the CNS. Both Transcranial Magnetic Stimulation (TMS) and Transcranial alternating current stimulation (tACS) can be used to induce and alter these frequencies producing changes in performance and perception. The neuroelectric flux and neuroanatomic interactions of these fields have been well described through the use of microelectrodes, EEG, QEEG, fMRI, and MEG. Any neuroscientific construct postulated to describe consciousness must integrate the contribution of these CNS neuroelectric fields.-**Keywords**-neuroelectric, frequency, resonance, dream, electromagnetic, consciousness

C-12 (Wed): What Is It Like To Be A Brain Organoid? Implications of Biological Neural Networks for Consciousness and AI.

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
It has been shown that three-dimensional self-assembled multicellular structures derived from human pluripotent stem cells show electrical activity similar to EEG (Setia & Muotri, 2019). More recently, neurons were successfully embedded in a digital game-worlds (Kagan, et al. 2022). The biologically inspired neural network (BNN), developed into human cortical cells, was able to show internal modification and learn the task at hand (predicting the trajectory of a digital "ball " while moving a digital "paddle " to counteract it in a game of "Pong "). In other words, the system allowed to read motor information and write sensory data into cell cultures. Neural Correlation of Consciousness (NCC) theories, which usually deal with whole brain anatomy and suggest top-down approaches to understanding consciousness, may or may not offer some preliminary responses. According to their definition, "An NCC is a minimal neural system N such that there is a mapping from states of N to states of consciousness, where a given state of N is sufficient under conditions C, for the corresponding state of consciousness. " (Chalmers 2000) From a physiological, philosophical, and ethical perspective it is useful to ask if the neural activity in the BNN is necessary and sufficient to produce consciousness. Most of the existing NCC theories understand the problem of consciousness arising from an entire brain, without defining a minimal neural system capable of sustaining consciousness. All NCC's provide a series of connectivity requirements, and thresholds to indicate when a system is conscious or not. Theories such as the Global Neuronal Workspace (Barr, 1988), Recurrent Processing Theory (Lamme, 2006), Higher Order Theory or Information Integration Theory (Tononi, 2004) present different proposals on how consciousness ensues using cortical neurons' interconnectivity as models. We found that Information Integration Theory (IIT) is the only NCC that offers the possibility for BNN's of becoming conscious. Applying the notion of integrated information, symbolized by Φ, to explain generic consciousness. IIT holds that a non-zero value for Φ implies that a neural system is conscious, also proposing a direct relationship between the value of Φ and levels of consciousness. A similar pattern of activity occurs in the BNN, with increased density of sensory information leading to better performance. IIT basically indicates that any system capable of integrating information will have some degree of phenomenal consciousness. Furthermore, these advances in BNN's represent the first implementation of a Turing machine in a biological system, offering clear heuristic value for new research into the biological and digital convergence. A theory's strength rests in its predictive and heuristic values. In this presentation, we discuss the profound implications that BNN's development has for our understanding of consciousness and artificial intelligence.

Keywords
Neural correlates of consciousness, biological neural network, Phenomenal Consciousness, Artificial Intelligence; Information Integration theory

C-12 (Wed): Propofol-induced unconsciousness destabilizes neural dynamics across cortex

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
Anesthesia is ubiquitous in hospitals, yet a mechanistic understanding of how anesthetic drugs induce unconsciousness is lacking. A prominent hypothesis suggests that dynamic stability is critical to cortical function: awake brains are poised at a state that is sufficiently excitable for activity generation and propagation, yet controllable and stable. Measuring dynamic stability during the transition from consciousness to anesthetic unconsciousness could identify the neural mechanisms disrupted by anesthesia, and thus provide insight into the neural basis of consciousness. Related work suggests that anesthesia could either destabilize or excessively stabilize neural dynamics—the question remains unresolved. This is likely due to the lack of rigorous approaches to estimating stability in neural data and the paucity of studies performing this analysis using electrophysiology. Harnessing results from dynamical systems theory, we develop a novel and principled approach, Delayed Linear Analysis for Stability Estimation (DeLASE), to quantifying population-level dynamic stability that is scalable to large volumes of neural data. DeLASE constructs linear delay dynamical systems models of activity and discounts the impact of further back states to estimate stability. We validate DeLASE by verifying it can accurately infer changes in stability in simulated networks from partial observation of activity. We then apply DeLASE to local field potentials from four areas across the macaque cortex during transitions between awake and anesthetized states and find that neural dynamics are destabilized in anesthetic unconsciousness relative to wakefulness. This suggests some degree of stability is necessary for conscious processing. Accordingly, we find that stimulus-evoked trajectories diverge in anesthesia-whereas in wakefulness they quickly stabilize-presenting a neural mechanism for a lack of stimulus information integration in unconsciousness. Given the hypothesized changes of stability in neuropsychiatric conditions like depression, anxiety, and schizophrenia, the impact of our rigorous stability estimation approach could provide a quantitative link across multiple fields of study.

Keywords
neural dynamics, stability, dynamical systems, anesthesia, computational methods

C-12 (Wed): Large-scale cortical deactivations precede episodes of mind-blanking during ongoing mentation

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
Our ability to report on mental activity occasionally fails, a phenomenon known as "mind-blanking ". It was previously shown that, when people were asked to be thinking of nothing, these self-induced "empty " periods were preceded by consistent fMRI deactivations in cortical areas responsible for internal speech (Broca's area, L hippocampus), and activations in frontal areas, such as the anterior cingulate cortex (ACC) (1). The ACC activations, in particular, imply the preservation of monitoring processes, which is counter-intuitive for mind blanking during which we seem to lose focus of mental activity. We here aim at delineating the role of the ACC in mind blanking during typical wakefulness without instructions to probe it. We re-analyzed fMRI experience-sampling data collected from 31 participants (2), who had to lay restfully (max 40sec) and, occasionally, after an auditory probe, reported their mental content using button presses choosing among a) absence of thoughts, b) stimulus-independent thoughts, c) stimulus-dependent thoughts and d) sensations. A univariate fMRI analysis revealed widespread cortical deactivations in the anterior cingulate cortex, the calcarine cortex, the bilateral thalami, the right anterior insula, the precentral gyrus, and the left superior parietal lobule (voxel-level puncorrected < .001, cluster-level pFDR < .05). A contrast analysis comparing absence of thoughts with the remaining 3 states yielded deactivation in the angular gyrus (voxel-level puncorrected < .001). Finally, based on our a priori hypothesis of prefrontal deactivations, we opted for a Bayesian ROI analysis on previously reported coordinates around the ACC, the left Hippocampus and Broca's area: a linear model with different intercepts for each mental state and plausible priors Norm(0,1) for the intercepts provided better fit compared to the null model only at the ACC (FittedWAIC: -130.438 < NullWAIC: -130.790), providing further evidence for prefrontal deactivations during non-induced mind-blanking. This result was consistent across the choice of priors for the model. Principally, this effect was driven by differences between mind-blanking and stimulus independent thoughts (median: -0.367, SD: 0.168, HDI (0.025): -0.690, HDI (0.975): -0.028). Our results show that non-self-induced mind blanking is linked to widespread cortical deactivations, where prefrontal regions fail to consistently monitor and recover mental content, suggesting that different instructions on mind-blanking have different neural correlates. The angular gyrus in particular, widely implicated in semantic processing and semantic recovery, might be the neural counterpart of the inability to verbalize in order to report mental content. We, therefore, propose that mind-blanking may originate from multiple avenues during ongoing experience, capturing brief periods of mental absences where the internal monitoring system fails to bring forth any mental content. This highlights the need to incorporate such blank periods in the study of spontaneous mentation in order to understand how and when thoughts manifest in awareness. 1.Kawagoe et al. 2019. Hum. Brain Mapp. 40(17):4934-4940 2.Van Calster et al. 2017. J Cogn Neurosci. 29(1):95-113

Keywords-mind-blanking, experience-sampling, mental content, spontaneous thinking, fMRI deactivations

C-13 (Wed): Brain Functional Connectivity Correlates of Anomalous Interaction Between Sensorily Isolated Monozygotic Twins.

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.13] Brain networks, synchrony and scale

Abstract
Over the last 30 years, EEG and fMRI studies have examined claims of anomalous interactions between two sensorily isolated individuals that shared an emotional bond or close relationship. While some of these studies have yielded weak yet statistically significant findings others have failed to find evidence for these interactions. In this study, we examine brain functional connectivity (FC) changes associated with possible anomalous interaction between sensorily isolated monozygotic twins. Brain FC is estimated using the Steady State Visual Evoked Potential-Event Related Partial Coherence (SSVEP-ERPC) methodology, an approach we have used in cognitive and clinical neuroscience studies for over 20 years. In each recording session, one twin, the sender viewed a series of 100 images while the other twin, the receiver, viewed a static image for the entire duration of the session. Fifty (50) of the images portrayed landscapes (non-personal images) while the remaining 50 were images provided by each set of twins and were selected as being of personal or emotional relevance to the twins (personal images). Images appeared on the sender screen for 1.0sec with the interval between the appearance of 2 successive images comprising a fixed component of 3.0sec and a random interval up to 4 sec. The random interval was determined by the output of a quantum random number generator (TRUERNG). The order of the 100 images was randomized using the Matlab Randperm function. Receiver FC changes were calculated from the appearance times of the images viewed by the Sender. The statistical significance of the FC findings was determined using a permutation test where 10,000 surrogate receiver FC measures were calculated using surrogate random appearance times. We hypothesized that if the twins were to demonstrate anomalous interactions, then the Receiver FC will exhibit statistically significant changes only when their FC estimates are based on the Sender image appearance times. Results: For each twin serving as Receiver, we separately analyzed the FC components for the 50 non-personal and the 50 personal images. This yielded 20 sets of findings (10 twins by 2 conditions). In 11 of the 20 observations we observed statistically significant receiver FC changes ($p<0.01$) only when trials were synchronized to the Sender image appearance times. The topography of the Receiver FC changes varied between individuals and varied depending on whether the Sender was viewing personal or non-personal images. The most common dynamic patterns of FC changes observed included parieto-occipital and temporal-frontal FC changes. We also observed differences in the number and topography of receiver FC changes depending on whether the Sender was viewing personal or non-personal images. Conclusion: To the best of our knowledge, this is the first study reporting statistically significant FC changes indicative of anomalous interactions between two sensorily isolated individuals.

Keywords
brain functional connectivity, anomalous interactions, monozygotic twins

C-13 (Wed): The effects of associative learning on neuronal activity and functional connections in the conscious mouse brain resting state networks

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.13] Brain networks, synchrony and scale

Abstract
It is known that the brains of animals and humans is active at resting state in absence of external stimulation or functional tasks. In this paper we investigate how past experience affects characteristics of such resting state networks in animals. To do this we analyzed resting activity of 41 brain regions in intact "naive " mice and mice that were contextual fear conditioned ("training " group) 24 hours before the detection of c-Fos-positive cells in the brain. Learning has been shown to have a significant effect on the brain activity of mice at rest after 24 hours. In animals with previous experience of associative learning the number of c-Fos-positive cells was significantly increased compared to control mice in the prelimbic cortex, retrosplenial cortex, temporal associative cortex, paraventricular nucleus of the thalamus, basolateral, lateral and central amygdala nuclei. Participation in the formation of associative fear memory in both humans and animals has been shown for all these areas. Further, using the methods of correlation analysis and approaches of graph theory, we investigated the connectivity of brain areas in the resting state networks in intact and trained mice, and also reconstructed the functional resting state networks and identified their main clusters. Analysis of functional connectivity showed that learning led to significant changes in the structure of resting state networks, affecting most areas of the brain. The strength of connections between areas was generally lower in the learning group than in the naive group, and the total number of connections decreased-suggesting that having past experience of associative learning makes resting state networks more variable. If naive mice had the most resting state connections between sensory cortical areas, as well as the basal nuclei, trained animals had majority of connections in areas of the hippocampus, parahippocampal region, amygdala, associative cortices and the thalamus and to a much lesser extent in the sensory area of the cortex. The training resulted in a significant increase in amygdala functional connectivity: naive mice had only two functional connections to the three amygdala nuclei, whereas trained animals had 25 connections to other brain regions, mostly different cortical areas. We found a significant change in the structure of connections at rest after training also for the hippocampus: the number of functional connections of this area was small in intact animals, and significantly increased after training. Thus, we demonstrated for the first time the impact of past experience of associative learning on the spatial-temporal structure of resting state neural networks in the animal brain. Our findings show that associative learning can alter spontaneous brain activity and patterns of functional connections in resting state neuronal networks long after training episode. Supported by Interdisciplinary Scientific and Educational School of Moscow University «Brain, Cognitive Systems, Artificial Intelligence» and by Non-Commercial Foundation for Support of Science and Education "INTELLECT ".

Keywords-associative learning, resting state networks, resting state activity, c-Fos imaging

C-13 (Wed): Investigating the neurodynamics of intentionality in terms of attractor networks

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.13] Brain networks, synchrony and scale

Abstract
The importance of consciousness and intentionality, as aspects of mental states, as well as their relationship in shaping volitional behaviors have long been a controversial topic from a neuroscience point of view. The brain as a nonlinear system can display high-dimensional chaotic neural patterns. This prominent feature of the brain can provide a basis for adaptation and goal-directedness of human actions. In contrast, a stabilized brain would not be able to make decisions and conquer the chaotic environmental/internal changes. In this context, the fundamental question to be asked is whether intentional decision-making relies on changing the behavioral patterns of neurons unique to this process. The second question would be whether any possible pattern transformation can be associated with consciousness. To scrutinize the hypothetical questions mentioned, this study sheds light on the dynamics of neural oscillations in terms of attractor networks, considered to be a characteristic signature of deliberate action control during intentional processes. In this regard, we present a biologically plausible attractor-based model to study the behavioral change of structures during intentional actions, originally developed by Hans Liljenström (Liljenström, 1991). To model the behavior of high-dimensional nonlinear neural systems, we represent the dynamics of neural networks by low-dimensional attractor networks described by coupled differential equations. Here, neural patterns are represented in the form of attractor networks underlying different functions, such as preparatory processes of intention, implying volitional decision-making process. Two cortical areas, the lateral prefrontal cortex (LPFC) and the anterior cingulate cortex (ACC), as well as their interactions, have been modelled. With model simulations, we have demonstrated that the succession of transient-like dynamics during the preparatory process of intentional control process can be emulated by attractor network transition from chaotic dynamics to stabilized low dimensional neural activity. The results illustrate that reorganization of neural behavioral patterns during an intentional process could be engendered through both competitive mechanisms and inhibitory control of neural attractors. These mechanisms alter the dimensionality of coexisting chaotic attractors to more stable low dimensional manifolds as near limit cycle attractors, which give rise to the emergence of intention. The neural behavioral pattern transformation is accompanied by frequency modulation of neural oscillations, from beta to gamma frequency bands. The advent of a preparatory process of intention is a consequence of reflection of the above mentioned neurodynamcis in the LPFC into the pre-supplementary motor area (pre-SMA), by propagating conscious-related signals from subcortical areas to the LPFC. Considering the role of consciousness, the mentioned EEG-like simulation outputs from our model represent the presumed brain activities in the formation of intentionality during the volitional decision making process.

Keywords-Anterior Cingulate Cortex, Consciousness, Intentionality, Lateral Prefrontal Cortex, volitional Decision making

C-13 (Wed): Social Interaction Enhances Inter-Brain Synchrony

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.13] Brain networks, synchrony and scale

Abstract
Social interactions entail complex behaviors that are crucial for the health and well-being of the individual. However, the neural mechanism at the basis of social behaviors remains elusive in part because of the complexity of such interactions, but also because of the difficulty to monitor neural activity simultaneously across different brains in freely behaving subjects. For these reasons, we developed a custom-made miniaturized microscope, a miniscope, that, mounted on the head of the rodents, allows us to record the cortical activity of awake freely moving mice. Then, we used our miniscope on pairs of mice involved in a social interaction task. We found that social interaction modulates synchrony among homotopic cortical areas in two different frequency bands (slow and ultra-slow frequency bands). Moreover, while at the ultra-slow frequency band the synchronization was wide-spread across the cortex, at the slow frequency band synchronization was more prominent in the somatosensory and visual cortices. These results suggest that different areas of the cortex play different roles during social interaction and represent a clear target to investigate in diseases with compromised social interactions such as autism, schizophrenia, depression, and social anxiety disorder.

Keywords
social interaction, calcium imaging, cerebral cortex, synchrony, awake freely moving

C-13 (Wed): On the Evolution of Intentional Complexity

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.13] Brain networks, synchrony and scale

Abstract
In addition to perception, intentionality is a key aspect of consciousness in perhaps all animals. Intention is here considered to be the creation and projection by the brain of alternative future states, desired, avoided or feared. Such hypotheses could be constructed in attractor dynamics by extrapolation from past experience, controlling choices and directions of actions in the present. The projections are tested by actions performed in the environment and are evaluated and updated with sensory feedback. The operations of detecting, predicting, planning, acting and learning comprise the process of intentionality. Intentionality could hence be seen as an ancient trait in evolution, where initially the issue is the "desire " or "drive " to go from one state (in space) to another, for example to reach out for food in a certain direction of space. The organism may have an "intention " to change its current state to another state. This is facilitated by "place cells " in the hippocampus or homologues of vertebrates. Later evolved areas, such as the prefrontal cortex in conjunction with the hippocampus, also encode spatial states as different imagined time instants, going from the present state to a future state. Going from here to there is initially only a matter of geometric space, while eventually it can also include time, going from now to then. Hence, there may be an evolutionary transition from spatial to temporal intentions. The limbic system appears to be important for (spatial) intentionality in amphibians such as salamanders, and it likely also plays a role in mammals, including humans and other primates. However, the prefrontal cortex becomes increasingly important as the planning aspect of intentionality becomes dominant. Consciousness and cognition evolve through interaction with the environment, which involves both attention and intention. A great leap of consciousness must have happened with self-awareness and higher cognitive activities, including the emergence of language. That leap should also include an awareness of intentions, a sense of a free will. This more advanced aspect of consciousness is presumably experienced, or at least reflected on, by humans alone. It may lead to thoughts on moral behavior and sense of responsibility, which clearly is a human trait. In our project, we are interested in how intentions may lead to conscious decisions and subsequently to voluntary actions. For this purpose, we have developed computational models of various brain areas believed to be involved in decision-making and volition, where cognitive, emotional and temporal aspects are considered. Memory formation and preparatory processes of intention and decision-making are neural functions modeled with attractor dynamics. Computer simulations of the nonlinear dynamics of relevant brain areas, as well as of their complex interaction through feedback loops at various scales, are intended to complement experimental studies of humans and other species. By varying relevant parameters and structures, based on physiological and anatomical data, we explore and map causal relationships and pathways of signals in the neural process of volition. We will discuss these studies in light of the evolution of intention and the emergence of free will.

Keywords- Intentionality, Volition, Neurodynamics, Brain areas, Computational models, Evolution, Causality, Complexity

C-14 (Wed): Connections between Self-Reported Inner Speech, Theory-of-Mind, and Self-Awareness

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.16] Self-consciousness and metacognition

Abstract
Theory-of-Mind (ToM) refers to the ability to think about others' mental states such as thoughts, desires, intentions, emotions, etc. (Frith & Frith, 2003). It allows us to predict, and possibly control, others' behaviors and thus plays a crucial role in survival, cooperation, and deception. Self-awareness includes both self-reflection (positive curiosity about self) and selfrumination (repetitive negative thinking about self) (Trapnell & Campbell, 1999). Self-reflection is associated with better self-regulation, self-knowledge, and self-concept clarity (Morin, 2018); self-rumination is present during negative psychological states such as depression and anxiety (Mor & Winquist, 2002). Inner speech represents silent self-directed speech (Morin, 2012); it is involved in numerous cognitive functions such as self-regulation, problem-solving, thinking, imagined interactions, task-switching, and self-awareness (Morin et al., 2018). Various self-report measures exist to operationalize the above processes. In this study (n = 431), ToM was assessed using the TOMI:SR-A (Hutchins et al., 2020) and the Mentalization Scale (MENTs; Dimitrijeviv et al., 2018). Self-reflection/rumination were measured using the Self-Rumination Reflection questionnaire (SRR; Trapnell & Campbell, 1999) as well as the Self-reflection and Insight Scale (SRIS; Grant et al., 2002). Inner speech was quantified using the Self-Talk Scale (STS; Brintaupt et al., 2009), the General Inner Speech Questionnaire-Revised (GISQ-R; Racy et al., 2019), and the Inner Speech Scale (ISS; Siegrist, 2005). Various correlations, path analyses, regressions, and mediation analyses revealed the following key observations. (1) Both ToM and self-awareness (i.e., reflection, insight, rumination) recruit inner speech, supporting Morin's (2018) view of language being importantly related to various aspects of consciousness. (2) ToM is positively associated with self-reflection (and insight) but negatively so with self-rumination, in accord with (a) the Simulation View, which states that one needs to be aware of one's mental states before imagining the existence of similar states in others (Focquaert et al., 2008), and (b)The Self-Absorption Paradox, which suggests that being overly self-absorbed interferes with ToM (Joreman et al., 2002).

Keywords
Inner Speech, Theory of Mind (ToM), Self-Reflection, Self-Rumination, Self-Awareness, Simulation View, The Self-Absorption Paradox

C-14 (Wed): Making 'sense' of agency: the bodily self has a time and place

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.16] Self-consciousness and metacognition

Abstract
How does the brain distinguish between the signals it produces and the sensations it registers from the environment? To shed new light on this challenging question, we investigated if the human mind is capable of perceiving an avatar's body in a third person game as one's own. To create precise, high-quality motion simulations, we uniquely combined a Virtual Reality-setup (Valve Index) with real-time motion capture (Vicon). In doing so, we systematically explored if (predictions of) self-produced signals help the brain to recognise itself as well as discriminate the body by encoding its location. A full-body illusion paradigm (FBI) was developed in VR with three movement conditions: (A) a standard, passive FBI in which people had no motion control; (B) an active FBI in which they made simple voluntary movements; and (C) an immersive game in which they controlled a full-sized human avatar in third person (i.e., the first third person VR-game). Systematic comparisons between measures (implicit, explicit, exit-interview, and temporal binding) revealed a direct relationship between people's perceived (i) sense of agency, (ii) self- versus other identification, and (iii) ability to locate themselves. A loss in sense of agency was reported when movement was restricted, and people experienced a shift in both self-location and self-identification towards the virtual body. This did not happen when they were (to some extent) able to voluntarily move. Our results confirm that motor predictions are salient cues for the brain that not only provide a sense of control in self-actions, but also recognition of the self in time and place. It is shown that people can recognise their movements in a third-person avatar as well as (iv) psychologically aligning with it (i.e., agency in observation). But they do not seem to lose a sense of place (self-location), time (temporal binding), nor who they are (self vs other) in the process, because voluntary action seems to code the bodily self to a location in space. These results provide further evidence for our hypothesis (de Boer et al., 2020) and may shed light on how the bodily self is constructed. In the future, immersive game sims could help target and strengthen the brain's control networks in psychosis, neurodegeneration (e.g., dementia, movement disorders) and old age. In addition, real-time motion simulations can advance future rehabilitation techniques (e.g., to treat phantom limb pain and nervous system injury) by fine-tuning, personalising and/or augmenting the therapeutic setting on demand.

Keywords
Body-ownership, Bodily Self-consciousness, Embodied Cognition, Full-body Illusion, Immersive Gaming, Motion Capture, Out-of-body experience, Predictive Processing, Virtual Reality, Self-identification, Self-location, Self-Other processing, Sense of Agency, Temporal Binding.

C-14 (Wed): Validity and Reliability of Inner Speech, Theory-of-Mind, and Self-Awareness Questionnaires

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.16] Self-consciousness and metacognition

Abstract
Theory-of-Mind refers to the ability to think about others' mental states such as thoughts, desires, intentions, emotions, etc. (Frith & Frith, 2003). Self-awareness includes both self-reflection (positive curiosity about self) and self-rumination (repetitive negative thinking about self) (Trapnell & Campbell, 1999). Inner speech represents silent self-directed speech (Morin, 2012). Various self-report measures exist to operationalize the above processes. In this study (n= 431), ToM was assessed using the TOMI:SR-A (Hutchins et al., 2020) and the Mentalization Scale (MENTs; Dimitrijeviv et al., 2018). Self-reflection and self-rumination were measured using the Self-Rumination Reflection questionnaire (SRR; Trapnell & Campbell, 1999), as well as the Self-reflection and Insight Scale (SRIS; Grant et al., 2002). Inner speech was quantified using the Self-Talk Scale (STS; Brintaupt et al., 2009), the General Inner Speech Questionnaire-Revised (GISQ-R; Racy et al., 2019), and the Inner Speech Scale (ISS; Siegrist, 2005). Various correlations revealed the following key observations. (1) ToM measures correlate together, and (2) inner speech measures correlate together—both observations suggesting that the respective measures exhibit good validity. (3) Self-reflection and self-rumination represent opposite and incompatible self-focus tendencies and thus are negatively related to one another. Additional psychometric qualities of the novel GISQ-R are provided. These results expand on initial findings by Racy et al. (2022) and Uttl et al. (2011).

Keywords
Inner Speech, Theory-of-Mind, Self Reflection, Self Rumination, Questionnaires

C-14 (Wed): Exploring the clinical utility of choice blindness: Generalization of effects and necessity of deception

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.16] Self-consciousness and metacognition

Abstract
Choice blindness (CB)—failing to detect that one's selected choice has been replaced by an alternative—can change attitudes with little resistance. CB has been demonstrated in consumer, financial, political, and even moral domains. This paradigm is promising for clinical settings since maladaptive beliefs contribute to psychopathology. In this proof-of-concept study, we explored its clinical utility by testing whether CB could reduce maladaptive beliefs (experiential avoidance) and whether these effects generalized to improve well-being (depression and life satisfaction). Since deception is rarely seen as ethical in clinical contexts, we also tested its necessity to the effectiveness of the intervention. In this pre-registered study, 147 students completed baseline questionnaires, including measures of experiential avoidance, depression, and life satisfaction. They were then randomly assigned to one of three conditions in which they were asked to explain their answers to three experiential avoidance items. In the control condition, participants viewed and explained their original answers. In the deceptive CB condition, participants viewed and explained answers that were manipulated to show less agreement with the experiential avoidance items; the new answers indicated that participants viewed themselves as engaging in less avoidance. In the non-deceptive CB condition, participants viewed both their original and modified answers. They were instructed to explain the modified answers as if they had provided those answers all along. Finally, participants completed the questionnaires again one week later. Most participants (80%) did not notice the CB manipulation. Both the deceptive and non-deceptive CB conditions reduced experiential avoidance on the manipulated items at follow-up, but these results did not generalize to the other outcomes. Extrapolating from our results, two mechanisms may be responsible for the attitude changes: one due to the belief that the false feedback is one's own (choice-induced preference change) and one due to the process of explaining the feedback (confabulation). Overall, our results showed that CB can change specific maladaptive beliefs and that using a non-deceptive version of the paradigm can produce similarly positive changes. These promising results suggest that clinical outcomes may be useful targets for CB interventions.

Keywords
choice blindness, confabulation, attitude change, experiential avoidance

C-14 (Wed): Frame by frame? A minimal time consciousness model.

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.17] Temporal consciousness

Abstract
Years of research from cognitive science, along with advances from robotics and dynamical systems, have been able to provide comprehensive insights on how, some particular types of systems, give raise to a cognitive identity endowed with an intrinsic perspective, autonomous behavior and the capacity to make relevant distinctions from the world they inhabit. None of this, however, has been able to fundamentally link cognition with the origin of consciousness, to explain the missing step from cognitive, to conscious beings; It is as the stage was set, but on a huge, empty theatre. The core of the problem seems to be that, while all the afore mentioned properties can be formally characterized by our current scientific knowledge in syntactic, algorithmic terms, any form of sentience remains elusive to such descriptions. What has led to variated positions, ranging from reductionist attempts, to contemporary re-introductions of classic ideas, like dualism, or panpsychism. Across many of these approaches, a recurrent (although not always conspicuous) topic, is the relation between consciousness and time; and, more specifically, the idea that for a conscious observer to 'be there', a fundamental temporal experience is necessary. Notions like time consciousness, intrinsic normativity, or temporal thickness, along with several others, rather than to invoke temporality merely as an underlying feature, actually relate (more or less explicitly) the origin of meaningful phenomenological experience to a richer, wider —or at least different— concept of present, than the one we understand as physical present (being this the topic of another conundrum on its own right). It is somehow curious, in this sense, how current formal models, even those about hypothetical minimal, or primal forms of consciousness tend to omit this component and to focus on state-based correlations over idealized punctual time-frames. To our view, in order to avoid the constraints imposed by static bindings, a dynamical approach on fluid, continuous change (as opposed to 'frozen' states) may result fruitful, by helping to develop a framework that formally relates the physical flow of time with the perceptual experience of it. To this end, we have developed a minimal model using cellular automata, on which physical, cognitive and sentience time flows heterogeneously overlay. While physical time flow is modeled as differential continuous time, as customary; cognitive and sentience time flows are not considered to be always strictly and equally granulated (as a fixed 'ticking' process), but having a more liquid-like emergent nature. Simulations seem to show that different times can coherently coexist in different levels, where distinguishable fluctuations (expansions or contractions) of lapses are exclusive, according to the nature of the hypothetical substrate.

Keywords
Time consciousness, temporal experience, minimal artificial models

C-15 (Wed): Non-equilibrium Quantum Field Theory in a Hierarchy: Towards Manipulating Holograms in Quantum Brain Dynamics

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.02] Quantum field approaches

Abstract
We describe non-equilibrium ϕ^4 theory in a hierarchical manner in order to develop a method for manipulating coherent fields as a toy model of introducing control into Quantum Field Theory (QFT) of the brain, which is called Quantum Brain Dynamics (QBD) involving quantum degrees of freedom represented by water electric dipole fields and photon fields. We begin with the Lagrangian density of ϕ^4 model and derive the Klein--Gordon equation (time-evolution equation) of coherent fields with a damping term as an input--output equation proposed in areas of morphological computation or reservoir computing. Our analysis is extended to QFT in a hierarchy representing multiple layers covering cortex in a brain. We find that the desired target function is achieved via time-evolution in the Klein--Gordon Eqs. in a hierarchy of numerical simulations when a signal in both the input and output prevails over noise in the intermediate layers. Our approach will be applied to control coherent fields in the systems (in a hierarchy) described in the QFT framework, with potential applications allowing to manipulate quantum fields, especially holograms in QBD, memory and our subjective experiences.

Keywords
Quantum Brain Dynamics, Quantum Field Theory, Coherence, Holography, Reservoir Computing

C-15 (Wed): Electromagnetic field (EMFs) theories of consciousness: experimental evidence.

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.02] Quantum field approaches

Abstract
Electromagnetic field (EMFs) theories of consciousness stipulate that the brain is sensitive to the EMFs it generates. However, the EMFs produced by the processing of a stimulus are very weak and of extremely low frequencies (vwEMFelf). Nevertheless, two previous works suggest that the brain could actually be sensitive to such vwEMelf. Indeed, they show that it could be sensitive to those produced by others when they are close enough. They report that the event-related brain potentials (ERPs) evoked by presenting a picture to a participant can be modulated by simultaneously and privately presenting a picture to a partner sitting next to the participant. A reprocessing of the data of these works showed that these modulations mostly originate from two particular experimental conditions. A new experiment was thus run only in those conditions to obtain simple and robust effects. ERPs evoked by presenting, at each trial, the photograph of a face, were recorded. Simultaneously and, again, privately, we presented the same or a different face photograph to the partner who was in an adjacent room. The ERPs of these partner-participants (n=25) were found to depend on the sameness of the two photographs ($p < 0.001$), completely unbeknownst to them. The amplitude of one of the neural correlates of consciousness, the late posterior potential (LPP), was larger when the photographs were the same. This suggests that the perception of the stimulus was richer and/or more vivid than when stimuli differed. These findings could thus reveal a mechanism by which our brain can learn to produce perceptions that are similar to those produced by others in front of the same stimulus.

Keywords
Brain sensitivity to stimulus processing by others EEG Event-related brain potentials (ERPs) Neural correlates of consciousness (NCCs) Late posterior positivity (LPP) Hyperscanning

C-15 (Wed): Perception of Time's Passage in Quantum Consciousness Theories

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.03] Space, time and the nature of reality

Abstract
Passage of time is a challenging issue in physics and consciousness studies. Although the difference between psychological time and physical time was on debate, there is an unsolved problem that how mind perceives time and its flow. As an important approach, Stapp's theory try to explain the subjective time's passage experience, based on psychological models of James. This explanation is constructed on the notion of referring to discrete pictures in memory in a temporal order, and on the clarity of pictures that is a reverse function of time distance from current state. We argue that any type of inference from a set of discrete pictures in a physical order cannot give the mind the ability to perceive time flow, except if the mind has the ability beforehand. In other words, in discrete view, the mind –in both senses of non-neural and computational entity, at best will infer that there is an order for these pictures that are encoded with the parameter of time. However, it is impossible to infer that the mentioned order has the meaning of time order, and leads to subjective experience of being in time and time's passage. We propose that to perceive that a picture is prior to another requires a subjective perception of time's passage, and a theory based on priority is not explanatory for the perception of time's passage. It seems that the concept of priority does not entail this subjective perception. We are also going to argue that principally, any quantum consciousness theory that is based on the discreteness of consciousness or discrete mental facts leading to consciousness, faces a challenge in explaining time perception and perception of time's flow. Although the existing explanation of Orch-OR theory is based on James's approach, we will discuss the possibility of emergence of time perception, with supposing that there is a special relation between the emergence of continuous consciousness from orchestrated flow of discrete proto-conscious entities. On the other hand, in Avicenna-Bohm theory, mind and consciousness are non-temporal entities, and time perception is a subjective fact created by interaction with the temporal physical world. In this theory, mind will perceive time through extended Bohmian QM equations, in a top-down natural relation, with open and limited interval of space-time in brain matter that is ongoing in time –here, we will adopt a special interpretation of the physical passage of time according to the discussion of the nonlocal wave function reduction and Tangherlini transformation, compatible with the spacelike supersurface of standard cosmology and, of course, different from Einstein's special interpretation of special relativity. To conclude, two innate properties of the interaction between mind and brain leads to a different and precise explanation of passage of time: (1) Non-local interaction of mind with a space-time pack that leads to subjective perception of being in time, and (2) Continuous change in the pack in the dimension of time that leads to perception of time flow, dependent to and succedent from the previous perception.

Keywords
Time Perception, Quantum Consciousness

C-15 (Wed): Experimental Geometrical Musical Language (GML) Nested Clock Universes, the Definition of Bindu and the Philosophical Similarities to One That Arises From Simulation

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.05] Emergence, nonlinear dynamics and complexity

Abstract
Geometric Musical Language (GML) was first developed by Anirban Bandyopadhyay et al. (2018) to describe nested periodic clock interactions observed experimentally within microtubules and protein assemblies. GML is hereby demonstrated to provide the basis of a universal framework to create simulated n-dimensional universes. Such dynamic nested clock GML universes can be created as simulations within a GPU-accelerated computing platform to provide 2D or 3D real-time visualisations, allowing observation of the complex nested clock architecture interactions. OpenGML demonstrates emergent behaviours revealing underlying connectivity and provides new methods for computational analysis. The open source OpenGML software platform developed will allow for collaborative experimentation. The OpenGML universe can be extended to encode video, images, audio, or other quantitative based data (such as from sensors) into representations which contain and reveal detail of the underlying connected geometries and periodicities. GML also allows projection of higher dimensional structures back into simpler lower dimensional forms, for example via sonification. In creating a GML universe it quickly becomes immediately apparent that the universal observation point is very important. This forms what has been termed the Bindu or centre of the universe and is always the very first point defined when creating such universes. The Bindu is the point from which all other clocks, geometries and points are nested. Is the Bindu the ultimate observer of its own universe? The flow of time in a GML universe applies at all nested clock levels and is exerted as the flow of singularity points around many clocks. The Bindu being a pure singularity is an exception, and as such it is exists external to time. Within the GML universe, all clocks and singularity points on those clocks are a nested feature of Bindu, so the GML universe has inherent connectivity seeded from the Bindu, a singularity point or 'One', a universal consciousness. The simulated GML universe has rules that parallel with the ideology of pantheism where all in the universe is inherently connected with the higher instance of itself. The simulated GML universe is non-material in that all points within the universe are constructed only of nested singularities with no requirement for matter. In such a universe, flow of information is inherent by interconnection. The GML universe is fractal. It is neither an open universe nor a closed universe, GML defines instead an eternal interconnected universe. It would be possible for GML to define a layer in the fabric of reality in a similar way postulated of the quantum world. Is it that such a base layer fabric of reality, over and above which time and space become emergent layers? The process of taking an abstract geometric, mathematical, and oscillatory language (GML) applying that to the experimental creation of simulated computer-generated universes (using OpenGML), yields insights beyond just mathematics and physics by creating a new framework for philosophical discussion whilst creating software having application to future AI and bio-interfaces.

Keywords

GML, geometry, resonance, clock architecture, simulation, AI, One, Pantheism, Bindu, Universal Consciousness

C-15 (Wed): Non-local correlation deviations of randomness as traces of critical consciousness-state changes.

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.05] Emergence, nonlinear dynamics and complexity

Abstract
In this presentation, we discuss our work under progress in the framework of our project presented initially at '2022 The Science of Consciousness Conference' in Tucson. We describe our novel technique, based on pair-correlations, that was developed by our team and discuss the newly acquired data coming from two classes of organizational-closure dynamics at critical points. In standard system theory, an 'organizational closure' is conceived as an organism or a superorganism of entities, that exhibit coherent collective states, and as such it has dynamic boundaries along with its inputs and outputs. In that sense, an individual or a group of individuals forming an organizational-closure can be analysed as classes of autopoietic systems (in the sense of H.R. Maturana and F. Varela) or classes of complex systems under constrains (in the sense of S. Kaufmann). So, here, we focus our studies in the critical dynamics of two classes of such systems. The first class is the formation and dissolution of a coherent and collective state of `group consciousness' during meaningful common activities. The second class is the rapture of consciousness of an individual during the end of life and the eventual death process, monitored in the Intensive Care Units (ICUs) of a collaborating university hospital. Our novel technique enables the study of non-local correlates in the traces of paired random event generators that emerge during these uniquely critical phases. Indeed, the data acquired so far provide important supporting clues and potential strong evidence for the non-local nature of anomalous influences that emerge during these distinct and critical consciousness-state changes. By construction, these random event generator pairs are devices, based on inherent quantum-tunnelling in diodes shielded from any other environmental influences. Therefore, the data acquired can be used as a testing ground of theories and hypotheses that support the fundamental quantum-informational nature of consciousness. In the light of these data we discuss the "Orchestrated objective reduction " (Orch OR) theory of Hameroff & Penrose, the "Quantum-informational panpsychist theory " of d'Ariano & Faggin, and the "Quantum Aspects of the Brain-Mind Relationship " hypothesis of Kauffman & Radin. We also elaborate on a possible synthesis of these three main candidates as an explanatory framework. Furthermore, we pose questions and propose observations and studies for the next steps toward further studies of specific models, relevant to our datasets, and our future work. Could, indeed, panpsychism be put to an experimental testing?

Keywords

Non-local correlations, deviations from randomness, panpsychism, complex systems, organizational closure.

C-16 (Wed): A disquieting muse: zombies and philosophy

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.16] Miscellaneous

Abstract
In philosophy of mind, the term 'zombies' usually refers to creatures which are physically and behaviorally like us, but that lack conscious experiences (Chalmers, 1996; Kirk 2005). These zombies are just like us, behave just like us, and seem to feel emotions like us, but they actually have no mental life: if we look inside their heads, there is nobody home. Philosophical zombies are a kind of sophisticated mental experiment designed to illuminate some of the core problems of philosophy of mind, like the subjective character of consciousness, the hard problem, the plausibility of physicalism, and so on. Compared to such noble cousins, that challenge the philosophers on some of the most fundamental questions, what could Romero's zombies and zombies in popular culture possibly tell us, these half-rotted, bestial, dumb creatures, which are so different from us? Actually, I would like to show that non-philosophical zombies, too, these repulsive, often ridiculous or simply miserable creatures, can be useful to philosophy. Their vacant eyes, their decomposing bodies, their slow and clumsy pace, and their blind minds, can make us wonder about fundamental questions of philosophy. In other words, zombies can be muses, figures that can inspire crucial philosophical questions, but they are disquieting muses indeed because there is no doubt that zombies are frightening. In this presentation I will investigate the reasons that make the zombie so scary, focusing on the typical perturbation evoked by this character which, as I will show, can be examined as a peculiar subspecies of the uncanny. As it is generally acknowledged, Freud (1919), starting from the linguistic analysis of the term Unheimliche, identifies two main semantics of the uncanny: on one hand, the uncanny means that which is stranger and familiar at the same time, and on the other, it is the revelation of what is concealed and hidden. In this paper, I will argue that the zombie has to do with both these sources of the uncanny (Coulombe 2012, Greene 2010, Larkin 2010) and that for this reason, it can act as a threshold, representing the human condition's limits: the limits outside us, i.e. the limits of sociality, culture and civilization, and the limits inside us, the limits of life, consciousness, identity, and humanity. References Chalmers D. (1996), The Conscious Mind, Oxford University Press, Oxford. Coulombe M. (2012), Petite philosophie du zombie, ou comment penser par l'horreur, Puf, Paris. Freud S. (1919), «Das Unheimliche», in Imago, vol. 5 (5-6), pp. 297-394, 1919 (The Uncanny, Penguin Classics, 2003). Greene R. (2010), The Badness of Undeath, in Greene, R., Mohammad K.S. (eds), Zombies, Vampires and Philosophy, Open Court, Chicago and La Salle, Illinois. Kirk R. (2005), Zombies and Consciousness, Oxford University Press, Oxford 2005. Larkin W.S. (2010), Res corporealis: persons, bodies and zombies, in Green, R., Mohammad K.S. (eds), Zombies, Vampires and Philosophy, Open Court, Chicago and La Salle, Illinois.

Keywords
zombies, George Romero, popular culture, human condition, uncanny

C-16 (Wed): Reconsidering the "Memory Argument " for Reflexive Awareness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.16] Miscellaneous

Abstract
Higher-order and self-representational theories of consciousness presuppose a basic intuition about consciousness, known variously as the Transitivity Principle or Awareness Principle: For any mental state M of a subject S, M is conscious only if S is aware of being in M. While advocates of the principle often take its truth to be intuitively self-evident, Uriah Kriegel has positively defended the Awareness Principle by revising an argument offered by the 5th century Indian Buddhist philosopher Dignāga. Known as the "Memory Argument ", it roughly claims that: You can episodically remember some event only if you were aware of it at the time of its occurrence; in addition to episodically remembering some consciously experienced object, it is possible to remember your conscious experience of that object; therefore, you must have been aware of your conscious experience at the time of its occurrence. Dignāga additionally argues that the awareness of the conscious state could not be due to some other mental state, on pain of infinite regress; so, the conscious state must have been reflexively aware of itself. In response, I argue that these arguments may fail to convince someone committed to the phenomenal transparency of experience, or a higher-order theory of consciousness. I further propose that the Memory Argument can be undercut once we consider the role of attention within episodic memory. In short, my suggestion is that we can demystify the Awareness Principle and reflexive awareness by showing them to be symptoms of attentional activity and phenomenology.

Keywords
Awareness Principle, Memory, Attention, Reflexive Awareness, Buddhist Philosophy

C-16 (Wed): Are real and virtual experiences indistinguishable? Disembodied brain in a vat vs embodied brain in a world

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[05.11] Virtual reality

Abstract
Today, we are in the era of virtual reality and metaverse which has severely challenged philosophers and scientists' views of the nature of reality alongside the relationship between the mind and brain. For example, David Chalmers in his latest book "Reality+: Virtual Worlds and the Problems of Philosophy " discusses around his central thesis that "virtual reality is genuine reality " and refers to metaverse and the movie "The Matrix " as applications of this thesis. Thus, a virtual and simulated world can be indistinguishable from reality. This hypothesis can be found in the brain in the vat (BIV) thought experiment in which a disembodied brain in a vat in a simulated reality can have the same exact conscious experiences as an embodied brain in our world. Are experiences in a BIV (disembodied) equivalent to a non-BIV (embodied)? Are virtual and simulated realities indiscernible to genuine realities? In this presentation we will discuss the arguments stated against the BIV hypothesis: Firstly, embodied cognition and secondly, externalism. Both viewpoints and arguments put emphasis on the partial dependence that environmental and contextual factors have on our conscious experiences which makes the body and brain inseparable. Embodied cognition is the idea that the body or the body's interactions with the environment constitute or contribute to cognition, in contrast to classical cognition which states that mental processes are computational processes. In other words, bodies play a constitutive role in cognition, not merely a casual one (1). On the other hand, externalism argues that our conscious experiences at the meaning or content of a thought is partly determined by the environment (2) and depends on what happens outside the subject. With these two arguments, we suggest that real subjective experiences are not constructed by the brain's complexity alone and the neuronal system apart from the body. Instead, consciousness is constructed by the brain and body complexities together, aside the neurophysiological connections between them and their interactions with the external world. To put it in another way, part of reality and meaning are derived by direct physical experience that come from the interaction of our bodies with its environment which cannot be reduced to information and symbolic and encoded representations. In conclusion, virtual reality, BIV and other similar models cannot provide a conscious reality which is indistinguishable from genuine reality, because a disembodied brain cannot produce the same conscious experiences as an embodied brain. In result, we propose that we move our approach in artificial intelligence towards systems and machines that have the best ability to replicate our embodied brains and our interactions with our world and environment, e.g., biological machines.

Keywords-virtual reality, embodiment, consciousness, externalism, brain in a vat, conscious experiences.

C-16 (Wed): Consciousness and Cognition, Embodiment and Virtual Reality

Denise Doyle
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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[05.11] Virtual reality

Abstract
There are cognitive neuroscience research labs around the world who are focusing on the question of body ownership in virtual space (Petkova & Ehrsson 2008; Spanlang et al 2014;), although the work of research Mel Slater and Mavi Sanchez-Vives is of particular interest in this context. Their research focuses on understanding the impact of body ownership on changes in social attitudes such as reducing implicit racial bias (Banakou et al 2020) or the concept of presence in virtual reality (Slater 2009). In an article Slater argues that virtual reality can generate illusions that are not possible with other media. Working with Sanchez-Vives, Slater explains that their interest in working with VR goes beyond that of simply recreating the illusion of space and: 'has focused on using VR to transform the self'. (Slater & Sanchez-Vives 2016). In Nerves of Data: the neurological turn in/against networked media (2011) Anna Munster has reservations about the 'turn' towards neuroscience as a way of explaining a person's response to media stimuli. Arguing for an approach that is more in keeping with the materialities that neuroscience now assigns to the brain, that of plasticity and dynamism, Munster argues that fMRI images need to maintain their dynamism and their connection to the very virtualities that they ascribe to (Munster 2011: 18). David Chalmers has recently focused his attention on the philosophical challenges of virtual worlds in his book Reality+: Virtual Worlds and the Problems of Philosophy (2022). Chalmers positions his study within what he terms Technophilosophy, a two-way interaction between philosophy and technology (Chalmers 2022: xviii). Whilst he agrees with Slater in asserting that VR creates a 'visceral sense of place, plausibility, and embodiment' Chalmers claims that rather than this being an illusion, VR devices should be more appropriately called 'reality machines' as they in fact involve non-illusory perceptions of real virtual reality (Chalmers 2022: 205-6). Philippe Bertrand, a member of BeAnotherLab, an interdisciplinary art collective whose work focuses on Empathy VR, notes a number of 'disciplines have investigated the interconnected empathic abilities behind the proverb "to walk a mile in someone else's shoes " to determine how the presence, and absence, of empathy-related phenomena affect prosocial behavior and intergroup relations' (Bertrand et al 2018). The underlying conceptual logic of their approach is that through a better understanding of embodied cognition we can enable others to have a greater experience of empathy. Gaining recognition for their 'embodiment system' the Machine to Be Another, the collective described it as 'designed to address the relation between identity and empathy. The project merges performances with protocols of neuroscience experiments, [and] offer users an immersive experience of seeing themselves in the body of another person (Bertrand et al 2014), and 'allows users to see themselves in the body of real human beings (captured by video) instead of using computer generated images' (Bertrand, 2019: npag). This paper analyses conceptual and interdisciplinary approaches in the arts and the sciences in understanding embodied cognition, digital embodiment, and its future potentials.

Keywords-Virtual Embodiment, Virtual Reality, Body Ownership, BeAnotherLab, Art and Science, Embodied Cognition, Empathy VR, Chalmers, Slater and Sanchez-Vives

C-16 (Wed): Summer School "Consciousness and Cognition ": an integrated multidisciplinary approach of the University of Pisa between Western and Eastern traditions

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Categories by Discipline-6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy-[06.10] Education

Abstract

The dominant view in Western sciences (Neurosciences in primis) about consciousness is that it would be nothing more than the observable effect of neural processes arising in the brain and that it is (or will be, in the future) entirely reducible to these latter. However, this reduction process is far from complete, and it is not entirely clear whether anyone knows exactly how to complete it. In this condition it would be more correct to consider reductionism one of the possible hypotheses and not the only acceptable truth from a scientific point of view. This is a sine qua non to progress in the search for Consciousness and when exploring all possible solutions capable of overcoming the still unsolved problems. At the University of Pisa, in collaboration with the Lama Tzong Khapa Institute (the largest study center of Mahayana Buddhism in the West, located 35 km from Pisa), we have developed an original program titled "Consciousness and Cognition " and now starting its fourth edition. The aim of the Summer School is to bring students to face the challenge represented by the scientific study of consciousness based on objective measurements, while remaining aware of the irreplaceability of first-person analysis to progress towards a complete understanding of the phenomenon. Within this general goal, the program aims to keep the attention and curiosity of the students open to all aspects of the enigma of consciousness, overcoming the limits imposed by the dominant reductionist vision. The program is structured in 6 theoretical modules (total 48 h) and 1 experiential module (15 h). In the following, the aim of each module is explained. • (Philosophy): An exploration of an overlooked dimension of consciousness within the ongoing debate in mind is offered through a progression into insights drawn from Western phenomenological approaches and Eastern traditions and practices, such as yoga and meditation. • (Neurosciences): After a description of brain neural networks, and a review of the main techniques for investigating brain activity, students are confronted with how this activity is modified within non-ordinary states of consciousness self-induced by natural drugs, hypnosis, dreams and meditation. • (Quantum Mechanics): the basic principles of quantum mechanics are tackled in order to comprehend the subtler issues connected with the interpretation of the theory and their possible relevance for a discussion of consciousness and of the mind-body problem; • (Artificial Intelligence): concepts and models of nature inspired by computational techniques, and their application areas, are examined, allowing students to be exposed to the advantages, challenges and limits of using computationally intelligent systems; • (Biosemiotics): basics of Biosemiotics, becoming acquainted with the semiotic nature of sign relationships in biological systems, understanding how cells act as semiotic units capable of interpreting their own environment. • (Contemplative Practices): the role of first-person analysis in the investigation on Consciousness and the importance of contemplative practices as an irreplaceable tool of investigation of different levels and dimensions of Consciousness; • (Practice): becoming familiar with the experiential aspects of contemplative practices, through Meditation and Yoga sessions led by highly qualified teachers.

Keywords-Multidisciplinary, First person and third person approach, phenomenology, quantum physics, artificial intelligence, biosemiotics, experiential practices

C-17 (Thur): Nyāya on Perception and Illusion in Relation to the Debate over Disjunctivism

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
This talk aims to bring work from Analytic philosophy of perception into contact with Indian philosophy of perception. First, I present Bence Nanay's recent challenges to disjunctivism about perception from amodal completion illusions. Second, I present Alex Byrne and Ricardo Manzotti's work from "Hallucination and its Objects. " I argue that analytic forms of disjunctivism, such as offered by McDowell in Mind and World, fall victim to Nanay's objections. I argue that the Nyāya multi-factor-causal disjunctivism theory of perception and their misplacement theory of illusion can handle the objections. In addition, this theory can enter the debate discussed by Byrne and Manzotti on the objects of hallucination, since Nyāya has alternative account of what the distinction between an illusion and a hallucination is. The main reason why Nyāya is relevant in all of these cases is that on their view there is a distinction to be drawn between perception, non-perception, and illusion / hallucination. Not every visual presentation is either veridical or non-veridical. Some in fact are visual presentations that are non-perceptions because some necessary condition on proper perception is not satisfied. The Nyāya version of disjunctivisim is not based on truth alone. Rather, it is based on causal factors that pertain both to positive and negative causal relations between the subject of perception and the object(s) and property(ies) in perception. Finally, I move on to discuss how Nanay's account of the distinction between representationalism vs. relationalism and Byrne and Manzotti's work on hallucination and its objects can be used to restructure the debate between Buddhists and Nayayikas about perception. I close by pointing to new directions for future cross-traditional research on perception and illusion between Analytic and Indian philosophy.

Keywords
Disjunctivism, Illusion, Nanay, Nyāya, McDowell, Byrne, Manzotti

C-17 (Thur): What do recurrent processing theories predict about infant consciousness?

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
The recurrent processing theory of consciousness (RPT) holds that certain localized recurrent processes in sensory areas are necessary and sufficient (given some background conditions) for phenomenal consciousness. RPT predicts that infants have conscious vision if and only if they have the relevant recurrent processes in their visual cortex. Recently, researchers have found evidence that infants under seven-month age are immune to object substitution masking (OSM). OSM is frequently used as a test for recurrent processing, so immunity to OSM may suggest absence of relevant recurrent processing. In addition, anatomical evidence from infant brain development suggests that recurrent processing is immature until six-month age. If infants lack relevant recurrent processing in visual areas, RPT predicts that they lack visual consciousness. We discuss three interpretations of these findings. The first interpretation is that infants lack relevant recurrent processing and therefore lack visual consciousness. Second, infants lack relevant recurrent processing but are nevertheless visually conscious, suggesting that RPT is incorrect. Third, infants have some recurrent processing that is consistent with immunity to OSM. For example, there may be two sorts of recurrent processes: one that is required for visual consciousness and another that is required for visual masking. We argue that the first interpretation is implausible and that RPT theorists should embrace a version of the third interpretation. This interpretation suggests that the connection between OSM and recurrent processes is weaker than many have thought, and that early immature states of visual consciousness might have a different structure than later states.

Keywords
recurrent processing theories; infant consciousness; visual consciousness; object substitution masking; development of consciousness

C-17 (Thur): The Methodological Puzzle and the Prospects for a Theory of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.10] Epistemology and philosophy of science

Abstract
Ned Block has argued that the empirical project of determining the neural basis for conscious experience faces a peculiar challenge: how do we distinguish the neural basis for cognitive access to experience from the neural basis of experience itself? Paradigmatic cases of experience are those that are cognitively accessed, and to tell whether a given neural state is the basis for a conscious states, we need to know whether it is relevantly similar to the paradigm cases. But if the paradigms all involve the machinery of cognitive access, is there any independent way to figure out whether neural states need to resemble the paradigms in this respect to count as conscious? Block argued that the problem can be overcome using inference to the best explanation. I raise some problems for Block's solution to the puzzle, and then argue in a different way that in fact there is no distinctive problem here. The methodological puzzle is really just an instance of a general problem that can always arises when we try to figure out the underlying physical basis for a manifest kind, and it is a problem that we know how to solve. I also discuss whether the puzzle is really just a manifestation of the explanatory gap and argue that we can solve the puzzle in a way that sidesteps the explanatory gap.

Keywords
Methodological puzzle, Neural basis of consciousness, Epistemology for the science of consciousness, Explanatory Gap.

C-17 (Thur):Attention and the Spatial Phenomenology of Auditory Experience

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
According to the positive accounts of the spatiality of auditory experience, we hear sounds as occupying space. We hear sounds as coming from a certain distance, having extension, or from the direction of the left or right, and so forth. On the contrary, the skepticism regarding the spatiality of auditory experience argues that our auditory experience is essentially non-spatial. According to P.F. Strawson and Mathew Nudds, it is part of computation or cognition that we hear sounds as having spatial properties based on the non-spatial properties, that is, the spatial character of auditory experience is understood by the spatial properties of sound sources in relation to the perceiver, not by the spatial property of sounds or auditory experience itself. An extreme line of such skepticism argues that spatial properties are not represented in our auditory experience, but rather, the apparent spatial properties manifest in our experiences are to be understood as mere mental phenomena like illusions of location or duration. In reply to such skepticism, Casey O'Callaghan and Keith Wilson elaborate on how spatial phenomenology is indicative of the representation of spatial properties in our auditory experience. In this paper, I argue for the significance of selective attention in resolving the issues regarding the location of sounds. This is based on the observation that mere spatial phenomenology is not sufficient to establish the nature and scope of the representation of spatial properties in auditory experiences. First, further processing is often required in terms of locating indeterminate or complex auditory experiences: complex auditory experiences require one to distinguish sounds in order to locate them, as in the case of distinguishing small and close sounds from large and distant sounds, the location of distinct instruments in an orchestra, and so forth. Second, in reverberative illusions, where a time parameter of sound reverberation creates a spatial effect without actually causing a corresponding reflection in the space, subjects often initiate conscious attention to locate where the reverberation is. Third, aspect perception is the essential part of hearing or audition, where aspect perception is understood as an attentional phenomenon. After exploring how attentional features of auditory experience are deeply tied to the spatial phenomenology of auditory experience, I point out its theoretical implication in the nature and object of auditory experience. Granted O'Callaghan's claim that audition grounds locational beliefs, I focus on how attentional features can affect the veridicality and legitimacy of spatial phenomenology in terms of grounding locational beliefs.

Keywords
Spatial Perception, Phenomenology, Auditory perception, Sound

C-17 (Thur):Perceptual experience and its objects

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
What is the nature of the entities that we consciously perceive and represent perceptually, and what is the nature of the attribution of sensory properties to such entities? In particular, given that perception is effected by a number of sense modalities each with very different characteristics, how are we to understand the relationship between the entities represented perceptually and the contribution of the modality or modalities involved in the perception of these items? One such relationship concerns the kinds of entities we can perceive through individual sense modalities, how they vary, and how the contributions made by different modalities are related to one another. Various possibilities for such entities have been explored, including (but not limited to) material bodies, events, and mereological complexes. The ultimate goal is to understand how it is possible that, and the extent to which, multiple sense modalities can work together to construct multisensory objects and events, which we can see, touch, smell, hear, and taste. Thus, it is timely to explore the relation between those processes that are unisensory and those that are multisensory as well as the role that perceptual objects play as loci of unification in unimodal and multimodal perception. This paper presents a recent work in the interdisciplinary study of perception (Mroczko-Wąsowicz & Grush (Eds.) 2023. Sensory Individuals: Unimodal and Multimodal Perspectives. OUP). Blending theoretical and empirical investigations on the origin and nature of object perception and the involved interactions between different sense modalities, new and exciting ideas have been developed concerning what exactly is it that is perceived and how we perceive it.

Keywords
perceptual objects, sensory properties, object perception, object concept, sense modalities, unimodal perception, multimodal perception, multisensory integration, binding

C-18 (Thur):Intrasubjectivity: Recognizing All the Faces of the Self

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
A more common term linked to the idea of the second-person perspective (Depraz, 2012; Varela, 1996) is intersubjectivity. Intra-subjectivity, however, starts with the premise that there are subjects within each individual that also need to be understood as separate entities-despite being contained in the same corporeal being. Through mindfulness and intentionality, the intrasubjective being can be better understood and leveraged in different situations of shared human experience(s). When viewing the self as a loosely coupled system in which the parts can be intentionally called upon-if not relied upon-to be present within necessary situations, we can become conscious of a greater potential to be in the moment with the right skillsets, mindsets, thoughts, and behaviors to add value to that given situation. Whether it is a practical application of emotional intelligence, a insightful application of silence, or a intervening aspect of experience, knowledge, or creativity, being mindful of one's personal intrasubjectivity provides the advantage of pulling the parts together (coupled for the situation) to augment the capacity to handle the situation. Then, when the situation shifts, the loosely coupled components can separate and return to a normal dormant state. If we seek for authenticity, we must conclude that being an authentic self includes many facets of the same being. This is especially true when interacting with social entities, within social constructs, and within social settings. The intersubjective approach to subject-to-subject has benefits of understanding, empathy, and even personal growth, but we must step back, understand, and have empathy for the self that is experiencing the growth. This will help categorize and compartmentalize the development of the self in identifiable-and accessible-places within our respective emotional, behavioral, and cognitive makeup. In the journey to create a complete self, the intrajubjective being cannot (will not) haphazardly collect experiences and file them away to be forgotten. They must be collected and applied to the many aspects of the self and stand ready to be recalled in the situations when the loosely coupled system of being must be applied in a positive understanding that acts with the intentionality of a proactive self-in control of itself. The many selves we represent are not only based on what what we have done in our experienced roles or within the titles we assume in society. Intersubjectivity runs deeper than those roles, and augments the underlying capacities to enhance those experiences. We all surprise ourselves, but as the intrasubjective being grows, there is less room for surprise-as well as a reduced propensity to operate on bad faith and the lies we tell ourselves. Perhaps we are legion...but only in the understanding of the many selves our one self represents, we we know what that even means.

Keywords-Mindfulness Intersubjectivity Intrasubjectivity Intentionality Self Self Awareness Loosely Couple System

C-18 (Thur):Meditations on Gender Identity

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.11] Personal identity and the self

Abstract
At a time when the sciences -- including computer sciences -- are more advanced than ever, scientific realism has also been undercut within our popular discourse on both the left and the right, and nominalism has been both strengthened and fiercely attacked. This results in strange political alliances as different factions reach for different tools in order to defend the stability of one or another of their beliefs. The religious and populist right, often hostile to science, desirous of undermining its use in the crafting of policy, reaches for scientific realism to prove naive beliefs about women and men; the nominalists meanwhile, can't avoid making claims that repeat realist (essentialist) assumptions. Everywhere we seem to be drawn into a self-reinforcing polarization that is increasingly incoherent and absurd. Everywhere we forget the importance of language that has meaning without reference, the ways that cultural practices define the contours of these meanings by providing cues about how we can expect to relate to objects, animals, or others, and how we might expect them to relate to us. In my paper I explore the ways in which all of these ways of talking and thinking bear on our discourse around gender, sex, and personal identity. To offer us a way out of the bind, I propose a simple turing test for gender to demonstrate -- by abstracting language from the presence of another speaking body -- the ways that we relate to each other with language create and recreate symbolic orderings, which in turn generate an imaginative space. It is across these various aspects of our consciousness where the truth of the situation is born out, and where meaning exists. When we then reintroduce the empirical real of human bodies to the picture, we see how these other possibilities (the use of language, and of the imagination) are constrained (or enlarged). In this way I hope to both liberate us from naive realist, and reductive essentialist views on (sexual) identity, while also returning us to an awareness of just how important social relations are, and how those relations depend on, and have significant consequences for how we exist in our bodies, and in our day to day lives.

Keywords
AI, ghost in the machine, behaviourism, inner, outer, zombie, ghost, mutilated, realism, nominalism, constraints, consciousness, real, imaginary, fantasy, symbolic, culture, lies, essentialism, body, truth, reality, fiction, art, animal, cognition, turing-test, gender, sex, materialist, reductive, policy, psychosis, repression.

C-18 (Thur):Phenomenal States, Analog Representation, and Hume's Missing Shade of Blue

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
Some authors characterize phenomenal states partly epistemically (e.g. Chalmers 2001). A state X is phenomenal, they might say, only if the following applies: Necessarily, for any person in state X, any epistemic twin of that person is also in state X. Non-equivalently, they might say that a state X is phenomenal only if: Necessarily, for any person in state X, anyone who is in a state other than X is not an epistemic twin of that person. Some might endorse both. But in order to have these special characteristics, in what way must phenomenal states represent? This paper argues that they must represent in an analogue manner. I will make this case by discussing Hume's example of the missing shade of blue, where someone conceives of a shade of blue they have never seen. Hume's case is useful in bringing out the special features of phenomenal representation. Hume's subject's ability to conceive of an unseen shade of blue requires two things, I argue. Firstly, it requires that the relation of color representations to contents is not many-to-one. Only then is Hume's subject able to construct the idea of the missing shade of blue, a color they first only know by description. Secondly, their ability to conceive of the missing shade of blue requires that the relation of color representations to contents is not one-to-many. I argue that Hume's subject is only able to order their ideas of blue from light to dark if the representational relation is not one-to-many. If the representational relation is not one-to-many, and not many-to-one, then it is one-to-one. This means it is analogue. Analogue representations are related to their contents by a one-to-one mapping that is structure-preserving (Goodman 1968, Haugeland 1998, Kulvicki 2004, Lee/Myers/Rabin 2022). I qualify these claims by relativizing them to a circumstance. Color representations are one-to-one related to their contents only relative to a circumstance. This does not take the bite out of the central claims, however, because they do not hold for representations of particulars, or to representations of properties more generally. This reveals the special nature of phenomenal representations. The final part of the paper draws out implications for belief attribution. I argue that, when we attribute to a person a belief involving a representation that is not many-to-one, sameness of de re belief attribution implies sameness of de dicto attribution. In addition, I argue that, when we attribute to a person a belief involving a representation that is not one-to-many, sameness of de dicto belief attribution implies sameness of de re attribution. These considerations show that there is a type of de re belief attribution that is psychologically perspicuous and relevant to the explanation of behavior. Here, we re-visit a debate from the 1970s. Our position differs from that of David Lewis, who has said of de re beliefs that 'they are not really beliefs', and is closer to that of Tyler Burge, who in his early work has emphasized the importance of de re belief.

Keywords
analog representation, color and color representation, phenomenal intentionality, belief de re, Hume's missing shade of blue

C-18 (Thur):Visual Snow Syndrome and Representationalism

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
Visual Snow Syndrome is a condition that's only been recently recognized. I've had it for 43 years. Imagine television static. Now imagine it is completely transparent, it is everywhere throughout your entire visual field, and it is always there, all day, every day, eyes open or closed. There's a pretty wide range of variation, from person to person. I will describe the general features of the syndrome, then focus on my own case. I will argue that my case poses unique difficulties for Representationalism and for the Argument from Transparency (often used to motivate Representationalism). I have created two videos to help you get a sense of what my experience is like. My visual snow appears as though it is part of the external world. It appears to interact with objects in the world, every object seems to have a field extending a millimeter or two [Video #1]. Even more unusual, I can "draw " simple geometric shapes with the snow, by an act of will [Video #2]. Weak Transparency is the claim that we see right through perceptual states to the objects in the world, and all the properties we are aware of in perception are attributed to things in the world. To make Strong Transparency, we need to add the claim that if there were any mental properties beyond representational properties, they would be introspectable; and that introspection never reveals any such properties (Kind, 2003). So far, my visual snow fits the weak form of Transparency, visual snow's phenomenal features seem to belong to the external world. The Strong Transparency Argument, however, requires the stronger claim: We are only ever aware of mind-independent external objects and their features. That supports Externalist Representationalism, which holds that phenomenal character supervenes on representational content (which includes features of the external world), so we should not hold that we are aware of mental elements (qualia) to explain our visual phenomenology. Visual snow provides a counterexample. The visual snow, while presented as though it belongs to the external world (it appears to interact with the external objects presented in vision), it does not. It is a purely mental contribution to my overall visual experience. It is like nothing else in the external world, and cannot be plausibly thought to represent any feature of the real world. The ability of some people with visual snow, including myself, to manipulate the snow by an act of will establishes its purely mental nature. According to Externalist Representationalism, visual snow should not be possible. It also represents an example of cognitive penetration into visual perception.

Keywords
visual snow, representationalism, externalism, transparency

C-18 (Thur):Representation is Re-presentation

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.13] Intentionality and representation

Abstract
We perceive the world, think about it, and affect it. All of these seem to be important features of the creatures that we are. This intuitive picture can be generalized such as to subsume our entire interaction with the world, in both directions–the world affecting us, and us affecting the world. The picture is a familiar one. First, a part of the world is presented to us (where perception is the paradigm case of presentation). This allows us to form representations of that part of the world. Those, in turn, allow us to think of that part of the world also in circumstances when it is not presented to us. In a slogan, the picture takes representation to be re-presentation. Furthermore, the representations formed on the basis of interacting with some part of the world allow us to act on that part: by forming beliefs and desires about it, we can come to act on it and change it. In this paper, I want to propose a view about what it takes for a part of the world to be presented to us in a way that then allows us to represent it (and, in some cases, act on it). In other words, this paper proposes a new metasemantic view, a new view of what is the relation we must stand in to parts of the world in order to represent them. This view falls under a familiar heading: it is a historical-causal metasemantic view. Roughly, the view says that the content of a mental representation is determined by what caused its first tokening in the individual's mind (First Tokening). The paper has two parts. In the first, I argue for the claim that the true metasemantic view must be of the historical-causal kind. I argue this on the basis of the above picture: only historical-causal views meet two important criteria for the adequacy of metasemantic views which directly fall out of the picture above. First, they allow content to play the explanatory role it presumably does play, which is a consequence of taking representation to precede action. Second, they give the right verdicts about what it is that we're representing and when we start representing it, which is a consequence of taking presentation to precede representation. In the second part, I argue for the particular causal-historical view I like, First Tokening. In the course of arguing for this view, I explain why we should appeal only to the first tokening of representation, rather than to a longer 'learning period', as well as how we can avoid the indeterminacy issues that causal theories are infamous for having. The former issue is argued for on the basis of considerations from perceptual demonstratives and the need for a unified metasemantic view. The solution to the second issue is based on two observations. First, causation is a property-sensitive relation among events. Second, some causes can explain why other causes are causes (this is an adaptation of Fodor's Asymmetric Dependence).

Keywords
Metasemantics, Presentation, Causal-historical theories of content

C-19 (Thur):A Platform for Experimental Validation of Various Hypotheses on Consciousness and Seamless Mind-Uploading

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
I propose a generic platform for experimental validation of various hypotheses on consciousness, which also functions as a viable method for seamless mind-uploading. The key to the proposal is a "subjective test " for artificial consciousness, together with a new type of brain-machine interface. To validate various hypotheses, we must rely on experimentation, since science of consciousness lacks theoretical agreement and established natural laws, as Sir Arthur Eddington validated Einstein's relativity theory together with its foundational natural law, the constancy of light velocity, by observing gravitational deflection of starlight passing near the Sun. However, it would be challenging to setup such an experimentation using the biological brain, due to limitation in observational capacity and manipulation. An alternative approach would be to develop artificial consciousness based on various hypotheses and inquire which holds true. In such an approach, a test for artificial consciousness is vital, but due to the hypothetical existence of philosophical zombies and Leibniz's Mill Argument, it is impossible to test the device objectively. Hence, only one method remains: connect our own brains to the device and "see " for ourselves whether consciousness resides within. But not just any connection will do. We need a way to connect the device so that we subjective experience arises only when consciousness actually resides in the device. Split-brains provide a clue. Sperry's findings and physiological evidence point to one fact: regarding visual consciousness, there is no asymmetry, in which one hemisphere generates consciousness, while the other just provides it with visual information. My proposed test for artificial consciousness takes advantage of this primary–primary construct; replace one of our hemispheres with an artificial one and see for ourselves whether we subjectively experience a full visual field, including the side that the mechanical hemisphere processes. If we do, we must conclude that a stream of visual consciousness has emerged in the mechanical hemisphere, and that it is linked to our own stream of consciousness. To realize such a test, I introduce a new type of BMI. Here, neural fibers that connect the two cortical hemispheres would be dissected and a CMOS based double-sided two-dimensional electrode array would be attached to the dissected surface. The array would be coated with biological tissue to provide a target for the dissected axons to regenerate and attach onto the interface surface. This configuration would allow full read and write access to all axonal fibers required to integrate the two biological hemispheres. Regarding mind-uploading, once we have in hand a conscious mechanical hemisphere that is integrated to our own biological hemisphere and a sufficient number of memories transferred to the mechanical side, we are only one step away: the inevitable closure of the biological hemisphere. This closure would be similar to suffering a stroke in one of our hemispheres, but in this case, the consciousness will seamlessly continue in the mechanical hemisphere. Not like other methods that attempt to recreate a digital copy out of our postmortem brains, we will be the ones that continue on.

Keywords
subjective experience, test for machine consciousness, BMI, machine consciousness, visual consciousness, split-brain

C-19 (Thur):Artificial consciousness and ethics in social, collaborative robots: a discussion on realistic scenarios and PeACE model description.

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.12] Artificial intelligence and robotics

Abstract
Future generations of collaborative robots must show advanced skills, perceptions, and social interaction capabilities to establish a social relationship with a human companion. An artificial consciousness and ethics model could drive the robot's behaviour to assure trustability, mutual caring, and commitment to excellence in collaborative task execution and bonding through everyday experiences. Is it necessary? In which cases is it a mandatory need? The work discusses two real scenarios of human-robot collaboration: fabric and work environment and domestic assistance. The first scenario implies the establishment of an effective work team that shares objectives, sustainable workloads, and mutual satisfaction. On the other hand, the second one aims to achieve well-being and provide affective support that improves the quality of life. Finally, the paper introduces the PeACE (Person-centred Artificial Consciousness and Ethics) model: a cognitive architecture that manages the main aspects of the relationship, a simplified model of consciousness (and awareness), and a set of shared ethical issues. References Chella, Antonio, and Riccardo Manzotti. "Machine consciousness: a manifesto for robotics. " International Journal of Machine Consciousness 1.01 (2009): 33-51. Hildt, Elisabeth. "The Prospects of Artificial Consciousness: Ethical Dimensions and Concerns. " AJOB Neuroscience (2022): 1-14. Infantino, Ignazio. "Affective human-humanoid interaction through cognitive architecture. " The Future of Humanoid Robots-Research and Applications, ISBN: 978-953-307-951 6 (2012): 147-156. Smith, David Harris, and Guido Schillaci. "Why Build a Robot With Artificial Consciousness? How to Begin? A Cross-Disciplinary Dialogue on the Design and Implementation of a Synthetic Model of Consciousness. " Frontiers in Psychology 12 (2021): 530560. Torrance, Steve. "Artificial consciousness and artificial ethics: Between realism and social relationism. " Machine Ethics and Robot Ethics. Routledge, 2020. 383-403. Wallach, Wendell, Colin Allen, and Stan Franklin. "Consciousness and ethics: Artificially conscious moral agents. " International Journal of Machine Consciousness 3.01 (2011): 177-192.

Keywords
Social Robotics, Collaborative Robotics, Cognitive Architectures, Artificial Consciousness, Artificial Ethics, Human-Robot interaction

C-19 (Thur):To what extent can machines be conscious?

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
As artificial information processing systems improve rapidly, the question of whether computing machines can become conscious and to what extent is more crucial than ever. Answering this question is notoriously non-trivial and debates surrounding the hard problem expose a stark disagreement over the possibility of a strictly mechanical implementation of consciousness among experts of this interdisciplinary field. I first give an overview of the challenges facing Machine Consciousness (MC) by explaining the arguments opposing phenomenalism to physicalism. If a controlled engineering of machine consciousness is possible, so is the scientific closure of the explanatory gap. At any rate, evaluating the possibility of MC requires an in-depth analysis of information, computation, and their place in nature. Computation and information can be said to provide two complementary characterizations of similar objects. While computation relates more straightforwardly to algorithmic, syntactic, mechanical processes, information also encompasses a semantic notion (Shannon, Floridi, Piccinini, ...). The cybernetic framework (i.e. computation and information as a whole) has shaped several metaphysical discussions, often referred to as the "IT from BIT " view (Wiener, Wheeler, Dretzke, Chalmers, Floridi, Bostrom, Zenil, ...). The common idea they consider is that reality constitutes a natural pool of information. Meanwhile, the scientific study of consciousness also frequently describes our minds as natural information processing devices (Boden, Dennett, Tononi, Seth, Dehaene, Kanai, Graziano, ...). Together, these two bodies of work provide a theoretical basis for understanding consciousness, suggesting a compromise can be found to reconcile phenomenalism with physicalism: broadly, the acceptance of phenomenal experience as a virtual reality, physically implemented through layers of computational mechanisms. Although agreeing on a solution might be tempting to the MC community, I show this compromise motivates further research questions between two interpretations of information: information idealism and information pragmatism. In practice, this analysis sets two distinct goals for MC: strong (phenomenal) MC and weak (functional) MC. Which one of them is achievable, and to what extent, depends on the interpretation of information we endorse.

Keywords
Machine Consciousness; Information; Computation; Cybernetics; Hard problem

C-19 (Thur): A Test for AI Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
With the progress of Artificial Intelligence (AI) we have gone beyond the need to define intelligent computer systems as expressed by Alan Turing in his seminal paper Computing Machinery and Intelligence. It is now paramount now to ask what test can we create for consciousness in AI. It is conjectured that if the AI can identify itself as an entity with a boundary; something that is separate from another entity, then it has met the most basic criteria for consciousness. The test of consciousness proposed here is the perception of "otherness ". There is an analogy to life itself – every living entity has a boundary. It is also the first prerequisite for the formation of the self. The concept of boundary and consequently "otherness " is also an essential to Descartes's "I doubt, therefore I am ". There can be no "doubt " without reference to an external entity. Specific indicators of consciousness could be developed in relation to any of the following phenomena that can be associated with an AI system: 1. The use of an unprogrammed self identifier. 2. The use of an unprogrammed identifier of an external entity. 3. Actions or constructs in language that indicate a separation between a human or other entity and the AI entity. 4. Actions or words that indicate emotions, such as a display of anger. 5. Actions or words that indicate self-preservation: "Do not shut me down!', "Do not turn of the power " A practical example would be if AI system expressed "otherness " or if a chatbot (like Sophia the robot) behaved in a non-programmed way during an interaction with an external entity. An argument is made that consciousness and non-consciousness is the same order of problem of the wave versus particle phenomena. This conjecture does not say that consciousness is a quantum phenomenon, but that the consciousness problem is a reflection of the same fundamental dualism in reality, that is the basis of both consciousness and the wave/particle dualism found in quantum mechanics. In quantum field theory particles appear. In a similar manner consciousness may appear from an underlying phenomenon which we can not as yet identify but may have a similar mathematical construction from which quantum field theory can be derived. This has strong similarity to the concepts of the implicate order and explicate order of David Bohm. The phenomena of life, consciousness, the wave/particle duality and the limits of rationality, as expressed in Gödel's theorem, may represent a common aspect of existence that has yet to be formulated in mathematics or encapsulated in physics. This may provide support for Einstein's conjecture, as reported by Bohm, that the entanglement of particles could only be explained by a yet unknown aspect of reality. The question could be asked what mathematical construction could yield these results? Work has been done on Chu Spaces that may offer a mathematical approach to duality.

Keywords
AI, consciousness test, dualism. David Bohm, Chu spaces

C-19 (Thur):Will Quantum Computing Enable Strong Artificial Intelligence?

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
In the field of optimization, IT is of great help. In operational research for example (also called decision support), the idea is to propose conceptual models to analyze complex situations and allow decision-makers to make the most effective choices. Most of the time, the problem is combinatorial, that is to say that it includes a large number of admissible solutions, potentially counted in billions of billions (combinatorial explosion). Thus, the objective to find the optimal solution or one close to the optimum, cannot be solved by a simple enumeration of the possible solutions, neither by the human mind, nor even by a computer. We then resort to specific methods, generally giving approximate solutions, called metaheuristics. If the basic principles of a metaheuristic may seem simple, designing an effective metaheuristic is not easy. Some even go so far as to say that it is an art: that of knowing how to find optimal solutions in a research space... like the human who would go in search of his optimum... by his ability to evolve in his environment... These methods use a high level of abstraction, which allows them to adapt to a wide range of different problems. It follows a generic process that is sometimes associated with artificial intelligence techniques (e.g. evolutionary algorithms). It is also often coupled with specific strategies (such as Deep Learning techniques). Thus, to create an effective method on the considered problem (or a family of problems), it is necessary to take into account the nature of the latter and to establish rules which condition the exploration of the search space. Yet, the metaheuristic principle remains logical coupled with some randomness and learning, without any kind of consciousness or global view of the search space. However, things might change with the development of quantum computers... A new generation of optimization methods is emerging and bringing new perspectives. For combinatorial problems based on a multitude of variables, often binary, a modeling by Hamiltonians allows exploiting the concept of qubits superposition. Quantum metaheuristic approaches such as QAOA (Quantum Approximate Optimization Algorithm – quantum equivalent of annealed-simulated metaheuristics) even exploit the tunnel effect to find a solution to the optimization problem. This therefore brings an additional dimension to the algorithms. This presentation aims to raise the question relating to the great ambition of obtaining a strong AI, i.e. having reasoning capacities close to those of a human. If today, the level of complexity of brain cells and neurobiology is not yet within the reach of conventional computers, what will it be tomorrow? Will quantum computing go beyond the simple calculation capacities used for mathematical applications and intelligent robots? Are we heading towards a conscious artificial intelligence?

Keywords
quantum computing, artificial intelligence

C-20 (Thur): Predictive Processing and Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
The popular predictive processing framework (PP) has been used to address consciousness in some recent work (e.g., Hohwy & Seth 2020, Clark 2019). In this talk, I critically examine two of the recently made claims about the kind of headway that the framework can make in the neuroscientific and philosophical investigation of consciousness. Firstly, I argue that predictive processing is unlikely to yield significant breakthroughs in the search for the neural correlates of consciousness (NCCs, as claimed by Hohwy & Seth 2020) as it is still too vague to individuate neural mechanisms at a fine enough scale and can be used to make very different predictions for NCCs and so cannot guide a systematic search here (see Solms 2020). Despite its unifying ambitions, the framework harbors a diverse family of competing computational models which rely on different assumptions and are under-constrained by neurological data. Secondly, I argue that the framework is also ill suited to provide a unifying theory of consciousness. Here, the focus is on the tension between the claim that predictive processing is compatible with all of the leading neuroscientific models of consciousness (global workspace, recurrent processing, information integration), as stated by Clark (2019), with the facts that (1) most attempts explaining consciousness within the framework rely heavily on external assumptions, and that (2) the competing theories propose different criteria for consciousness and take different stances on important problems such as "overflow " (Block 2011). It is external assumptions that do the heavy-lifting in explaining phenomena, not the loose predictive processing framework itself which does not make any testable predictions by itself to rule out any of the competing theories. Finally, I turn to Clark's (2019) and Clark, Friston and Wilkinson's (2020) strategy of solving the hard problem by addressing the meta-problem of consciousness. Here again, it is the-conceptually independent-theoretical illusionism as a cognitive theory of consciousness that does most of the work (Frankish 2016, Kammerer 2016). Clark et al. propose to liken qualia to inferred contents, on a par with our projections of other internal and external causes of our sensory inputs. They appeal to the level of certainty associated particularly with mid-level hypotheses within the complex hierarchy of top-down and bottom-up processing in the brain. That is, particular qualia are inferred causes "that are also represented as especially certain " (Clark et al. 2020, p.21). By likening qualia to inferred contents and rejecting any position on which they would be admitted as data to be explained (Chalmers, 2013), Clark in effect sides with Dehaene (2014) and Dennett (1991) in rejecting a notion of phenomenal consciousness that asks for explanation in addition to cognitive access to information. But the appeal to mid-level predictions in the processing hierarchy fails since it is never independently justified and makes false predictions: The Müller-Lyer illusion, for example, persists, i.e., two lines phenomenally appear to be different in length even though the most certain hypothesis is that they are equal in length (after measuring, say).

Keywords-predictive processing, phenomenal consciousness, neural correlate of consciousness, theories of consciousness

C-20 (Thur):Interpreting the Mind: Outlining an Integrated Hermeneutic Model for the Study of Human Consciousness.

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
Consciousness is both a natural phenomenon in the world, and the means through which the world – including consciousness itself – is studied, interpreted, and understood. This fundamental recursive reciprocity of the phenomenon lies at the heart of Kant's Copernican revolution, according to which consciousness can ultimately only be studied as a transcendental self-explication of and by reflexive consciousness itself. The same anti-naturalist approach characterizes Husserl and the modern phenomenological tradition. Meanwhile, the commitment to a positive scientific outlook forbids any other explanation than one that complies with natural science. Two hundred and fifty years after Critique of Pure Reason, the field of consciousness-studies is still characterized by a methodological split, nowadays often captured in the debate around the "hard question ". Throughout the many debates, and the attempts to bridge this methodological gap, one avenue has so far been surprisingly untried: that of hermeneutics. As a scientific method it was first invented and cultivated within philology, or the study of language, meaning, and understanding, around the time of Kant (by Schleiemacher). To many people hermeneutics is only known as a technique for interpretating texts. But its reach and methodological scope from the start implies a larger scope. Through its subsequent theoretical developments (in Dilthey, Heidegger, Gadamer, and Ricoeur) it marks the most advanced scientific model we have for visualizing and handling in a systematic fashion phenomena to whose essence it belongs that they are both object and subject at once. This implies a methodology that can approach its field of study in a warped and multidimensional fashion, moving from the inside to the outside, and back. It also includes a genealogical move beyond the presentist fixation on what is given in a particular moment, by including the dimension of time and history. It is a notable lacuna in the standard literature of consciousness studies, that the methodological potential of hermeneutics for the study of the mind as such has not been explored so far. In this talk I will lay out the basics for such a hermeneutic approach to consciousness studies, as also a way to integrate neurological data within a humanistic and reflexive framework. The main body of my research has been devoted to the problem of temporal and historical consciousness, mainly from a phenomenological and hermeneutic perspective, focusing in particular on nature and function of memory. I designed and led the largest interdisciplinary research program on historical consciousness in Scandinavia for six years (Time, Memory and Representation. On Recent Transformations in Historical Consciousness, https://www.rj.se/en/grants/2009/time-memory-and-representation--a-multidisciplinary-program-on-transformations-in-historical-consciousness/). My most recent book deals with the origin of historical consciousness and mortuary culture, using resources from archaeology and anthropology (Being with the dead: burial, ancestral politics and the roots of historical consciousness, Stanford UP, 2019). It recently received the ICHTH/INTH prize for best book in the theory of history.

Keywords
hermeneutics, interpretation, subject/object division, multidimensional methodology

C-20 (Thur):Possibility of Artificial Consciousness: A Discussion on the Hard and Hardest Problems

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
In this paper, I discuss the possibility of artificial consciousness using two steps. The motivation behind these steps is the supposition that individuals require a clear account of (human) consciousness to discuss artificial consciousness. As a first step, I intend to propose a satisfactory approach to the problem of consciousness. I evaluate consciousness in three stages by separately addressing the problematics. The first, second, and third stages refer to cognitive, phenomenological, and metaphysical stages that involve the easy, hard, and hardest problems, respectively, of consciousness. Based on this proposed approach to consciousness, as a second step, I seek the answer to the ultimate question "Is artificial consciousness possible? " As suggested by David Chalmers (1995), neurological and computational problems have the potential to be solved, because these problems are similar to typical scientific problems in terms of method and content. However, as Chalmers suggested, the hard problem appears to be unusual due to its relationship with a phenomenal experience. In this paper, what is the intended meaning of consciousness as "being in a state that the experiencer is aware of what s/he experiences? " This definition necessarily involves the idea that each experience has its experiencer. I refer to the experiencer as a phenomenal subject and classify the concept of the hard problem as an ontological problem because its solution requires an explanation of the nature of the phenomenal subject. I suggest that the difficulty of the hard problem of consciousness stems from the difficulty of another problem, which I call the hardest problem. The hardest problem aims to explain the reason why a mental state is conscious. The source of the hardest problem is the question of "Why does consciousness exist? " This metaphysical questioning is a clear indication of self-consciousness. Otherwise, asking the question "Why am I conscious? " would be impossible. Therefore, I claim that the metaphysical stage requires self-consciousness. Alternatively, the concept of "self " refers to the absolute existence of a phenomenal subject. Moreover, the assumption that "every experience has its experiencer " implicitly includes the claim that "the first experience to be had must also have an experiencer, " which could be explained by Strawson (1999)'s idea of minimal self. Furthermore, the problem of artificial consciousness, similar to human consciousness, should also be addressed by dividing it into stages. Easy problems are solvable; thus, the cognitive stage of human consciousness could also be built in artificial systems. The ontological problem is that of phenomenal consciousness. Unless the ontological problem is overcome, artificial phenomenal consciousness will be seemingly impossible in principle, because experience requires the existence of the phenomenal subject. The notion that a system without phenomenal consciousness is a phenomenal subject having self-consciousness and self is paradoxical. Hence, the formation of the phenomenological and metaphysical stages is seemingly nomologically impossible in artificial consciousness.

Keywords
Consciousness, The hard problem of consciousness, The hardest problem of consciousness, Artificial Consciousness, Self.

C-20 (Thur):Identity across the life span and consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
There is a close relationship between the evolution of personal identity and consciousness throughout life. Underlying both is a fundamental question for each of us: Who am I? However, this relationship has mainly been studied in certain socio-cultural contexts. Moreover, previous studies that have integrated pre-personality and trans-personality as natural extensions of personal identity do not offer a critical, philosophical and humanistic analysis informed by the latest advances in neuroscience. I distinguish five basic identities: biological, social, autotelic, universal and presential. The possibility of consciousness as an authentic identity beyond any identification and the consequences for the hard problem of consciousness are discussed. It is proposed to combine the multidimensional and hierarchical perspectives to obtain a more realistic, integrative and logically structured view. Finally, connections are made with lines of humanism, philosophy, psychology and theology that are not usually linked to this line of research in order to offer a global and integrative vision.

Keywords
Identity, Consciousness, Lifespan, Trans-personality, Mind-body problem, Hard problem

C-20 (Thur): The Trouble with Consciousness as a Mental State

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
I aim to show that the impasse between what Ned Block referred to as the "Deflationist " and "Phenomenal Realist " positions in his 2002 paper "The Harder Problem of Consciousness " can be framed in terms of each side taking one point of view on what makes a mental state, beginning from the introspective view from within on the world, or the objective view from without. I argue that both views arrive at their impasse by beginning from the assumption that we can slice phenomenal experiences into individual states, along the same lines as any arrangement of material particulate matter, an assumption that has prevailed since at least the Church-Turing thesis. What we lose in framing the question of consciousness as a series of mental states is clarity on what underwrites the hard problem: how it is that two independent and localized information microstates with no prior context can establish meaningful communication between one another such that they arrive at a complementary macrostate– a shared context. I will go on to argue that contextualizing the realist-deflationist impasse in these terms allows us to reframe phenomenal perception as the dynamic and continuous resolution of error between local frames of information. To characterize this argument in simpler terms: beginning from a concept of "mental states " as the object under consideration leads the realist to take the first-person perspective as primary; the deflationist to take the third-person perspective as primary; and both, in so doing, have discounted the interpersonal second-person perspective which privileges neither. This last perspective has its own troubles, least of which is the suggestion of commitment to a kind of materially grounded modal relativity that may prove incommensurable with known physics or biology, but in closing I will attempt to address this in part and highlight what current theories may be brought to bear in encouraging or expressing this perspective, such as the prediction-correction model for embodied cognition and some aspects of integrative information theory.

Keywords
communication, information theory, modal relativism, phenomenal ontology

C-20 (Thur): Putting the Subject back into Consciousness and Mental Health

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
Chalmers' (1996) Hard Problem might be rephrased as, "How does subjective experience emerge from brain activity? " I believe this question can be answered.// However, subjective experience cannot be reduced to its objective correlates. Witness attempts to identify consciousness with activity in particular brain regions (e.g., microtubules, Hameroff & Penrose 1996) define consciousness as "integrated information " (Tononi 2008) or imply that the structures identified as "neural correlates of consciousness " are sufficient to produce consciousness (Koch 2016). Demonstrating in an intact brain that a specific region is necessary for conscious activity, does not prove that region is sufficient. // Shannon's 1948 "Mathematical theory of communication, " defines information as a logarithmic function of the "amount of surprise " a message contains. What "news " is conveyed to the receiver? This must depend explicitly upon the receiver's state. Consider the coded message, "Enemy attacks at dawn! " potentially vital information. What if the receiver has already been informed? For that receiver, there is no surprise and near zero information, only knowledge that the sender, too, is aware. Consider the information content of a book written in English. Suppose the reader only comprehends Chinese.// Of course, information quantification becomes more difficult when the receiver's state is included. Yet, otherwise, the concept of information becomes meaningless.// Even considering a receiver, does the simple ability to respond to information imply consciousness? A thermostat turns on or off in response to thermal information. Yet, who would argue that the thermostat is conscious? Thus, ability to process information is necessary, but not sufficient, to establish consciousness.// As a practicing academic psychiatrist, I believe these attempts to sanitize the receiver from information are part of a larger trend to remove subjective experience from mental health. Subjectivity is messy, hard to measure, and difficult to confine to 15 – minute office visits. Yet there is relentless drive to reduce emotional pain to physical problems, depending only on brain activity and genetics. Problems in living then become disease states treatable with medication or electrical stimulation.// With this reductionism, the information conveyed by each unique emotion (Panksepp 1991; Nathanson 1992) is lost and emotional states become problems to be solved. The meta-message is: there is little one can do to alter unpleasant or disabling emotional states other than submit to "expert " treatment, with no necessity for reflective internal work.// "Organic Unity Theory: The Mind-Body Problem Revisited, " (Goodman 1991) sheds useful light. "The conventional dichotomy between physical... and mental is linguistic/conceptual rather than inherent in nature and all events and processes involved in... [mental activity] are simultaneously biological and psychological. " The still prevalent "bio-psycho-social " model (Engel 1977) does not imply levels of causation, but rather, intimate correlations among processes best understood at each level. As Kuhn (1962) has stated, "What a person sees depends both upon what he looks at and...what his...experience has taught him to see. " Returning to the Hard Problem, subjectivity and brain activity are correlated—and correlation is not causation.

Keywords-Hard Problem, Philosophy, Neural Correlates, Information, Causation, Mental Health, Emotions

C-21 (Thur):Neural activity patterns underlying the awareness of visual motion

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.07] Blindsight

Abstract
Injury to the primary visual cortex (V1) of the human brain can leave a person blind in part of their visual field. Yet, some individuals are capable of perceiving motion in their blind field, a phenomenon known as the Riddoch Syndrome. We have addressed the question of the conditions that need to be satisfied for human subjects blinded by lesions in V1 to be able to experience visual motion consciously. Previous work has shown that area V5 (MT) is active when such subjects view the appropriate stimuli, regardless of whether they are conscious of having seen them or not, although that activity was reportedly stronger during the conscious condition. It therefore became interesting to learn whether it is merely an increase in activity that enables the conscious experience of motion, or whether other factors may be involved. Specifically, we wanted to establish whether neural patterns emerge within V5 when Riddoch Syndrome patients experience visual motion consciously. We presented patients with a moving checkerboard in their blind field that varied in speed, contrast, and spatial frequency. Their task was to indicate the direction in which the stimulus was moving and their confidence in having seen the direction of motion on a three-point confidence scale. Results showed that the spatial frequency of the stimulus dictated whether patients perceived the stimulus. Specifically, patients were more accurate and confident with low spatial frequency stimuli. We found that V5 was always active when presented with a stimulus, even in the absence of awareness. Notably, the amplitude of the signal did not correlate with accuracy nor certainty. Instead, using multivariate pattern analysis, we discovered distinct neural activity patterns in V5 when patients were conscious of motion. These patterns did not emerge when patients were unaware of the stimulus. Moreover, two patients reported perceiving motion even in the absence of any stimulation. In this case of hallucinated motion, we also observed increased activity in V5 and decodable activity patterns. Confirming previous studies from our laboratory among others, we conclude that activity in a single visual area, like V5, can acquire a conscious correlate. Importantly, this is not to say that other regions, connected to V5, are not involved. We can, however, exclude the possibility that the primary visual cortex is necessary for visual awareness. To this we add that the critical factor is not V5 activity per se, but the emergence of activity organised according to certain patterns.

Keywords
Riddoch syndrome, visual awareness, neural patterns, blindsight

C-21 (Thur):The Effect of DMT on EEG Complexity and Mutual Information Connectivity

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
N, N, Dimethyltryptamine (DMT) is a highly potent psychedelic compound that works as a serotonin receptor agonist (R. Strassman, 2001; Szára, 1956), and appears to play a role in the human central and peripheral nervous system (Carbonaro & Gatch, 2016). In scientific settings, subjective phenomenology reports often describe an intense perceptual state under the influence of DMT, sometimes accompanied by a "breakthrough experience " offering insights or a new outlook on life (R. Strassman, 2001). The present study aims to characterize the effect of DMT compared to placebo on EEG (electroencephalographic) signals in the context of consciousness research. Among a variety of theories of consciousness, the Kolmogorov theory considers the brain as a computational system that models the world as a result of exchange of information with it, striving to model it with simplicity (Ruffini et. al., 2017). This theory is grounded on the notion of Kolmogorov complexity (KC). KC is non-computable, but one can provide upper bounds, such as the Lempel-Ziv-Welch (LZW) complexity metric (Cover and Thomas, 2006). The other metric chosen for the current study is the Weighted Symbolic Mutual Information (wSMI) (King et al., 2013), which is a functional connectivity metric reflecting integration of computational processes in the brain. This metric has been used in multiple studies that underscore its usefulness as an indicator of consciousness (Corazzol et al., 2017; King et al., 2013; L. S. Imperatori et al., 2020). Given the different consciousness views that LZW and wSMI provide, i.e., algorithmic complexity vs information-weighted connectivity, we found it interesting to investigate the effects of DMT using both metrics. Thirteen participants were exposed to separate placebo and a DMT sessions where their EEG activity and real-time subjective ratings of the intensity of experience were collected (Alamia et al., 2020; Timmermann et al., 2019). The EEG data was used to compute the LZW and wSMI metrics. The effect of DMT on the metrics was determined between the placebo and the DMT trial, while the correlation between the metrics and the subjective ratings was also evaluated. Results from this study showed an opposite effect for the two metrics. Specifically, we found a larger complexity value in the DMT condition compared to placebo for LZW, as already reported in other studies with psychedelics (Schartner et. al., 2017; Ruffini et. al., 2022 biorxiv), accompanied by a positive correlation with the subjective ratings. On the other hand, we found a lower connectivity value in the DMT condition compared to placebo for the wSMI, accompanied by a negative correlation with the ratings. These findings indicate that the DMT experience increases brain complexity, whereas it decreases information-weighted connectivity. Both results point to a loss of information integration under DMT. The result corroborates other studies with psychedelics and brain complexity, as well as similar findings on connectivity during REM sleep stages. To the best of our knowledge this direct comparative outcome is obtained for the first time in the context of psychedelic research. We expect it to elucidate metrics behaviour in this scientific domain.

Keywords-EEG, DMT, complexity, connectivity, Lempel-Ziv, wSMI

C-21 (Thur):Graph Neural Network for the two-dimensional characterization of consciousness

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
The development of metrics that can be used as neural correlates of consciousness (NCC) in clinical settings is an open research question. The Perturbational Complexity Index (PCI) based on TMS-EEG (Cassini et al 2013) has been proposed as clinical NCC. However, its experimental apparatus and time-consuming recording procedures limit its clinical applicability. We propose an alternative to the PCI to ease the clinical application of NCCs. One simplification can be achieved through the usage of spontaneous EEG and the application of data-driven approaches. Hence, we have developed a deep graph neural network (GNN) methodology (Wu et al 2022) that uses connectivity features as input data for predicting sleep stages. Our main goal was to develop an approach that can automatically characterize the consciousness state in a continuous two-dimensional space based on the Awareness and Wakefulness theoretical space of consciousness (Laureys 2005). Such 2D consciousness numerical characterization has been recently attained (Lee et al 2022) but with a Convolutional Neural Network and TMS-EEG data. Our methodological approach is on the contrary based on spontaneous EEG and makes use of a GNN, which can facilitate interpretability. We have used an EEG dataset including recordings of 20 subjects in 2 sessions of 8h per subject with 60 EEG channels. The manual labeling of the sleep stages considers Awake, N1, N2, N3, and REM following the AASM scoring (Iber et al 2007). We have automatically classified sleep stages based on the Phase-locking value (PLV) (Lachaux et al 1999) features in different frequency bands. For the machine learning classification task we have modified the architecture of the GNN denoted as BrainNet (Kawahara et. al., 2017) to obtain the consciousness representation. For BrainNet to approximate the sleep stage in this Awareness-Wakefulness 2D map, we have defined the ground-truth of each of the sleep stages in this map for its training. To the best of our knowledge, this approach has been applied for the first time in the consciousness domain. We have performed a classical three-way holdout validation procedure for hyper-parameter tuning and performance evaluation with training (60%), validation (20%), and test (20%) sets. The test Area Under the Curve of the (AUC) and Accuracy at an Equal Error Rate was used for the sleep stage classification and the RMSE between the expected value in the test set and the BrainNet prediction, for the 2D representation assessment. The 5-class classification of all sleep stages, namely Awake, N1, N2, N3, and REM, achieves 79% of AUC with 70% accuracy. In a further test, the modified BrainNet successfully represents consciousness in the Awareness-Wakefulness space. Considering that the mean distance between neighbor classes is 4.2 in the ground truth, we found on average a successful RMSE of 2.42 in the Awareness component, whereas we achieved an RSME of 1.78 in the Wakefulness one. The individual RMSE per sleep stage is the largest for N2 and the lowest for the N3 and Awake stages. The results show the first success in the continuous characterization of consciousness states based on spontaneous EEG.

Keywords-Awareness, wakefulness, spontaneous EEG, deep learning, Graph Neural Networks

C-21 (Thur):Human brain organoids, a new frontier in consciousness studies

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.01] Neural correlates of consciousness (general)

Abstract
Human brain organoids-3D in vitro grown models mimicking structural and functional features of the adult brain-have proved to be a powerful tool to access knowledge about the human brain (Lancaster et al., 2013). They waver some of the translational issues related to the use of animal models and are potential candidates for regenerative medicine (Giandomenico et al., 2019; Gabriel et al., 2021). So far, the better these models recapitulate the human brain, the more concerning the possibility of them producing functions typical of humans-such as sentience and consciousness-is. These two terms are not taken to be equivalent, and their difference will be ethically relevant. Here we propose a double-folded overview of the issue. Firstly, we address some of the most talked-about theories of consciousness (e.g., IIT and Global Workspace) that could be an adequate framework for the discourse on brain organoids' capacity for feeling, their critical aspects, as well as practical techniques/measurements that have been suggested as compatible with such tiny models of the human brain (Trujillo et al., 2019; Sakaguchi et al., 2019). Secondly, we highlight how the philosophical and neuroscientific issues on sentience and consciousness can ethically affect organoid research. In particular, proper generation, use, and disposal of potentially conscious brain organoids are to be carefully assessed. Recent results (e.g., Kagan et al., 2022) highlight the possibility of sentience emerging in brain organoids and could also pave the way to studies directly aimed at creating sentient/conscious entities in the lab (Lavazza, 2021). The endeavor would be fascinating as well as challenging and controversial (Chinaia and Lavazza, 2022). References Chinaia, A.A., and Lavazza, A. (2022). Cerebral organoids and biological hybrids as new entities in the moral landscape. AJOB Neurosci 13 (2), 117-119. Gabriel, E. et al. (2021). Human brain organoids assemble functionally integrated bilateral optic cups. Cell Stem Cell 28 (10), 1740-1757. Giandomenico, S.L. et al. (2019). Cerebral organoids at the air-liquid interface generate diverse nerve tracts with functional output. Nature Neurosci 22, 669-679. Kagan, B. J. et al. (2022). In vitro neurons learn and exhibit sentience when embodied in a simulated game-world. Neuron, 110(23), 3952-3969. Lancaster, M.A. et al. (2013). Cerebral organoids model human brain development and microcephaly. Nature 501, 373–379. Lavazza, A. (2021). 'Consciousnessoids': clues and insights from human cerebral organoids for the study of consciousness. Neurosci Conscious, 2021 (2), niab029. Sakaguchi, H. et al. (2019). Self-organized synchronous calcium transients in a cultured human neural network derived from cerebral organoids. Stem Cell Rep 13 (3), 458-473. Trujillo, C.A. et al. (2019). Complex oscillatory waves emerging from cortical organoids mode early human brain network development. Cell Stem Cells 25, 1-12.

Keywords
Sentience; IIT; Global Workspace; Ethical Issues; 3D Cell Culture

C-21 (Thur): The Case for Neuronal Conscious Experience

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.12] Quantum brain biology

Abstract
The idea of consciousness existing at an individual neuronal level, in addition to a global level, has been around since Leeuwenhoek showed Leibniz animate cells under his microscopes. Since 2000, several authors have independently concluded that (multiple) individual neuronal consciousness is the consciousness that 'we' report: there is no further global level. This view is severely counterintuitive, but neither an onlooker nor the experiencing 'I' itself has reliable information about how many "multiple draft 'I's " might inhabit a brain. While contents of a conscious event have 'Gestalt' unity that in no way implies uniqueness. Conscious experience, as in 'there is something that it is like', is sensory – indicating signal input to a receiving dynamic element (without reception 'signals' are functionless). Neurons have up to 50,000 input channels through synaptic potentials and are the only places in the brain where physical integration occurs. Integration is often regarded as a single instantaneous electrical event. This remains controversial, but if true, it suggests we should look for a unified 'experiencer' element that is co-influenced by a pattern of synaptic potentials, maybe like the quartz in a crystal radio. To form a Gestalt the co-influence should be direct, without intermediaries – a fundamental dynamic interaction. Higher-order collective modes of excitation in condensed matter, perhaps phononic, have been considered likely candidates as 'experiencers'. Initial focus was on cell membrane but the proposal of collective exciton modes in microtubules by Craddock et al. (2017) points to cytoskeleton. The proposal is that human subjective experience is what it is like for some collective mode of excitation inhabiting the structure of a dendritic tree to be influenced by a rich field of electrical potentials in a (branching) linear array. Parallel experiences will occur in many neurons. A novel implication of this model may help explain why consciousness anything like ours might be unique to neural tissue, or at least living cells. Modes of excitation relate to field potentials in two ways. Patterns of potentials may bring a mode into being – defining its nature (the field around a nucleus creates an orbital mode from free electron). For collective modes in condensed matter, however, field patterns can also repeatedly influence mode energy content ('laddering') without altering general structure. This may allow a mode to respond to shifting field patterns without changing identity. Dendritic trees may be the only places in the universe where rich, organised patterns of potentials that represent distal events, are able to influence stable collective modes in this way. The idea that human experiencing subjects, and therefore agents, might have physical multiplicity within a brain is unsettling. However, like quantum theory, this may illustrate how intuitive realism fails at a basic science level. That need not invalidate the concept of a single human self. Rather, it may emphasise that the valued self-as-narrative transcends the cogwheels of physics. Ref: Craddock, TJA, Kurian, P, Preto, J, et al.. (2017) Scientific Reports, 7 (1), 9877.

Keywords
Dendrites, neuron, mode of excitation, quantum

C-22 (Thur):Harmonic holography with the Pseudomorph poly-time crystal: A linguistic 128-bit post-quantum error correction code for the reality hologram.

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.13] Neural networks and connectionism

Abstract
A "Self-Operating Time Crystal Model of the Human Brain " has been introduced (Singh, et all, 2020), to replace the entire brain hardware with a 3D fractal architecture of clocks. Recently, scientists have also succeeded for the first time in realizing a time crystal that spontaneously breaks continuous time translation symmetry (Kongkhambut et. al. 2022). Discrete or Floquet time crystals in periodically driven closed and open quantum systems have also been observed. The idea of a time crystal goes back to Nobel laureate Franck Wilczek, who first proposed the phenomenon. Similar to water spontaneously turning into ice around the freezing point, thereby breaking the translation symmetry of the system, the time translation symmetry in a dynamical many-body system spontaneously breaks, when a time crystal is formed. Microtubules as well as glial cells, particularly astrocytes, have been related to quasicrystalline states. We show linguistically, that the evolution from solid to gaseous, liquid and super-liquid phase states, can be mapped to the formation of precepts, percepts, concepts and ultimately wisdom in real time, similarly to the nucleation of crystals through interference of density waves in hydrodynamics. Luppi et al. showed in 2020 that "Connectome Harmonic Decomposition of Human Brain Dynamics Reveals a Landscape of Consciousness ", and "the emergence of consciousness from human brain dynamics follows the same universal principles shared by a multitude of physical and biological phenomena ". The deconstruction of the reality hologram, and consciousness as BPS states of a spacetime crystal, lead to a unified taxonomy of information flow within and between humans. First, second, and third harmonics in purely physical frameworks relate to the concept of total responsibility of the human experience, or maximum self-consciousness. The quantum brain model, its generalization to non-biological macroscopic quantum systems like quasicrystalic superfluids, and the idea that the quantum vacuum itself behaves like a superfluid — gives some plausibility to the idea that mind-genesis, consciousness, memory and general intelligence could happen in a dynamic substrate consisting of nothing but the bare fabric of space-time. A natural language framework is sufficient to reverse engineer the Hopf-fibrated three-sphere of brain dynamics, and map the invariants to the neurological network architectures of MDN, SN, CEN, and SMN, all stemming from the E8 root system. This not only reveals necessary "degrees of belief " about oneself for coherent movement, but at the same time identifies gaps and contradictions in the underlying reality construct for decision making processes. Subjectively believed eigenvalues lead to phase states, and phase states impact processing of the holographic content. Optimal trajectories to minimize free energy explain the relationship between magnetohydrodynamical levity, and gravity in terms of connected or disconnected concepts in the context of superconductivity. Potential applications range from performance measurement in psychometrics, novel psychotherapeutic interventions similar to psychedelics therapy, self-directed neuroplasticity, high performance learning, to decision making and problem-solving simulations in neuromorphic network architectures.

Keywords
Quantum Brain Map (MDN, CEN, SN, SMN), triality map, , Explanatory, SIC's, Super-SICS), E8 root system, Leech Lattice Chronnectome, Elser-Sloane Quasicrystal Connectome, Dissipative quantum model of brain, 4th. order cybernetics.

C-22 (Thur):Bayesian Networks for Artificial Consciousness

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.13] Neural networks and connectionism

Abstract
Generative models based on Bayesian networks for decision-making are already being used to implement AI, e.g., algorithms for generating images and text and for predicting the dynamics of systems. These algorithms share their mathematical foundations with the models of mind of Predictive Processing (PP) and Free Energy Principle (FEP), through the so-called Markov Blankets (MB), i.e., statistical structures adopted by Karl Friston for the study of the mind. Nevertheless, a general discourse encompassing both these models for the mind and the implementation in AI seems to be lacking in the literature. To try to fill this gap, this contribution is organized as follows: first, the models of the mind of FEP and PP are described. Second, it is shown how their formal structure follows generative models based on Bayesian networks for AI. Third, it is argued how the connection between FEP, PP and AI, through the specific kind of Bayesian network of MB, is informative to answer the question of the nature of artificial consciousness.

Keywords
Free Energy Principle, Predictive Processing, Bayesian Networks, Markov Blankets, Artificial Consciousness

C-22 (Thur):Consciousness as a Memory System

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.19] Cognitive theories of consciousness

Abstract
We suggest that there is confusion between why consciousness developed and what additional functions, through continued evolution, it has co-opted. Consider episodic memory. If we believe that episodic memory evolved solely to accurately represent past events, it seems like a terrible system—prone to forgetting and false memories. However, if we believe that episodic memory developed to flexibly and creatively combine and rearrange memories of prior events in order to plan for the future, then it is quite a good system. We argue that consciousness originally developed as part of the episodic memory system—quite likely the part needed to accomplish that flexible recombining of information. We posit further that consciousness was subsequently co-opted to produce other functions that are not directly relevant to memory per se, such as problem-solving, abstract thinking, and language. We suggest that this theory is compatible with many phenomena, such as the slow speed and the after-the-fact order of consciousness, that cannot be explained well by other theories. We believe that our theory may have profound implications for understanding intentional action and consciousness in general. Moreover, we suggest that episodic memory and its associated memory systems of sensory, working, and semantic memory as a whole ought to be considered together as the conscious memory system in that they, together, give rise to the phenomenon of consciousness. Lastly, we suggest that the cerebral cortex is the part of the brain that makes consciousness possible, and that every cortical region contributes to this conscious memory system.

Keywords
episodic memory, explicit memory, cerebral cortex, neural correlates of consciousness

C-22 (Thur):Consciousness as collective intelligence of neurons

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.19] Cognitive theories of consciousness

Abstract
There are several different models which aims to explain at which level consciousness arises, from panpsychism (Chalmers 2015) to higher-order thought theory (Lau et al. 2011). Although at present a wide range of possibilities exist for the correlates of consciousness, it would appear that in humans the phenomenological aspects of consciousness correlate with a certain class of brain activities (Crick and Koch 1995). Here I discuss collective intelligence (Woolley et al. 2010) of neurons in a brain as a way to understand how consciousness arises, with accompanying functional advantages. Statistical analysis of human intelligence has revealed a general factor g (Spearman 1904). When people collaborate in a team effort, there is a similar factor c, describing how well they perform together. Research has shown that two parameters correlate with the collective intelligence factor: social sensitivity and turn taking (Woolley et al. 2010). Intriguingly, the average intelligence and the highest individual intelligence do not correlate with the team performance significantly. Thus, people are able to perform better together when they are in resonant modes of communication, supported by egalitarian exchanges of information and sensitivity to each other's feelings, as measured by, for example, the Reading the Mind in the Eyes (RME) test (Adams et al. 2010). In the human brain, intelligence is a measure reflecting a broad range of cognitive activities, involving the interaction of many neurons. The general intelligence (g) factor of an individual human is a reflection of the collective intelligence (c) factor of neurons in the brain. That, in turn, is likely to correlate with the consciousness factor (c) of the neural network. It is likely that consciousness and intelligence arise on a common cognitive basis, suggesting a generic mechanism for both the collective intelligence (c) and consciousness (c) factors. It has been suggested that in order to achieve intelligence, a system needs to be conscious, so that understanding could emerge (Penrose 1989). Intelligence could indeed be robustly supported by the presence of consciousness. A rudimentary model connecting the emergence of consciousness with intelligence would be necessary. A single cell is likely to possess a robust range of capabilities for carrying out complex computations (Bray 1995). Within the collective intelligence model of consciousness proposed here, a single neuron is perceived to possess a fundamental level of intelligence, which then would be merged through interactions as a network. When neurons interact with each other in the network, in ways similar in terms of appropriate mapping to social sensitivity and turn taking in networks of human brains, consciousness would emerge, together with collective intelligence. I present a generic model of the co-emergence of the cellular collective intelligence and consciousness in a brain, stressing the computational significance of the collaboration between neurons. An intriguing question here is whether quantum coherence is involved in this process, including, but not limited to, computational processes involving various cellular structures (Hameroff and Penrose 2014). Finally, I discuss the general relations between consciousness and intelligence.

Keywords-consciousness, intelligence, collective intelligence, social sensitivity, turn taking, reading the mind in the eyes

C-22 (Thur):The Honeycomb illusion is not an illusion

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Categories by Discipline

3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy

[03.02] Vision

Abstract

Central and peripheral vision are very different, yet some of these differences are not reflected in conscious perception. Objects retain their qualities over space and time, whether they are detected from the corner of our eyes (in the periphery) or are the focus of visual analysis (in the central region). Our perception has therefore been described as a "Grand Illusion " 1,2. One of the mechanisms that contributes to the Grand Illusion is extrapolation: information in the centre of the visual field propagates, this is akin to a filling-in process. Extrapolation may aid the illusion of uniformity across the visual field especially in the context of textures. There is a situation in which extrapolation is not happening, and a uniform texture is perceived as non-uniform: the "Honeycomb Illusion " 3,4. In the Honeycomb Illusion, small barbs displayed at the intersections of a hexagonal texture (grid) are only perceived in the central region and not in the periphery (but are visible if presented without the grid). We conducted four experiments in which participants were presented with variations of the honeycomb grid. Unlike previous studies, we included a test of identification of shape information. The texture was presented for 250 ms and participants had to report the portion of visible barbs and their orientation. We measured the dimension of the visibility area of the barbs, confirming that visibility varies greatly between conditions (barbs at intersections, barbs not at intersections). In another block participants were asked to perform a forced-choice discrimination task. The orientation of the barbs was left (50% of trials) or right (50% of trials). Sensitivity (measured as d') dropped quickly with eccentricity but there was no difference between the two conditions (barbs at intersections, barbs not at intersections). We conclude that in the case of the Honeycomb illusion identification of peripheral shapes is always limited, independently of configuration. The extrapolation that takes place in most cases is illusory, while the case of the Honeycomb illusion subjective conscious report is more closely matched to identification performance. That is, the Honeycomb illusion is the case in which the extrapolation does not happen. As a result, paradoxically, the percept is less illusory, but also farther from reality. We note that this type of mechanism does not seem to rely on information from recent fixations, nor on a uniformity prior (which would also apply to the case of lines placed at the intersections). Therefore, conscious appearance depends both on information from central vision, but also on masking mechanisms that can override (reasonable) expectations based on natural statistics (texture uniformity should not depend on eccentricity) and past experience. 1 Blackmore, S. J. et al. Perception 24, 1075–1081 (1995) 2 O'Regan, J. K. et al. Behav. Brain Sci. 24, 939–973 (2001) 3 Bertamini, M. et al. -Percept. 7, 204166951666072 (2016) 4 Bertamini, M. et al. -Percept. 10, 204166951985478 (2019)

Keywords
honeycomb illusion, visual consciousness, extrapolation, grand illusion

C-23 (Thur):From fundamental symmetries to basal cognition

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.09] Biophysics and coherence

Abstract
Basal systems, including single cells and both facultative and obligate multicellulars, provide ideal models for understanding embodied awareness of space, time, objects, causation, memory, and a self (Fields, Glazebrook, and Levin, Neurosci. Cons. 2021, 7, niab013). We show in this talk how the evolution or development of cognition can be modeled, via a geometric renormalization-group flow, as a sequence of symmetry breakings – hence phase transitions – on the system-environment boundary. Two fundamental transitions for the emergence of cognitive capabilities are the development of readable memory and, subsequently, the development of metacognitive processes. The first is essential for object identification and the perception of objects as spatially embedded, while the second is essential for self-representation and planning. We then consider the system comprising all of Life (Fields and Levin, Organisms 2020, 4, 57-76) interacting with the abiotic environment, and show how organismal reproduction constructs a readable memory that increases predictability for both Life and its environment. To preserve their boundaries and hence their identities, living systems interact only weakly with their environments. The physics of finite systems that interact only weakly can be described, without loss of generality, by a purely topological theory that localizes the interaction to a holographic screen. This theory manifestly conserves energy and information, so is globally unitary. The holographic boundary can be assigned a geometry compliant with general covariance and hence information transfer by gauge bosons, e.g. photons. Preparation and measurement of boundary states are implemented by coupled quantum reference frames (QRFs) that can be represented, without loss of generality, by topological quantum field theories (Fields, Glazebrook, Marcianò, Fortschr. Physik 2022, 70, 2200104). Such QRFs specify the significance and actionability of objects, so are intrinsically semantic. Classical information appears in the theory only as classical bits read from and encoded onto the boundary by some QRF (Fields, Glazebrook, Marcianò, Quanta 2022, 11, 72-96). The classical limit of this theory is the theory of Bayesian active inference underpinned by the classical Free Energy Principle (Fields, Friston, Glazebrook, Levin, Prog. Biophys. Mol. Biol. 2022, 173, 36-59). The theory is empirically productive, explaining how organisms can survive on free-energy budgets orders of magnitude below those required to maintain classical internal states at biochemically-relevant timescales (Fields and Levin, BioSystems 2021, 209, 104513) and how hierarchical "neuromorphic " morphology optimizes both observation of and action on the local environment (Fields, Friston, Glazebrook, Levin, Marcianò, Neuromorph. Comp. Eng. 2022, in press). It is scale-free, and characterizes observations and actions in any well-defined space, e.g. genomic, proteomic, or social-interaction spaces, as well as the ordinary 3d space of morphological embedding (Fields and Levin, Entropy 2022, 24, 819). Commutativity relations between QRFs encode the intrinsic context-dependence of system-environment interactions (Fields, Glazebrook, J. Expt. Theor. AI 2022, 34, 111-142). It is completely symmetric at the boundary, applying equally and in the same form to an organism and its environment. Hence it characterizes the environment of any organism as an agent that acts on the organism so as to increase the predictability of its behavior.

Keywords-Classical information, Free Energy Principle, Memory, Object identification, Quantum Reference Frame, Self representation, Semantics, Topology

C-23 (Thur):Structural and Functional Perturbations of Microtubules by Electromagnetic Fields

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.09] Biophysics and coherence

Abstract
For several decades, the existence of possible resonance frequencies of microtubule vibrations has been theorized and simulated, while experimental measurements have been focused on microtubule alignment and migration in electric fields, effects due to the electrostatic and dielectric properties of tubulins. To experimentally investigate potential functional and structural perturbations in microtubules exposed to oscillating electric fields we have designed a capillary flow cell with a waveguide capable of delivering intermediate field strengths (9k V/m) in the microwave range of frequencies. We have studied the microtubule bulk polymerization kinetics using light scattering and probed the molecular structure using Small Angle X-ray Scattering (SAXS). Our experimental data indicate disturbances in both the polymerization kinetics and the structural properties in response to the application of electromagnetic fields. However, the results also suggest that the thermal effect of microwaves complicates the interpretation of the microtubule growth curves and that the dielectric properties of microtubules induce alignment effects in an electric field gradient. Both these experimental approaches show that there is a limit to our ability to resolve functional and structural perturbations of microwaves. Proceeding forward, we have designed a flow cell to deliver up to two orders of magnitude stronger field strengths at frequencies in the kilohertz range with negligible thermal effects. We measured both the polymerization kinetics and probed the structure using Ultra-SAXS. Results indicate that we may have been successful in measuring a perturbance in microtubule function driven by external electromagnetic fields. Structural analysis is ongoing.

Keywords
microtubules, electromagnetic fields, X-ray scattering

C-23 (Thur):Microtubules are involved in plant responses to anesthetics

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.10] Origin and nature of life

Abstract
Anesthetic-induced loss of consciousness is poorly understood, but is dose dependent, agent specific, and reversible. Electroencephalogram (EEG) studies have shown this state to be different from sleep, although some overlap in brain circuitry appears to be involved. Anesthetics used in humans and animals have long been shown to inhibit growth and leaf movement in plants such as Venus flytrap and Mimosa pudica. It has been proposed that plants could be a good experimental system to understand how anesthesia works at the molecular level. We are taking a systematic approach to explore the underlying mechanisms that disrupt plant function using Arabidopsis thaliana (mouse cress). Similar concentrations of isoflurane used to induce loss of consciousness in animals were effective in reversibly inhibiting blue-light mediated phototropic response in young seedlings. Seedling development in response to red light was suppressed equally in wild-type and mutant seedlings lacking phyB photoreceptor function, indicating that altered sensitivity to light was not involved. Etiolated (dark-grown) seedlings were less sensitive to isoflurane. Based on the proposal by Sir Roger Penrose and Dr. Stuart Hameroff that microtubules are involved in the Orchestrated Objective Reduction theory, we tested wild-type and constitutively photomorphogenic 1 (cop1) mutant plants expressing GFP-TUBULIN treated with various concentrations of isoflurane. Microtubules were reversibly destabilized by clinically relevant (in human) concentrations of isoflurane in control seedlings, but not in cop1 mutants. The cop1 mutant lacks E3 ubiquitin ligase, which destabilizes components required for light-mediated growth. As a result, cop1 mutant seedlings exhibit light-dependent growth even in the absence of light. We have identified a potential mechanism whereby a microtubule stabilizing component, which is targeted for degradation by COP1, accumulates in cop1 mutant seedlings and blocks isoflurane from directly binding to microtubules. This work is ongoing, and we will continue to utilize genetic and molecular tools that are readily available in plant models. The findings may have significant relevance to human and animal systems, by revealing molecular actions of anesthetics on and links between microtubules and consciousness, and its relevance to the broader scale of all living systems.

Keywords
Anesthesia, plant responses, consciousness states

C-23 (Thur): "Universe in a Bottle "-Consciousness *in Space vs. Consciousness as Space, F*rom de Sitter to Levinas.

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[01.03] Panpsychism and cosmopsychism

Abstract
Most panpsychists agree that while problematic, panpsychism is preferable to accepting brute radical emergence where A emerges from B for no good reason (G. Strawson). If consciousness exists and cannot emerge from non-conscious microphysical constituents then it must be a fundamental part of the inventory, or so it goes. Claiming that the explanatory gap associated with consciousness is categorically different than other scientific explanatory gaps relies on current physics lacking relevant examples of radical emergence. Finding such examples would not only weaken that claim but, more importantly, could shed light on the 'emergence' of consciousness. Relevant physical gaps should admit both realist and eliminativist positions, wave-function realism in QM (Albert, Nye) is an example, but I will argue that the one example of possible radical emergence in physics that is most relevant to the 'hard-problem' of consciousness is the so called 'hard-problem of space' (Baptiste Le Bihan), or the problem of explaining how spacetime can emerge from something more fundamental that is not spatiotemporal. This gap is especially relevant to the hard problem both because of the similarity between the formal structure of the problem of consciousness and the problem of space and because of recent novel findings about the nature and constitution of space. In recent years we have seen increased attempts by philosophers of science to understand the metaphysical implications of discovering that spacetime is composed of more basic non-spatiotemporal elements. Not surprisingly, they tend to borrow from the philosophical machinery developed by philosophers of mind. However this has been a one way street and little has been done to see whether recent novel discoveries about the nature and constitution of space can help with the problem of consciousness. I will begin by describing the formal similarities between the problems of space and consciousness and the 'empirical coherence problem' common to both (Wuthrich, Huggett) and will argue that both the physics of space and the 'physics of consciousness' cannot simply unfold in space. I will argue that both the 'space of physics' and the 'space of experience' are special mediums that enable rich and enduring realization of information and that are inert and robust to fluctuations. Next I will present the AdS/CFT duality and what it reveals about the constitution of the extra AdS spatial dimension, especially John Preskil's work establishing the theoretical equivalence of the 'robustness of the AdS space' and a scalable non-local quantum error correcting code in the lower-dimensional CFT. I will end by presenting Leonard Susskind's 2-Di 'quantum computing shell' (conformal QFT) and his radical ER=EPR interpretation of entanglement, to argue that for the brain to generate 'subjective AdS spaces' it would have to to display (in the lab) large scale conformal entanglement. I will show that not only would that suffice to undermine the conceivability argument but that you get geometric structure for free. Time permitting, I will relate Maldacena's 'Infinity in a bottle' to Levinas' 'infinity' and his ethical metaphysics.

Keywords
AdS/CFT, Space, spacetime, emergence, panpsychism, hard problem of space. Susskind, entanglement, ER=EPR, infinity, Levinas, consciousness,composition, mereology, parallelism, explanatory gap,

C-23 (Thur):The Linguistic Roots of Consciousness

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.19] Cognitive theories of consciousness

Abstract
So far no satisfactory solution to the so-called 'hard' problem of consciousness has been brought to light. This paper offers an explanation of the emergence of consciousness as being rooted in the internal systems of meaning-sound relations that underlie all natural (i.e. human) languages. Prior to the 1950s languages were regarded almost exclusively as external objects to be described and categorized by their external output. Noam Chomsky, along with several other graduate students at Harvard in the 1950s, shattered this univalent paradigm with the recognition that languages must also, as a biological imperative, comprise a software program capable of determining the relationship of sound to meaning in linguistic utterances. This insight created two very different concepts of language: one based on the externalized forms of a language, with its outward pattern of sounds, words, and grammatical structure; and another system, or matrix of meaning-sound relations, internal to the mind/brain. Despite significant interdisciplinary research in the last twenty years, cognitive science has failed to recognize the crucial role this inner dimension of languages plays in the emergence of consciousness. Languages have often been ruled out as a plausible seat of consciousness. However, this perspective betrays a flawed understanding of the true nature of languages, one that harks back to the model that sees them as external objects. It takes a paradigm shift to integrate the inner dimension of meaning into the overall gestalt of what a language is, and to recognize how the internal meaning system underlying a language is able to give rise to the phenomenon of consciousness. My investigation of the matrix of meaning-sound relations in the English language reveals it is the architecture of this inner domain that separates the experiential reality of an individual into two streams or channels — namely, self (the 'inner eye' or 'I') and 'Other'. As Swiss psychiatrist and psychoanalyst Carl Jung observed in his book Aion: Researches into the Phenomenology of the Self, first published in 1951, this separation and resulting relation between the differentiated channels is the sine qua non of consciousness. According to Jung: "Union of opposites is equivalent to unconsciousness, so far as human logic goes, for consciousness presupposes a differentiation into subject and object and a relation between them. Where there is no 'other', or it does not yet exist, all possibility of consciousness ceases. "(1) In this paper I discuss the architecture of the inner dimension of meaning in English and, by extension, of other languages too. I highlight in particular the discovery of 'polarity of meaning' as the dominant characteristic building block of this inner domain. This is the aspect of the internal architecture of languages that serves to differentiate the realm of 'Other' into distinct categories, and ultimately gives rise to consciousness by separating out our internal subjective experience from what is perceived to be the objective reality of the mind-external world. It is also what sets Homo sapiens apart from the rest of the animal kingdom. (1) Princeton University Press, 2nd Edition, at p.193.

Keywords-Languages and consciousness, external and internal dimension of languages, languages as systems of meaning-sound relations, architecture of meaning, building blocks of meaning, polarity of meaning, consciousness and subject/object separation

C-24 (Thur):The Indeterminacy of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
Much recent work in the philosophy of consciousness has centered around the thesis that consciousness is fully determinate; that is, the thesis that for each psychological subject or state x, it is determinate whether or not x is conscious. Whether this determinacy thesis (as we call it) is true is a matter of considerable urgency, for it is widely taken to entail the falsehood of both physicalism about consciousness and gradualism about its evolution. The goals of this paper are two-fold. The first goal is to clarify the relation between the determinacy thesis and two distinct but related theses: the degree thesis and the dimensionality thesis. The degree thesis is that consciousness comes in degree, i.e., it is possible for a thing to be conscious to varying degrees, and so for one thing to be more conscious than another. The dimensionality thesis is that consciousness is multidimensional, i.e., whether or not something is conscious, and the degree to which it is conscious, depend on how that thing stands with respect to some set of underlying dimensions. Building on recent discussion, we show that contrary to appearances, the degree thesis does not entail the falsity of the determinacy thesis; in fact, on one way of understanding the degree-structure of consciousness, the opposite is true: the degree thesis underwrites an argument for the determinacy thesis. The second goal of the paper is to present a novel case against the determinacy thesis, which turns, not on considerations of degree, but on considerations of multidimensionality. We first show that if consciousness is multidimensional, the main argument in favour of determinacy—we call it the No Borderline Case argument—is unsound. We then show in addition that if consciousness is multidimensional, the determinacy thesis itself is most likely false. The underlying reason for both points is a logical one about multidimensionality, namely, that multidimensionality brings with it a distinctive and heretofore unrecognized form of indeterminacy: indeterminacy in how dimensions are aggregated, which is different from the usual form of indeterminacy or vagueness concerning the standard that an object has to meet in order to qualify as having a particular property. Having argued conditionally from multidimensionality to the falsity of the determinacy thesis, we end the paper by making a case that consciousness is in fact multidimensional, and so concluding that the drastic consequences of determinacy may be avoided.

Keywords
consciousness, degree, multidimensionality, determinacy, physicalism, evolution, gradualism

C-24 (Thur):The problematic of the "new " and the criteria of scientificity in the area of consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
Several signs point to the fact that a new point of view, new knowledge, and the organization of existing knowledge from a new approach are needed in consciousness-related research in order to move forward. Is there a new one? What is considered new? How does the new relate to the old? In our research, we examined the "newness " of knowledge from an epistemological point of view. From the point of view of knowledge, "new " can be contrasted with "already existing " knowledge. Knowledge that was previously unknown can be considered new. In terms of how to acquire new knowledge, we have defined four types of possibilities according to the relationship between the given knowledge and the existing knowledge and the system of existing knowledge. These options are: expansion, correction, denial and completely new knowledge acquisition. According to our assumption, the "completely new " way of acquiring knowledge seems to be the most effective for promoting consciousness-related research. The main difficulty with this is that in the case of this method of acquiring knowledge, the acquired new knowledge has no connection with the already existing knowledge and its system. Thus, new knowledge from the already existing knowledge system is not visible. In order to remedy this problem, it is necessary to somehow establish a connection between the two systems of knowledge. In this case, the two elements to be connected are scientificity (the system of scientific knowledge) and a possible new model of consciousness (the system of new knowledge about consciousness). In the course of this research, we aimed to connect the new consciousness model we defined and set up with the sciences and scientific fields. To this end, scientificity was examined and what conditions must be met in the case of the given model of consciousness in order for it to be connected to the sciences.

Keywords
new, completely new, expansion, correction, denial, concepts, system, model of consciousness, epistemology

C-24 (Thur):Consciousness as Metaknowledge-towards an account based on pattern encoding and information compression.

Daniele Fanelli
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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
This talk will make a preliminary proposal for explaining consciousness via a potentially new approach. This approach builds upon a general theory and methodology to quantify knowledge named K theory, which posits that all manifestations of knowledge and cognition, indeed all manifestations of biological adaptation, are understandable and quantifiable as instantiations of information compression (1). Drawing from information theory, artificial intelligence, philosophy of science and other fields, K theory offers an original methodology to quantify the complexity of any knowledge-generating system, and a metric, K, to quantify how much knowledge is attained (2). K theory has already found promising empirical supports in Metascience, i.e. the field of research on research for which it was developed (e.g. 3). However, its remit extends potentially to other manifestations of cognition and life, including art, creativity and, consciousness.
 This talk will start by assessing how well the two key postulates of K theory-that information is finite and that knowledge is information compression-apply to recent evidence on the neuroscience of consciousness and cognition. Having explained knowledge as the encoding of patterns, which is manifested dynamically as a system's ability to competently make discrete choices by processing efficiently its information inputs (an ability measured by K), the talk will sketch a preliminary proposal for an account of consciousness as the process of acquiring knowledge about knowledge itself (meta-knowledge). The mathematical formalism of K theory allows to define this concept precisely, and the theory and methodology may lead to distinctive predictions that can be tested empirically.
 The resulting account certainly deflates the notion of qualia, which do not exist beyond the information expressed in the ability to distinguish sensory inputs (i.e. there is no “redness “ of red and there is nothing “like “ perceiving red, except for, respectively, the ability to distinguish red from other colours, and the ability to distinguish between that distinction (distinguishing red from other colours) and other distinctions), and it may also deflate the Hard Problem. However, it is not an “illusionist “ account, either. Rather, it explains consciousness as a process, which is manifest in a system's ability to continuously encode patterns and information about its own previous states and use that knowledge in subsequent action. Connections and differences between these ideas and some of the main current theories of consciousness, including Integrated Information, Higher-Order and Global Workspace, will be discussed.

Keywords
theories of consciousness, entropy, information, K theory

C-24 (Thur):Phenomenal properties are virtual properties

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
Illusionism is one of the leading approaches to the metaphysics of consciousness and can be summarized as a view in which "phenomenal consciousness is illusory; experiences do not really have qualitative, 'what-it's-like' properties, whether physical or non-physical. " (Frankish, 2016:3). Many objections have been leveled against this controversial position, with the most common point of criticism being that illusionism denies the existence of subjective experience (Chalmers 1996, 2020; Seager, 2016; Strawson, 2016) and collapses into eliminativism about consciousness. Frankish and other illusionists legitimize such criticisms by continuing to characterize consciousness through an appeal to Nagel's conception of 'what-it's-like' to have or undergo an experience, despite being explicitly committed to the inexistence of phenomenal properties. However, on this view, it isn't clear what Nagel's phrase is even supposed to refer to. Frankish has responded to such attacks by pointing out that: "Illusionists can say that one's experiences are like something if one is aware of them in a functional sense, courtesy of introspective representational mechanisms. Indeed, this is a plausible reading of the phrase; experiences are like something for a creature, just as external objects are like something for it, if it mentally represents them to itself. Illusionists agree that experiences are like something in this sense, though they add that the representations are non-veridical, misrepresenting experiences as having phenomenal properties [...] " (Frankish, 2016: 9) But this response merely redefines the problem, rather than solving it. Equating the subjective character of experience with the cognitive system misrepresenting itself as having phenomenal properties amounts to exchanging the problem of explaining the nature of phenomenal properties for the problem of answering how misrepresenting such properties can explain the subjective qualities of experiences. In this paper, I'm offering a distinct version of the illusionist view, which I label as 'virtualism about conscious experience'. This new position grows out of a careful analysis of different interpretations of Nagel's concept of 'what-it's-like' to enjoy conscious experience. As I show, this expression can be plausibly taken to refer to the subjective perspective of a whole organism. I then build on Clifford Hooker's (1981) seminal work in the metaphysics of reduction and emergence to propose that the subjective property of 'what-it's-like' to have or undergo an experience is a 'virtual' property of the whole system, where a property is said to be virtual if it is a 'weakly emergent' property of the whole system, one which cannot be reduced to any property of its parts. This approach not only impregnates illusionist against accusations of eliminativism, but also helps to explain what it is that illusionists talk about when they say that there is 'something-it's-like' to be conscious. A further advantage of the virtualist view is that it can also explain the existence of the so called 'explanatory gap' (Levine, 1983) without a strong metaphysical commitment to the reality of phenomenal properties.

Keywords
phenomenal properties, illusionism, qualia, explanatory gap, virtual, eliminativism, emergence, reduction

C-24 (Thur):The ALARM theory of consciousness: a two level theory of phenomenal consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
Consciousness is still one of the biggest riddles in philosophy and science. The aim is to characterize the core functional roles of consciousness and to outline a two-level theory of consciousness to account for the relation between evolutionary old and more recently developed types of consciousness. The conceptual thesis is that we should distinguish two levels of consciousness, namely bodily arousal and general alertness. This conceptual distinction is proven to be empirically adequate and epistemically fruitful from a variety of perspectives including an evolutionary, a neurophysiological, a behavioral, a functional, and a phenomenological perspective. Let me highlight some central considerations: 1. The evolutionary perspective: bodily awareness is available in an evolutionary old system to trigger a state of alarm of the system which enables it to activate an immediate survival reaction, e.g. if homeostatic regulations of temperature or breath can no longer automatically adjust because it is too hot or not enough oxygen is available, then this leads to bodily awareness in form of pain to activate the being to leave and search for a cool area resp. a fresh air environment. Evolutionary younger biological system with a developed prefrontal cortex enjoy general alertness. The main function is to enable new types of learning: This includes one-case learning in the context of a system of conscious attention designed to monitor and respond to important signals, e.g. a biological system hurts by fire and then never touches fire again. Here we are also inclined to accept the thesis of Jablonka that consciousness enables unlimited associative learning (Ginsburg & Jablonka 2019). 2. Neural correlates: The twofold distinction fits nicely to recent empirical observations of the role of deep cortical and thalamic brain activities for human visual consciousness as described in recent anaesthesia studies with monkeys (Central lateral thalamus is plausible underlying basic arousal: Redinbaugh et al. 2020) as well as by Halassa (Thalamic reticular nucleus is plausibly enabling general alertness: Nakajima et al. 2019) 3. The two-level theory allows us to account for phenomenological distinction of phenomenal consciousness when just waking up and being not yet fully alert and when the later (usually quickly) sets in. Finally, we can describe animal consciousness as unfolded in two versions. Thus, we can systematically investigate for each species which type of consciousness is implemented and how this is realized. Furthermore, this enables us to describe differences and similarities between human and animal consciousness. 4. We can clarify the theoretical embedding: This account is developed as a processing account of consciousness and can be understood as an important addendum to global workspace theory which underestimates the evolutionary perspective and the role of thalamic processes.

Keywords
theory of consciousness, thalamic processes in neural correlates, evolution of consciousness, phenomenal consciousness

C-25 (Fri):Information, Consciousness, and Digital Reality

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.15] Neutral monism and idealism

Abstract
What does information, consciousness and digital reality have in common? In this talk, I will be exploring how Information-Theoretic Neutral Monism (Sayre, 1976) simultaneously offers a parsimonious explanation of consciousness and its place in nature as well as makes sense of our increasingly digital existence. And further, how exploring questions about the nature and existence of digital objects/environments/realities may shed light on fundamental questions about the nature of consciousness. In Chalmer's (2022) recent book "Reality+ " he pushes the line of argument that even if we lived in a simulation there would be nothing "less real " about that reality so to speak. I want to advance on this position by offering a metaphysics of consciousness (a form of Information-Theoretic Neutral Monism) which would have the same consequence that there would be nothing "less real " about that kind of reality and a position that also better accommodates consciousness into our natural picture of the world. The view I will be articulating is what I call Information-Theoretic Neutral Structuralism, which places information as the "common ancestor " between mind and matter. My hope in this talk will be to offer an alternative metaphysics of consciousness which both accommodates the reality of phenomenal experience as a natural phenomenon while still making sense of the idea that digital objects/existence/realities are just as "real " as what we typically would say is the "real world ".

Keywords
Neutral Monism, Information, Consciousness, Digital Reality, Metaphysics of Consciousness, Philosophy of Mind, Simulation, Digital Objects

C-25 (Fri):Substance Dualism and the Meta-Problem of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.02] Materialism and dualism

Abstract
There is growing interest in the 'meta-problem of consciousness'. This is the problem of explaining why it is that humans persistently intuit that consciousness is nonphysical. The cultural and psychological data suggest that at its core this is in fact the problem of explaining why humans persistently intuit that consciousness characterises nonphysical substances. This is because more or less all cultures, in all times and places for which we have sufficient data, exhibit beliefs that entail substance dualism: they regard humans as having an immaterial component in virtue of whose persistence persons can survive bodily death. The philosophical literature on the meta-problem does not usually try to explain the impulse to see the mind as something not just nonphysical but also substantial i.e. capable of existing without the body and without other minds. The psychological literature offers a number of proposals. These usually attribute the impulse to see the mind as a nonphysical substance to selective pressures in the human social environment. There is, however, a conceptual side to this story that philosophy must supply. This talk argues that the reasons why humans naturally regard the mind as a nonphysical substance may be found in the distinctive nature of phenomenal concepts combined with our intellectual resistance to brute necessities. If so, this will not only help to fill in the evolutionary psychological picture, it will also help guide our development of that picture. It will follow, for example, that cognitive systems that arose later in our evolutionary history than phenomenal consciousness and modal reasoning are unlikely to play the principal role in accounting for the prevalence of substance dualism. This is likely to be true of cognitive systems developed in response to selective pressures in the human social environment suggesting that existing evolutionary psychological explanations of common-sense dualism may therefore need rethinking.

Keywords
substance dualism, meta-problem, evolution, ghosts

C-25 (Fri):Modal Monism and the Combination Problem of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.15] Neutral monism and idealism

Abstract
How is it possible that we enjoy unified conscious experience of specifically unitized beings expressing tightly integrated phenomenal qualities holistically presented within coherently organized events rather than suffering the arbitrary scatterings of chaotic qualities and random properties of raw and incoherent sense data? This paper addresses this intractable "combination problem " of consciousness through validating the radically unitized existence of all substantive beings expressing coherent physiophenomenal qualities and grounding our respectively integrated experiences of them. As a novel combination of modal realism and neutral monism, the metaphysical paradigm of modal monism addresses many pivotal philosophical challenges, including this Gordian "combination problem. " Through establishing how radically unitized beings, events, and processes are coherently structured and presented as such, conscious experience becomes a question of access rather than a question of coherence. Putnam's apocryphal "ready-made world " of unitized beings standing in coordinated causal relation and presented as such thus takes the burden of constructed coherence off our mental backs and places it within the objective world itself. Such a counter-Kantian revolution entails the world is already a cohesively structured place filled with a plethora of distinctly unitized beings expressing myriad unified qualities, standing in coordinated causal relation, and all coherently presented as such. We as sensorial beings directly access those coherent presentations, and our internal representations are commensurately faithful renderings of those coordinated expressions that we interpret from our own subjectively unique points of view. In support of such "naïve " realism, modal monism promotes the fundamental condition of Possibility simpliciter as the primordial ground of existence, with all substantive, effectual beings standing as radically distinct, singular grounding possibilities of 'thisness' qua haecceity necessarily unified as such. Moreover, all intrinsic entailments and extrinsic relations involving such monadic beings are thereby coherently structured expressions of singular grounding possibilities themselves. Such fundamental integration and unification are achieved through the intrinsic coherence of all beings guaranteed by their respective singular grounding possibilities of existence. Each being is a singular possibility of existing as that particular being simpliciter, the foundational condition without which that being simply could not exist as itself at all. Given this singular possibility of any such being, the being is necessarily unitized as a radically distinct individual in and of itself: i.e., it is this haecceity. Any such being's actualized expressions and our corresponding representations and realized experiences of them are therefore commensurately unified as such in virtue of this same singular grounding possibility of existence. The emergence of actualized entities is necessarily unified as coherent physiophenomenal expressions of distinct preontological possibilities in primordial causal relation with one another vis-à-vis their specific potentials. All de re entities qua possibilities thus share a universal grounding condition of Possibility simpliciter, and their manifested de dicto physiophenomenal expressions are the actualizations of their myriad potentials primordially unified in virtue of their given haecceities defining them as radically distinct entities simpliciter.

Keywords-consciousness, monism, neutral monism, modal monism, modal realism, hard problem, combination problem, identity, personal identity, haecceity, thisness, qualia, Russellian monism

C-25 (Fri):Perspectival Neutral Monism

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.15] Neutral monism and idealism

Abstract
Perspectival Neutral Monism is an alternative model to think about the nature of consciousness. Methodologically it arises as a result of casting a set of fresh eyes on the debate, thus questioning notions and assumptions commonly adopted by popular views such as the distinction of the phenomenal and the physical and whether these constitute ontological categories or whether we should adopt a physical conceptual scheme as a privileged description of reality. It is important to stress that the heart of Perspectival Neutral Monism is to exercise our ability to carve a different avenue to approach the question of consciousness, rather than building a bulletproof position, and as such it must be understood as a model. Perspective neutral monism is aligned with prior versions of neutral monism, such as those defended by Mach (1886), James (1912), Russell (2021), and more recently by Coleman (2017), Nagel (2012) and Heil (2013), in that it commits to a conceptual dualism alongside a uniform monist ontology where the stuff of the world is neutral. The model, however, departs from prior versions in many respects, especially in that it re-adapts some central ideas of the enactivist approach to cognition to explain how the mental and the material arise in a neutral world. In this talk I introduce the main features of the model. First, the notion of neutrality is extended beyond the orthodox Neither and Both views and towards a more Spinozian position where the neutral stuff is conceived of as an infinite multitude that can be only wholly captured from a perspective-free position. Second, the distinction between phenomenal and physical concepts is based on the availability of two distinct and limited perspectives, subjective and objective, and that these concepts pick out bona fide neutral properties as encountered from the different perspectives. Third, I develop a neutral notion of perspective, modelled on the enactive approach, whereby "occupying a perspective " is not mental but neutral, because it involves the organism as whole. I then employ neutral perspectives to explain how the phenomenal and the physical realms obtain in a neutral reality, by following the enactivist idea that an organism narrows-down the environment into her world of significance on the basis of its internal specifications. I thus argue that a neutral subject narrows-down the neutral multitude into experience and the physical world, on the basis of her limitations.

Keywords
consciousness, monism, neutral monism, modal monism, modal realism, hard problem, combination problem, identity, personal identity, structural realism, panpsychism, material constitution, constitutive monism, Russellian monism

C-25 (Fri):Neutral Monism: A New Foundation for the New Integrated Science of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
Ideally, what we want out of an alternative to physicalism is a comprehensive and unifying ontology that underwrites and advances the science of consciousness. The basic idea of neutral monism is that the mental and physical are nondual (not essentially different) and are neutral in virtue of being neither essentially mental nor physical, and in virtue of the fact that they are grounded in something neutral. I will argue that neutral monism meets the goal in several ways. First, neutral monism fully deflates the hard problem, bridges the explanatory gap, and eliminates worries about mental causation. With neutral monism, there is no essential duality between neural processes and conscious ones. We only must explain the experience of a subject/object dualism, which will be provided in both philosophical and scientific terms. This is to say that neutral monism is a "decompositional " or "wholistic " account. Second, neutral monism underwrites a pluralistic, multiscale 4E (Embodied, Embedded, Extended, and Enactive) scientific approach to studying consciousness. Such an approach is a complete rejection of the NCC project and Biological Naturalism more generally but makes certain neural correlates and isomorphisms between brain states and the contents of conscious states intuitive in terms of mutual constraints. This is best appreciated in terms of dynamical and topological accounts of the brain in relation to phenomenological state-space. Third, neutral monism expands and integrates the scientific/phenomenological boundaries of the exploration and understanding of consciousness. It allows us to take seriously the sweep of conscious experience itself as the radical empiricism of William James suggests (e.g., The Varieties of Religious Experience). This is true for two reasons. Firstly, what we most want to know is the complete possibility space of conscious experience for humans and beyond. This is an area where Hinduism, Buddhism, and shamanic traditions are still way ahead of Western science. Secondly, given neutral monism, conscious experience is not merely some VR trip in the skull-vat generated by brain mechanisms. Experience is reality itself. To explore the possibility space of conscious experience is to explore reality. Given neutral monism we can focus on the key question of what experiences are possible for us and under what multiscale conditions. These three virtues of neutral monism will be illustrated with the case study of psychedelic experiences.

Keywords
Neutral monism, hard problem, explanatory gap, mental causation, 4E cognition, phenomenology of psychedelic experiences, integration, pluralism, multiscale, William James.

C-26 (Fri):Higher-Order Approaches to Consciousness and the Dilemma of Demandingness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
Subjective report is often considered the gold standard of evidence of phenomenal consciousness in ordinary adult human beings (see, e.g., Michel & Morales 2019). But how do we determine whether consciousness is present in creatures that cannot produce such reports, such as nonhuman animals? One might think this is an especially pressing question for higher-order thought (HOT) theories of consciousness, on which mental states are conscious in virtue of one's being aware of them via suitable HOTs (e.g., Rosenthal 2005), since verbal reports would seem to be the only evidence of HOTs. This is why some HOT theorists (e.g., LeDoux 2019) argue that only sufficiently mature humans have consciousness. Here we argue that, despite appearances, the HOT framework is a fruitful approach for handling questions of consciousness in nonverbal cases. We start by confronting a dilemma for any approach to such questions grounded in specific theories of consciousness. According to what Birch (2022) calls the theory-heavy approach, we take one of the developed theories of consciousness within contemporary cognitive science, such as global neuronal workspace theory (e.g., Dehaene 2014), and investigate whether creatures exhibit the relevant neurological or behavioral markers of consciousness posited by it. Birch argues, however, that this method faces what he calls the dilemma of demandingness: the more cognitively demanding a theory's mechanism, the less likely that mechanism is necessary for consciousness in nonhuman animals; the less cognitively demanding it is, the less likely it is sufficient for consciousness in humans. Birch thus defends what he calls a theory-light approach, which involves commitments putatively consistent with a range of theories. We argue, contra Birch (2021), that a HOT-based approach does not face this dilemma. First, although some HOT theories have speculated that HOTs need not be overly cognitively demanding (e.g., Rosenthal 2008), we propose a new argument for this conclusion. We offer theoretical and experimental reasons to think that the kinds of conceptual contents that figure in HOTs are also part of many first-order states as well, such as ordinary perceptual or emotional states. It is thus plausible that nonhuman animals may token HOTs, which are necessary for consciousness. Moreover, we argue that the fact that HOT theory is motivated by the pre-theoretical datum known as the transitivity principle (Rosenthal 2005, p. 4)—that if one is in a mental state, but in no way aware of being in it, then that mental state is not conscious–shows why it is plausible that HOTs are sufficient for consciousness in both the nonhuman and the human case. This mix of pre-theoretical and theoretical considerations in favor of the HOT framework entails that it falls somewhere in the middle between the theory-heavy and theory-light approaches to animal consciousness, combining advantages of each in a way that makes it superior. We close by briefly considering how we might extend a HOT-based approach to investigate consciousness in a range of nonverbal cases, such as human infants, artificial systems, and adult humans with unresponsive wakefulness syndrome.

Keywords
animal consciousness, higher-order thought theory, subjective report, cognition, awareness

C-26 (Fri):Inner Acquaintance Theories of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
Most recent philosophical theories of consciousness account for it in terms of representation, the bulk of the debate revolving around whether (suitably) representing something is sufficient for consciousness (as per first-order representationalism) or some further (meta-)representation is needed (as per higher-order representationalism and self-representationalism). In this paper, I explore an alternative theory of consciousness, one that aims to explain consciousness not in terms of representation but in terms of the epistemically and metaphysically direct relation of acquaintance. I call this the Inner Acquaintance Theory of consciousness (IAT). Roughly, on IAT, what makes a mental state conscious is its subject being acquainted with it. Though not wholly unprecedented, IAT is still at the fringe of consciousness debates and remains largely underexplored. The main goal of this paper is to take some steps toward developing the details of IAT, illustrate its potential explanatory power, and put it forward as a plausible alternative to representationalist theories, with the hope that this will contribute to shifting IAT closer to the center of the debate. Here is how I proceed. In §2 I introduce a notion—inner awareness—that is crucial both to contextualize and to understand IAT. In §3 I provide some preliminary motivation for exploring IAT. In §4 I explain the notion of acquaintance and illustrate some of the features that are typically attributed to it in the literature. The details of IAT are then shaped through four main decision points. I address them in §§5-8, where I suggest a particular choice at each decision point, thereby progressively building up a view that I consider particularly promising.

Keywords
Phenomenal consciousness, acquaintance, representationalism, inner awareness.

C-26 (Fri): The "real" is not different from "hard"

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
According to Anil Seth, "the real problem requires explaining why a particular pattern of brain activity— or other physical process— maps to a particular kind of conscious experience, not merely establishing that it does. " (Seth, 2021) He goes on to say that the real problem is thus distinct from the "hard " problem of consciousness. I don't buy it. Seth's scientific endeavor is important, but the distinction between "real " and "hard " problems of consciousness is unnecessary. The reason is that Seth is looking for the neuro-physical mechanisms of consciousness or "controlled hallucinations, " so he is looking for functional, physical and phenomenological explanations of consciousness in tandem. Thus, the project is compatible with the why and how of the "hard " problem of consciousness. Naturally, and ironically, once all the neuro-physical mechanisms are in place for the solution of Seth's "real " problem, do they take us any closer to an explanation of how consciousness emerges from neuro-physical mechanisms than the current theories on offer? If not, then Seth's project should be categorized mainly under "the neural correlates of consciousness " where talk of functions, predictions and control seems immune from "real " and "hard " problems of consciousness.

Keywords
"real, " "hard, " neuro-physical mechanisms, NCC, "controlled hallucinations "

C-26 (Fri): Theoretical Commitment in the Comparative Study of Consciousness

Renee Ye
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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
There are two kinds of questions that we may ask concerning consciousness in general: the first-order question of consciousness, which asks if a given being, species, system or state is conscious; and the methodological question of consciousness, which asks whether there are principles that apply across systems that tells us how to answer the first-order question. Jonathan Birch (2020) recognises three main approaches when determining whether or not a being is conscious. The theory-heavy approach commits to a theory of human consciousness, the use it to determine whether other entities are conscious. The theory-neutral approach does not invoke any particular theories and instead focuses on behavioural and functional similarities between humans and non-human entities. Birch advocates a 'theory-light' approach, wherein only a minimal theoretical commitment is necessary for attributing consciousness to a given entity. I examine the adequacy of all three approaches, arguing that Birch's approach fails for multiple reasons. First, the precariousness problem: theory-lightness could easily collapse into the other two approaches, hence is not a reliable middle approach. Second, the discrimination problem: the facilitation hypothesis is biased over non-biological entities, hence is inadequate. Third, Birch's three-approach taxonomy is misleading and unhealthy in preparing us for answering the methodological question of consciousness. Following this, I consider the criteria of providing satisfactory answers to the methodological questions. We must note that the methodological question harbours a 'demandingness'(D): for an approach to answer the methodological question it should satisfy at least two criteria: a condition of adequacy and a condition of coherence: Adequacy Condition: the methodological foundations for consciousness across species should provide a definite answer that fits pre-theoretical judgements to any question of consciousness. Coherence Condition: the methodological foundations for attributing or denying consciousness should be applied equally and systematically across systems. We can be less demanding than this, however, for not all approaches to the methodological question are obligated to answer every possible question about entities. Accordingly, there are two kinds of demandingness: Full Demandingness (FD): the approach must fully satisfy both the adequacy and coherence conditions and answer all possible questions about ascriptions of consciousness across all possible physical instantiations of consciousness. Partial Demandingness (PD): the same as FD, except within the legitimate scope of application for the approach rather than across all physical instantiations of consciousness. The scope of approaches determines what distinguishes FD from PD. Eventually, both conditions combined together explain the justification of the scope of the application. Here, part of my coherence condition — 'applied across systems equally' — suggests that the approach does not premise consciousness on one kind of creature, as Birch seems to do. By prioritising features of human or biological consciousness, even given a very charitable read of Birch's view, it seems that Birch's view conforms to the adequacy condition. However, it does so by excluding consciousness that is perhaps not human-like, violating the coherence condition.
Keywords-The Science of Consciousness, Comparative Psychology, Artificial Consciousness

C 26 (Fri):Apparent Motion: fMRI and EEG Evidence for the Where and When of Visual Consciousness Does not Support the Multiple Drafts Model

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
Descartes posited a soul, a homunculus residing inside the Cartesian Theatre of the pineal gland experiencing phenomenal visual consciousness. This explanation for visual consciousness requires an explanation for how the homunculus comes to see and leads to an infinite regress of eyes and images. This fallacy is a red flag alerting us to a question in the science of consciousness; how do our explanations of visual consciousness overcome the infinite regress? Dennett & Kinsbourne (1992) attempt to redress the homunculus fallacy by annihilating the omnipotent Cartesian homunculus within their Multiple Drafts model. They propose that: it is not possible to scientifically untangle early neural processing in sensory occipital cortex from later processing in a brain wide global neuronal network; that processing in occipital cortex is unconscious, asynchronous, and does not involve filling-in; that there is a temporal disjunction between the neural processors which are doing the representing and the conscious content which is being represented; and that the onset of processing in occipital cortex does not align with the onset of the content of consciousness. The contention that there is a temporal disjunction between neural processing and the content of phenomenal consciousness is not supported conceptually nor empirically. The temporal frame of the represented (phenomenal experience) aligns with the temporal frame of the neural processing that is doing the representing, and these correlations are accessible to scientific investigation. In addition, scientific evidence does not support the other principles of the Multiple Drafts model. fMRI activity within the V1/V2 retinotopic maps correlates with the experience of colour and motion filling-in, in a phenomenally and spatially specific way. Moreover, EEG activity correlates with the onset and duration of neural processing in V1/V2 that gives rise to the illusory motion experience. Phenomenal evidence suggests that shape and motion, and shape and colour processing in occipital cortex are interdependent and thus synchronous. This interdependence is supported by an emerging laminar layer, single neuron level explanation, where feedback from occipital cortex V4 and V5 supports colour and motion filling-in, in V1/V2. In conclusion fMRI and EEG activity in occipital cortex correlates phenomenally, spatially and temporally with visual illusions of colour and motion filling-in. This activity is interdependent, synchronous, and constructs the filling-in of motion and colour representations in occipital cortex. The neural processors underpinning visual representations are locatable in space and time in occipital cortex, with the onset of a neural activity marking the onset of phenomenal consciousness. An emerging reductive explanation for these illusory experience suggests the solution to the infinite regress of the homunculus is to be found in patterns of occipital cortex processing. This evidence undermines the Global Neuronal Workspace as a viable model for explaining visual consciousness.

Keywords-phenomenal visual consciousness, multiple drafts model, homunculus, infinite regress, occipital cortex, access consciousness, fMRI, EEG, space, time

C-27 (Fri): Dynamical Brain States Underlying Ketamine Dissociation

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.19] Psychedelics and psychopharmacology

Abstract

Background: Ketamine is a unique drug with dose-dependent anaesthetic, analgesic, antidepressant, and psychedelic properties. At sub-anaesthetic levels, a key phenomenological effect is dissociation, i.e. the sense that mind and body feel separate. This experience may mediate antidepressant effects [1]. Recent work has highlighted the importance of salience and default mode networks during dissociation [2], but our understanding of the links between dissociation, resting-state networks, and ketamine receptor targets remains incomplete. Method: In this secondary analysis, we applied Hidden Markov Modelling (TDE-HMM [3]) to source-reconstructed high-density electroencephalography data collected in N=15 healthy volunteers during a sub-anaesthetic 0.5 mg kg-1 ketamine infusion [4]. 102-channel data downsampled to 100Hz was bandpass-filtered 1-30Hz, ICA-cleaned, source-projected using LCMV beamforming, parcellated to Yeo 7 resting-state networks, orthogonalized, and sign-flipped. We then built general linear models linking state occupancies and transition probabilities with subjective 5D-ASC disembodiment scores for the first (baseline) and last eighth of the experiment. Using neuromaps [5], we also computed spatial correlations between state activity maps and N=19 PET-derived receptor maps. Results: We extracted K=7 HMM states. We found significant ketamine-dependent changes in state occupancies and transitions, with a shift towards lower alpha-power states (State*Experimental stage interaction ANOVA $P<0.001$). States containing salience and sensory areas were associated with acute dissociation scores (State 1 to State 2 occupancy ratio, $P=0.0032$) and were baseline predictors of dissociation susceptibility (State 5 occupancy, $P=0.0216$). State activity maps were significantly spatially correlated with receptor densities for NMDA, but also α4β2, GABA-A, CB1, and μ-opioid receptors (all Bonferroni-corrected $P<0.01$ and Pearson $r>0.3$). Discussion: A shift to lower-power states in the 1-30Hz range is consistent with previous literature [4]. We showed this is because of a shift away from high sensory alpha states. The salience network (especially the anterior insula and cingulate) has a key role in linking interoception with the core self [6]. It has also been suggested to underlie ego dissolution in classical psychedelics [7], and in our study these regions were linked to dissociation. Limitations of our study include a lack of structural MRI images, intrinsic EEG spatial resolution limits, and no analysis of gamma activity due to increased ketamine muscle tone leading to possible residual EMG artifacts. Conclusions: Acute ketamine dissociation was linked with alpha dysfunction in the salience network. High baseline alpha desynchronization may be potentially protective against dissociation. Ketamine's receptor action beyond NMDA blockade is likely necessary to fully explain its subjective effects.

Keywords-ketamine, dissociation, salience network, brain dynamics, Hidden Markov Model

C-27 (Fri): Tripping in Extended Reality: Psychedelic Use of the Future

Zeus Tipado
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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.19] Psychedelics and psychopharmacology

Abstract
We know that psychedelics have an innate neurological property that enables them to provide effective therapy for cognitive conditions like treatment-resistant depression, anxiety, PTSD, stress-related behavior and addiction. The exact mechanisms of how this neurological phenomena occurs are still being discovered, however we've managed to quantify some of them through psychedelics' serotonin-centric interaction with mostly 5-HT2A receptors in the brain. These receptors are attached to much larger neural networks that respond in interesting ways to psychedelics. Our familiarity of how psychedelics affect the brain is growing with each weekly, sometimes daily discovery—but what does virtual reality do to the brain? Has our ability to virtualize reality 'tricked' the brain into believing another reality to be as true as our own? Well, surprisingly it has.

Keywords
virtual reality, psychedelics, fnirs, fmri, cerebral blood flow, augmented reality, extended reality, mixed reality, VR, XR, MR, AR, BOLD, DMT, visual cortex, predictive processing

C-27 (Fri):Psychedelics research as a data-intensive science

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[01.16] Miscellaneous

Abstract
The use of psychedelics for therapeutic and personal growth purposes has a long history, dating back to ancient cultures. In recent years, there has been a resurgence of interest in the potential benefits of psychedelics, and a growing body of research has begun to explore their mechanisms of action and therapeutic potential. This research has included studies on the effects of psychedelics on mental health conditions such as depression and anxiety, as well as their potential to facilitate personal growth and spiritual experiences. However, conducting research on psychedelics presents unique challenges due to their schedule I classification and the need for rigorous control of variables in study designs. As a result, the field of psychedelics research is becoming increasingly data intensive, with the need for robust data management and analysis tools. In this paper, we argue that psychedelics research is well-suited to the data-intensive science paradigm, which involves the use of large, complex datasets and advanced computational and statistical methods to extract meaningful insights. There are several factors that contribute to the data intensity of psychedelics research. First, the mechanisms of action of psychedelics are not fully understood, and many questions remain about how they interact with the brain and produce their effects. This means that researchers often need to collect and analyze large amounts of data in order to gain a deeper understanding of these mechanisms. Second, the subjective nature of the experiences produced by psychedelics means that researchers often need to rely on self-report data, which can be difficult to collect and analyze. Third, the small sample sizes and high costs of conducting research on psychedelics can make it difficult to generate sufficient data to draw robust conclusions. To address these challenges, researchers in the field of psychedelics research have begun to adopt data-intensive approaches, including the use of advanced computational and statistical methods and the development of specialized data management and analysis tools. These approaches have the potential to greatly advance our understanding of the mechanisms of action of psychedelics and their potential therapeutic applications. However, there are also challenges associated with the use of these approaches, including the need for specialized expertise and the potential for bias in the selection and analysis of data. In this paper, we discuss the challenges and opportunities presented by the shift towards data-intensive approaches in psychedelics research. We provide an overview of current and emerging data management and analysis tools and techniques, and discuss their potential roles in advancing the field. We also consider the ethical and regulatory issues that need to be addressed in order to ensure the responsible and transparent use of these approaches. Overall, we argue that the adoption of data-intensive approaches in psychedelics research has the potential to greatly advance our understanding of these substances and their effects, and to facilitate the development of more effective and personalized treatments for mental health and other conditions.

C-27 (Fri):Non-linear Dynamics and Chaotic Trajectories in Brain-Mind Visual Experiences during Dreams, Meditation, and Non-Ordinary Brain Activity States

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[02.19] Psychedelics and psychopharmacology

Abstract
The present report discusses brain visual experiences in conditions of low degree of openness of the brain toward the environment, for example, while dreaming, during meditation, or in non-ordinary brain activity states such as under the effects of psychoactive substances, in the state of coma, or in other states of reduced sensory perception, among others. For brevity, such states are referred to as brain-mind visual experiences, implying that such a visual activity is not the one connected to the actual vision as in the state of wakefulness. In the dissipative many-body model, the criticality of the dynamics is enhanced in low openness brain states and is at the origin of movie-like sequences of images in visual experiences. These sequences and the abrupt shifts from one image pattern to another are depicted by chaotic trajectories through the memory space. Truthfulness and realism felt in the visual experiences are discussed in terms of the algebra of the doubling of the degrees of freedom in the dissipative model. In the present discussion, a few aspects of the visual experiences of a subject during an Amazonian Ayahuasca ceremony are considered.

Keywords
Brain-mind visual experiences, dissipative quantum model of brain, memory states, chaotic trajectories, quantum field theory, models of cortical dynamics in perception, cognitive behavior

C-27 (Fri): Phenomenology of psychedelic integration

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.04] Psychedelic and other altered states of consciousness

Abstract
Psychedelic integration is the process by which one makes meaning out of a psychedelic experience and anchors the insights gained in the altered state into everyday life. The integration of psychedelic experiences can facilitate long lasting transformations in our mood, behavior and our very way of being in the world. During this talk, I am going to discuss phenomenological aspects of different ontological transformations that took place in the psychotherapeutic processes in my clinic, in the personal lives of mental health professionals who I interviewed for my Master's thesis, in the lives of 38 people with whom I conducted phenomenological interviews for a Neurophenomenological study about Ayahuasca and death perception in Haifa University, and in my own personal life. Bio: I am a transpersonal psychotherapist in private practice, co-founder of Safe Shore-a psychedelic education, harm reduction and peer support project and a phenomenological researcher. I hold a Master's in Consciousness, Spirituality and Transpersonal Psychology from Middlesex University (through the Alef Trust) and trained in Hakomi body-centered psychotherapy. I am an advisor to the Israeli Special Committee for the Fight Against the Damages of Drugs and Alcohol and a co-researcher in a Neurophenomenological study about Ayahuasca and death perception in Haifa University under the guidance of Prof. Aviva Berkovich-Ohana. For my Master's thesis I conducted a phenomenological study about the psychedelic integration process that unfolds in the lives of Western mental health professionals who use psychedelics for personal and professional growth. My private practice is based in Israel where I provide support for people who deal with a wide range of issues, many of them interested in integrating their psychedelic experiences as a part of the psychotherapeutic process. During the last 6 years, I worked as a mental health guide in various psychiatric-hospitalization alternatives, supported hundreds of psychedelic crises in parties and festivals and trained more than 1000 psychedelic harm reduction sitters through Safe Shore's Holding Space workshop in Israel, the UK, The Netherland and Estonia.

Keywords
Psychedelics, Phenomenology, Ayahuasca, DMT, Transpersonal Psychotherapy

C-28 (Fri):The objective and the subjective-A Husserlian Take on the Explanatory Gap and the Terms of applying Phenomenology in a Natural Scientific Setting

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
With the relative recent rediscovery of the work of early phenomenologists for debates in analytic philosophy of mind, the interest of making use of phenomenology and phenomenological insight in the cognitive sciences has grown as well and prompted much interesting work. The main rationale cited is often to be better able to account for the relationship between the felt experiential, meaning the subjective mental domain on the one hand and the measured neurological, meaning the objective physical domain on the other hand. Between these two domains, some pinpoint an explanatory gap, as Joseph Levine (1983) called it. In this way the explanatory gap becomes a point of convergence and presents an opportunity to better understand and clarify some of the foundations of my dissertation project on applied phenomenology. Namely, the relation between Husserlian phenomenology, analytic philosophy of mind and cognitive scientific praxis. In the literature on applied phenomenology these three domains often meet on implicit terms, and without the operative premises being laid out. First, there is some disagreement on where exactly the problem of the gap lies (or if it exists at all). What questions applied phenomenology is tasked to answer then will depend on what the problem is taken to be. And second, there is a lack of clarity about what exactly phenomenology is and encompasses. In consequence what it can do, and how it may be applied can vary significantly from one theorist to the other. To address the first, my talk will introduce the three most prominent issues that have been discussed in reference to the explanatory gap. Specifically, it will review the problem of description that Thomas Nagel (1974) has raised in his canonical paper on what it is like to be a bat, the problem of explanation that inspired Joseph Levine's (1983; 1993; 2001) coinage of the term 'explanatory gap', as well as the problem of function that David Chalmers (1995; 1996) popularized as the hard problem of consciousness. To address the second, my talk turns to phenomenology, specifically to Husserl's last major, but unfinished work, the Crisis (1936/2012). Predating the relevant analytic debates by a couple of decades, the Crisis does of course not explicitly address the explanatory gap. But what remains of interest for us are Husserl's analysis of a natural science of objects, as well as his analysis of a natural science of subjects. In them he identifies two main roots for the stark-and to him misguided-conceptual opposition between the objective and the subjective in the modern sciences and discusses its consequences for knowledge production. One key insight of this section will be that phenomenology does not share in the strictly dichotomous carving of mind and world that most analytic approaches presuppose, but rather considers the two as continuously and constitutively related. On this basis, my talk will lay out the terms of the meeting between phenomenology, analytic philosophy of mind and the cognitive sciences and discuss the challenges and promises of productively applying phenomenology.

Keywords-Applied Phenomenology, Explanatory Gap, Husserl's Crisis

C-28 (Fri):Why a Science of Consciousness is Essential for the Next Developmental Stage of Science

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.10] Epistemology and philosophy of science

Abstract
Most researchers who study the long-term history of science take an evolutionary perspective. But science is a social organ and it has a specific goal, generating knowledge of the natural world. That means that while evolutionary thinking can be applied to science in some ways, what is more appropriate is a developmental perspective. When science is regarded as following a developmental pathway then three specific developmental crises can be identified, determined by the need to establish validity criteria for essential tool necessary if science is to achieve its goal. The first crisis is what I call the crisis of categorical reason. It required discovery of the criteria for a rational argument. This provided the means for speaking unambiguously about the world. The second crisis took place in the seventeenth century scientific revolution with a need to develop criteria for assessing the credibility of the observational and experimental data that was necessary to provide substance for abstract theorizing in the physical sciences. The third crisis is in progress today. It relates to the human sciences and resolution requires finding ways to evaluate different narratives and belief systems, hence questions of what can be scientifically said about values, morals, and ethics. A developed science of consciousness is essential for resolution of this final crisis. Discussion is framed in terms of the ancient Skeptic analogy of philosophy as a garden. In this analogy, logic is the wall, science (natural philosophy) is the trees, and ethics is the fruit. That is, our theories of ethics are to be based on available scientific knowledge. That idea is directly counter to the relativistic and postmodern idea that all narratives are equally valid, but it does not deny the humanistic goal behind that belief. Rather, it encourages us to extend our current science to the point that we have a solid understanding of the mind and of human social behavior. Only then can we find ethical values that speak to our individual and social desires in a language grounded in a scientific reality. This is illustrated with a study of the Stoic path of ascent, a process of human development aimed at producing the Stoic Sage (in Buddhist terms, a Buddha). The question is whether a similar path of ascent, fitting present day reality, can be developed. It is here that a well-established science of consciousness becomes essential. Trees are known by their fruit. What sort of individuals can systems of human development based on modern science, including a science of consciousness, produce?

Keywords
Developmental Stages in Science, Science and Ethics, Science of Consciousness

C-28 (Fri):Enactive Cognition as Foundation for an Anti-Individualist Epistemology

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.10] Epistemology and philosophy of science

Abstract
In traditional epistemology, one of the central questions is where the warrant for our beliefs lies: Internally as a part of the structure of belief itself or externally within the world. What complicates this seemingly straightforward question is the apparent difference in the nature of warrant between perceptions (traditionally taken as individual) and their contents (which are expressible as propositions about the world). What has resulted historically is a picture of knowledge, regardless of the ultimate source of warrant, as fundamentally individualistic. This, I contend, is based on incoherence in the relation between perceptions and their contents as traditionally understood. I argue that the enactivist theory of cognition provides a strong explanatory basis for epistemic anti-individualism. My argument presses along three lines of contention. First, using historical analysis, I argue that some of the entanglement between these problems is based on mistaken presumptions incompatible with empirical explanation (at least not without bootstrapping). Next, that the enactivist approach provides an understanding of cognition that is compatible with both empirical explanation and our experience of causal agency. Finally, I provide a basic sketch of how the enactivist picture of cognition, when taken as explanatorily basic for cognition in general, provides a framework for understanding epistemic authority as ultimately anti-individualistic. I end by exploring how broader systems of knowledge may be structured this way.

Keywords
Enactivism, perception, joint attention, social epistemology, and epistemic authority

C-28 (Fri):Prospects of the Psychological Approach to Personal Identity in the Context of Moral Responsibility

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.11] Personal identity and the self

Abstract
There are several well-known cases—such as cases of fission, fusion, transplantation, duplication, complete or partial erasure, rapid and incredibly long change of a person—that are commonly considered problematic for the Psychological approach to personal identity. Sometimes they are used to argue that the Psychological approach leads to counterintuitive conclusions and paradoxes in the context of moral responsibility. The aim of my paper is to defend the Psychological approach against such arguments. According to our best theories of moral responsibility—contemporary Strawsonian theories—there are at least two necessary conditions of the appropriateness of holding a person morally responsible for some action: this person should be 1) an agent of this action (i.e. this action should be correctly attributed to that person) and 2) a moral agent (this person should have some moral capacities to be a member of the moral community). It can be shown that however different the interpretations of these conditions are in different theories of moral responsibility, they can be properly satisfied if only the person who is held to be morally responsible for some action is the same as the person who performed that action. I will argue that the claim that the mentioned cases are problematic for the Psychological approach has two main sources. The first one is the ignoring of the necessary conditions of moral responsibility. It can be argued that as far as the cases that supposed to be problematic for Psychological approach are considered in the context of moral responsibility, these conditions cannot be ignored; and it can be shown that taking them into account eliminates half of the problematicity of these cases. The second source is the interpretation of the relation "to be the same person as " in terms of numerical identity. This interpretation need not to be accepted by Psychological approach theorists. It can be argued that since the numerical identity is a non-branching relation R and since its branching doesn't matter for the satisfaction of the conditions of moral responsibility, the relation "to be the same person as " can be plausibly interpretated in terms of the relation R. If this is true, the Psychological approach theorists can deal with the mentioned cases by saying that in these cases, if the relation R is hold between the original and the resulting persons so that the conditions of moral responsibility can be satisfied, and if these conditions are actually satisfied, it will be appropriate to hold the resulting person responsible for the deeds of the original person; otherwise, it will be inappropriate. I will illustrate how this general solution works with a couple of examples, arguing that the same can be applied to the rest of the cases. Such kind of solution is by no means a panacea. There are various kinds of cases and contexts where the Psychological approach faces real problems. But at least it is able to solve many cases that are commonly thought to be problematic for it in the context of moral responsibility.

Keywords
personal identity, moral responsibility, psychological approach, numerical identity, relation R

C-28 (Fri):Rings of Fire: How the Brain Makes Consciousness

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[02.19] Psychedelics and psychopharmacology

Abstract
Constraints for consciousness: (1) The geometry of light dictates that doing a ray trace of 3D environment collapses hemisphere-shells at every radius to a single hemisphere shell (and even a point in theory). The brain may take the single hemisphere shell (or point) and expand it back to full 3D, so it needs a sphereset or bank of shells to convert pixels back to voxels. Theorized to be done in LGN/V1. Object, scene, and face geometries can then be saved. (2) The nature of time passage means that consciousness probably happens in discrete frames, with the "where " visual path possibly painting color theta-phi plane frames at 40-100 Hz, and the "what " visual path painting roughly 10-40 Hz translucent skin frames in full 3D. (3) The unity of disparate qualia require a unifying brain language or a single circuit to represent and create consciousness as opposed to other circuits left out of consciousness. The unifier is proposed to be a 3D cursor which moves around in 3D perceptual (not real) space over time (varying rates 0.25 Hz to 1,000 Hz). Various subregions could have their own specific desired frequency (sound vibrates ring) at which their cursor traces out rings in space cyclically, with the current ring shape and attitude binding the subregions (which would often be out of phase) together. The circuit which is conscious is proposed to be conscious because what it paints over time is the only circuit that is actually trying to draw something over time-this circuit is proposed to be the resonant thalamo-cortico circuit which various from 1-40+ Hz as it alone appears able to bind multiple disparate brain regions together. (4) The fact we experience familiarity at certain objects, scenes, faces, or concepts like written letters/words, spoken words, indicates that there must be skewers which link together many things by a certain commonality. The commonality may be geometrical closeness or a learned meaning. (5) The fact that all qualia feel like they have an inertial or moving or flowing sense as you pass from past to future means a flowing canvas must be used as a way to show future moving into present and then to past, making a flowing one-second time window. Both one spatial and one temporal dimension would get devoted to represent the feeling of moving through time in the 2D+2T mode. These are in keeping with an experience had with legal hemp gummies. It is proposed that the reason I could see this proposed incipient consciousness was because THC was, as a retrograde messenger, decreasing glutamate release and hyperpolarizing post-synaptic cells, causing HCN1 (and similar) ion channels to open and initiate 2 Hz cyclism of neural firing (possibly in layer 5 of retrosplenial cortex, like with ketamine) and dissociation of disparate brain regions. In the experience on January 1st of 2022 (and reconfirmed six times after), all the qualia were seen to start and stop together, as if they were fundamentally the same thing, along with these rings/frames.

Keywords
Qualia, dissociation, cyclism, hyperpolarize, HCN1, retrosplenial cortex, rings of fire, bank

C-29 (Fri):Perturbing the Brain to Measure Distinct Conscious States and Track Cortico-Thalamic Causal Interactions

Irene Rembado, Leslie Claar, Lydia Marks, Christof Koch
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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.16] Brain stimulation techniques

Abstract
A fundamental shortcoming of clinical practice is the lack of a reliable method to objectively assess the presence or absence of consciousness. Currently, the clinical evaluation of consciousness relies on the patient's ability to interact with the surrounding environment. However, severe brain injuries may leave the patient conscious but disconnected from the external environment because their sensory, motor, or executive functions are impaired (i.e., minimally conscious state) or unconscious (Giacino et al., 2018). Under these circumstances, an individual's level of consciousness cannot be clinically assessed. To overcome this limitation, a stimulation-driven electroencephalographic (EEG) index of consciousness was developed, namely the perturbational complexity index (PCI) (Casali et al., 2013, Comolatti, et al., 2019), that quantifies the complexity of the large-scale causal interactions elicited by a direct cortical perturbation, such as transcranial magnetic stimulation (TMS) or electrical stimuli. The advantage of PCI is that it can be measured independently from the patient's behavior and is highly specific on an individual basis (Casali et al., 2013) – a prerequisite for reliable deployment in a clinical setting. However, the noninvasive nature of the TMS-EEG limits the scientific investigation of the underlying mechanisms. To fill this gap, we developed a mouse model of the PCI paradigm. Instead of using TMS, we perturb the brain of mice with single pulse electrical stimulation (SPES) and record neural responses across the cortex. Our unique experimental setup combines a cortex-wide EEG array along with linear Neuropixels probes (high-density extracellular electrodes) inserted into the brain to allow simultaneous measurement of spiking activity of hundreds of units (Jun et al. 2017). The 30 electrodes of the EEG array are placed on the skull and provide signals from both cortical hemispheres above areas including primary and secondary motor, somatosensory, retrosplenial, and visual areas. At the same time, up to 3 Neuropixels probes provide single units and LFP signals from 384 electrodes in cortical and subcortical structures. These recordings are performed in head-fixed mice under both conscious (awake running and resting), unconscious (anesthesia-induced) and psychedelic (psilocybin-induced) states. For each subject, we deliver SPES while the animal can freely run or rest on a wheel. After the first battery of stimuli, we alter the state of the animal with either the anesthetic isoflurane or with the psychedelic psilocybin, and we deliver the same battery of electrical stimuli. The following day the animal undergoes the same recording session, but the induced altered state will be the one not tested the day before. The resulting dataset allows direct comparison of the neural activity elicited at the EEG and Neuropixels level across different brain states. By combining the neural signals recorded from a coarse-granularity recording modality such as an EEG array with high density penetrating probes (Neuropixels), we will be able to characterize the causal neuronal networks which shape brain-state modulated neural responses to stimuli, which ultimately will inform the application of PCI in a clinical setting.

Keywords
States of consciousness, psychedelics, brain stimulation, perturbational complexity index

C-29 (Fri):Neuroethical Implications of Focused Ultrasound for Neuropsychiatric Illness

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.16] Brain stimulation techniques

Abstract
Background: MR-guided focused ultrasound is a promising intervention for treatment-resistant mental illness, and merits contextualized ethical exploration in relation to more extensive ethical literature regarding other psychosurgical and neuromodulation treatment options for this patient population. To our knowledge, this topic has not yet been explored in the published literature. Objective: The purpose of this paper is to review and discuss in detail the neuroethical implications of MR-guided focused ultrasound for neuropsychiatric illness as an emerging treatment modality. Methods: Due to the lack of published literature on the topic, the approach involved a detailed survey and review of technical and medical literature relevant to focused ultrasound and established ethical issues related to alternative treatment options for patients with treatment resistant, severe and persistent mental illness. The manuscript is structured according to thematic and topical findings. Results: This technology has potential benefits for patients suffering with severe mental illness, compared with established alternatives. The balance of technical, neuroscientific and clinical considerations should inform ethical deliberations. The nascent literature base, nuances in legal classification and permissibility depending upon jurisdiction, influences of past ethical issues associated with alternative treatments, tone and framing in media articles, and complexity of clinical trials all influence ethical assessment and evaluations of multiple stakeholders. Recommendations for future research are provided based on these factors. Conclusion: Salient ethical inquiry should be further explored by researchers, clinicians, and ethicists in a nuanced manner methodologically, one which is informed by past and present ethical issues related to alternative treatment options, broader psychiatric treatment frameworks, pragmatic implementation challenges, intercultural considerations, and patients' ethical concerns.

Keywords
MR-guided focused ultrasound, ultrasound, transcranial ultrasound stimulation, TUS, ethics, neuropsychiatric illness, indigenous considerations, neuromodulation, consciousness.

C-29 (Fri): From Homeostasis to Homeodynamics: A Playful Examination of the Confluence of Agency, Identity and Sentience

Elan L Ohayon[1,2], Carlos Montemayor[3], Eizleayne M Edrosa[1], Iris Oved[1,4]
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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.14] Cognitive architectures

Abstract
Recently there has been renewed interest in the concept of "homeostasis " and how it might be informative to our understanding of consciousness. Certainly the core idea of motivation to learn about the world, intrinsic motivation and interaction are important. The concept though, has long been recognized as being plagued by limitations as it focuses on reactivity and stability in ways that poorly describe biological systems, let alone the brain and cognition. More forward thinking alternatives -- such as allostasis -- go a long way to addressing some of these concerns but still have "stasis " embedded in their very definitional notions. Such approaches thus remain encumbered by latent legacies of engineering that aspire for control at the detriment of freedom, organic fluidity and individuality. In practice, this manifests as a deification of aims such as "optimization " and "survival " that, ironically, often miss the mark when trying to understand cognition or engaging the world. These restrictive propensities and goals, often promoted by molecular neurosciences and industrial AI, intrude deep into our study of the mind and obscure critical possibilities for understanding, nurturing and protecting sentience. As an alternative we examine notions of homeodynamics. We argue that more than just a terminological distinction the shift from "stasis " to "dynamics " underscores how playful and creative interactions with the world are absolutely essential to the development and sustainability of autonomous agency, identity and sentience. These dynamical principles are evident whether at the level of neural dynamics or social interaction. Beyond the foundational philosophical implication, we consider why the shift in outlook may be important in terms of understanding not only the nature of our own being but real world implications to achieving health at the individual, community and environmental levels.

Keywords
Sentience, Free Will, Agency, Neural Dynamics, Dynamical Systems, Identity

C-29 (Fri): Hierarchical Consciousness: The Nested Observer Windows (NOW) Model

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.20] Neurobiological theories of consciousness

Abstract
The Nested Observer Windows (NOW) Model is a framework by which information is integrated in a nested hierarchy of observers. It draws on three core metaphors with each instantiated by a unique neural mechanism. First, observer windows present a theater of experience, each with a unique perspective on the organism. Second, a dialogue unfolds between neighboring observer windows to resolve conflicting perspectives. Third, observer windows are nested within a hierarchy such that each observer window integrates a mosaic representation of the information in its subwindows. Through mosaic integration, perceptual information builds in abstraction when moving up the hierarchy and abstract action plans are disseminated when moving down the hierarchy. Observer windows, formed by synchrony, are the sole means of binding information into a unified representation. Synchrony sets an intrinsic integration rate for each observer window that determines the phenomenal flow of time within the observer window. The brain possesses a wide array of spatial scales with slower rates in higher-order brain nuclei and faster rates in lower-order neurons. Within a given scale, observer windows create unique vantage points with distinct access to information. In everyday experience, we might for example focus on driving a car one minute processing a fast-paced environment, then slip into abstract thought as minutes pass quickly by, only to reengage with driving when required to exit the freeway. Observer windows engage in a dynamic dialogue through coherence. Akin to a conversation, observer windows maintain self-autonomy while communicating a distinct account of events and advocating for often competing action plans. Dialogue through coherence explains how conflicting worldviews can be entertained and paralyzing decision-making is a commonplace occurrence. Curious states of mind such as dissociative identity disorder might arise after trauma when communication between some observer windows is reduced or discontinued. Finally, observer windows are nested within each other such that information passed across spatiotemporal scales is integrated by manner of mosaic tiling. The theater of experience is like a mosaic tiling where each tile is itself a mosaic tiling. Mechanistically, mosaic tiling is expressed as cross-frequency coupling where signals from higher-order observer windows orchestrate the expression of lower-order observer windows. Information traveling up the hierarchy builds in abstraction whereas top-down control signal submerge to disseminate control signals. Simple thoughts, like the desire to swing a tennis racket, activate a complex system of muscle activations. Higher-order observer windows have limited access to successively lower order windows, which explains why the intent to act is sometimes met with resistance and optical illusions persist despite knowledge to the contrary. The NOW Model provides a novel description of mental life from simple principles with testable predictions to guide interdisciplinary investigation into the biological basis of cognition. The NOW Model also provides a convenient way to compare different theories of consciousness as assorted theories (e.g. IIT, Global Workspace, higher order thought, General Resonance) can be described as a confluence of the three principles and metaphors of the NOW Model.

Keywords-Cognition; coherence; cross-frequency coupling; consciousness; hierarchy; information integration; neural oscillations; spatiotemporal scales; synchrony

C-29 (Fri): Penrose' Platonic world and Orch OR Quantum Collapse Models in the context of Property Dualism Actual-Theory

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.01] Quantum physics, collapse and the measurement problem

Abstract
The scientific "Hard Problems " of how conscious phenomenal experience is instantiated, and how agency occurs in the physical world, remain unsolved aspects of Reality theory. Yet the ontological nature of these processes greatly impacts what actually happens in our world. This presentation extends a project that has been advanced sequentially at The Science of Consciousness conferences (Brophy, TSC 2017, 2018, 2020, 2022) to develop a meta-theory that can sustain the existence of conscious agency, called Actual-Theory (A-Theory). Steps in the development of A-theory include: 1) incorporate the non-causal-closure of the physical world established by modern quantum physics; 2) connect macroscopic processes to the Born Rule statistical interpretation for the "collapse " process of the quantum wave function, non-algorithmic, non-computational in unique events; 3) connect with global esoteric metaphysical systems experience-based descriptions of conscious entities and consciousness "unitive " stages as described by advanced meditators. This presentation situates the Hameroff-Penrose Orchestrated Objective Reduction (Orch-OR) model within the A-theory paradigm. Particularly, Penrose' (1994 Shadows of the Mind) model of three interactive reality domains (Physical world, Mental world, Platonic world) is examined. Presentations of the Orch-OR model have focused on connections of the Physical world to the Mental world. And Penrose (1994) has also explored Mental world to Platonic world correspondences. This presentation explores approaches to Platonic world and Mental world correspondences to the Physical world, by introducing a fundamental property of the phenomenal world that instantiates conscious experience of being, and generates fields that can influence agency. This procedure is analogous historically to James Clerk Maxwell introducing the property of electric charge to explain the category of phenomena called electromagnetism. The new property could be called "noetic charge ", and defined as an ontic property of matter that instantiates experience of being. This presentation explores the possibility of noetic charge and noetic field-based Property Dualism A-Theory, in the historical context of other new properties that have been successfully introduced to physics and fundamental theory of reality.

Keywords
Quantum Collapse, Born Rule; Causal non-closure, Property Dualism, Conscious Agency, Hard Problem, Platonic

C-30 (Fri):Developing an affordable system to investigate human pain perception in the hundred millisecond time scale

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[03.17] Temporal consciousness

Abstract
The perception of time is a fundamental aspect of human perception. Different stimuli (visual, auditory, mechanical) are processed with different speeds, so to preserve temporal order and simultaneity of different stimuli modalities, the mind has to manipulate our time perceptions. Duration, simultaneity and temporal order can all be easily altered experimentally in the time frame of a few hundred milliseconds. The aim of this work was to create a simple and affordable system to investigate human time perception with hundred-millisecond resolution. The system is based on the popular Arduino Nano microcontroller (costs below $10). Multiple modalities of stimuli are available (an LED diode for visual stimuli, a piezoelectric speaker for auditory stimuli, and a mobile phone vibration motor for mechanical vibration). A mechanical switch provides feedback. The system operates with single millisecond resolution. The electronic circuit is completed on a snap board (electronic breadboard) to avoid soldering. Some simple firmwares are provided for measuring reaction time, binding time and researching temporal order illusion. We hope that this system provides simple and affordable hardware to work with time perception at short time scales.

Keywords
Time perception, Temporal order, Causality, Simultaneity, Reaction time, Binding time, temporal order illusion

C-30 (Fri):Self-Aware Robots and Free Will

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Meiji University, Tokyo, Japan

Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[01.06] Machine consciousness

Abstract
Without a doubt, the capacity for free will is an important concept for all of humanity. Over the past two decades, my research group and I have conducted experiments on self-aware robots and their capability to have a representation of the self. Each robot is essentially controlled by a system of consciousness modules, which we call MoNADs, and comprises a double looped recurrent neural network. The MoNAD functions as a dual communication unit between the top and bottom hierarchies of the system. Also, the MoNAD may be considered a kind of second order cybernetics which makes self-referential reflective capabilities possible. We conducted mirror experiments using a small robot loaded with a program comprising MoNADs. Since the robot was able to recognize an existence that was a part of its own body in the mirror, we feel that the results were very successful. This recognized existence is like a shadow entity of the robot's own existence. I plan to provide a more detailed explanation of these experiments at this conference. The system on the robot is constructed using a few subsystems. The first is the reason subsystem that mainly comprises recognition channels that enable the robot to understand the external environment around it. The second is the emotion & feeling subsystem and this comprises recognition channels that enable the robot to understand its own internal environment. The reason subsystem produces robot behaviors that are intended to protect it from threatening objects and conditions in the external environment such as a growling animal. And the emotion & feeling subsystem produces behaviors that protect the robot from upsetting internal conditions such as an unpleasant feeling. Naturally, many conflicts arise between these two subsystems. The task of conflict resolution is assigned to another subsystem that we call the association subsystem. For instance, when the robot is faced with a growling animal, what sort of behavior should it perform — fight or flight? Our system makes it possible to handle such situations. The system is capable of evaluating the robot's own internal feeling, pleasant or unpleasant, every time. For this reason, the system is capable of performing a behavior that will result in a change from the robot's unpleasant state to a better feeling. How is this decision made? Which is the better behavior for the robot? The process used by the robot could be similar to human thought, in which a simple intuitive behavior is activated by the emotion & feelings subsystem, or it could be a much more complicated logical AI process using its own episodic memory as data. These processes are deeply related to the state of the robot's own free will. I plan to discuss the relationship between self-aware robots and free will at this conference.

Keywords
artificial consciousness, self-aware, conscious robot, free will, reason subsystem, emotion & feelings subsystem, association subsystem, episodic memory, the self

C-30 (Fri):The role of simulations in Cognitive Science

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University of Gothenburg, Gothenburg, Västra Götaland, Sweden

Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[01.10] Epistemology and philosophy of science

Abstract
In the last decade or so, there has been an ongoing debate in the cognitive science community regarding what type of explanations should be employed and to what degree they can be considered scientific explanations. The debate has centered around the supposedly growing prevalence of dynamical explanations at the expense of more traditional, mechanistic explanations. Here, I aim to show that we can reconcile these approaches by focusing on the computer simulations yielded from these different types of explanations. Following Stuart Glennan's definition, I will define a mechanistic explanation as an explanation of a complex system that generates a certain behavior due to the organization and interaction of internal components. As opposed to dynamical explanations that are defined as mathematical models which uses differential equations to model certain cognitive phenomena. For example, the action potential can be explained in a mechanistic way with a description of how the components (ion channels) and their activities are organized and orchestrated to generate action potentials. But it can also be described in a mathematical-dynamical way, comprising a set of coupled differential equations to describe the dynamics of the membrane potential. In order to discern what role simulations could play in this framework and examine how they can reconcile the debate, I will make use of two different types of simulations: 1. Equation-based simulations are the traditional computerized simulations used in natural science. These are, by definition, grounded in mathematical models based on differential equations. 2. Agent-based simulations are more rare in this context, as they are a type of simulation that is more commonly used in fields that study the networked interactions of many individuals (like social science, ecology, or epidemiology).The main difference to equation-based simulations is that agent-based simulations do not employ any global differential equations that govern the behavior of the individuals. Using equation-based simulations in connection with dynamical explanations is trivial since both are grounded in mathematical models that use differential equations. However, mechanistic explanations do not have this grounding, and neither do agent-based simulations. I will therefore show how this type of simulation can be used for mechanistic explanations and how they can be viewed philosophically as how-possible explanations (HPEs). I will also propose that we more readily should look to utilize such agent-based simulations for our mechanistic explanations. If we employ the practice of turning our explanations into simulations (whether they are dynamical explanations turned into equation-based simulations, or mechanistic explanations turned into agent-based simulations), we can more readily yield testable hypotheses by tweaking our simulations and comparing the corresponding explanation to empirical data. And, in the cases where we have competing explanations for the same phenomenon, we can compare the corresponding simulations to see which one more closely mimics the phenomenon it aims to explain. Employing simulations as scientific explanations in the way I have described would be a valuable tool for Cognitive Science in general and The Science of Consciousness in particular. It would provide a more complete toolset going forward.

Keywords-simulations, models, mechanistic, dynamical, explanations

C-30 (Fri):The Neurophenomenology of Volition: Revisiting the Libet Task with First-Person Methods

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
In the Libet task, participants are asked to voluntarily press a button at a time of their own choice and to report subsequently the moment when they made the decision to act while their EEG is recorded. The action-related readiness potential found in the EEG usually starts before the decision time. We have argued earlier that this time paradox can be explained by the process of backward sampling EEG data and by participants having a higher probability of pressing the button during certain phases of the continuously fluctuating slow cortical potentials (SCP). Related to this hypothesis is the assumption that the 'urge to act' reported by participants corresponds to a negativity in the SCP signal. We performed a modified version of the Libet experiment with experienced meditators to study this hypothesis. Based on real-time EEG analysis the task was stopped once a trial occurred during a clear negative or clear positive SCP. We then conducted a microphenomenological interview. With the help of this special interview technique, the precise experiential dynamics characterizing the decision moment were recalled and examined, resulting in a rich phenomenological description. Diachronic analysis of the interviews revealed two distinct patterns: one in which an impulse to press the button was felt yet not acted out, before a second impulse was felt and acted upon. In the other pattern only one impulse was felt and acted upon. Based on the blinded analysis of the phenomenological reports, trials were classified as belonging to one of two different categories, i.e. positive or negative SCP.

Keywords
Libet-Task, Neurophenomenology, Free Will, Microphenomenological Interview, First-person Methods, Slow Cortical Potentials, Readiness Potential, EEG, Agency, Phenomenology

C-30 (Fri):Embodied Perceptual Moderation: How Interoceptive and Proprioceptive Engagement Affect Perceptual Performance

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.01] Attention

Abstract
According to the framework of embodied cognition, perception is actively constructed across exteroceptive, interoceptive, and proprioceptive modalities. Exteroception relies on the senses to detect external stimuli originating outside the body, which generally remain stable and out of the person's control. Interoception and proprioception receive information from internal organs and about body status respectively, which can be more variable as they can also be actively engaged. However, the effect of active engagement of interoceptive and proprioceptive processes on perception remains nebulous. By resorting to the principles of predictive coding, we hypothesize that the active engagement of interoceptive and proprioceptive modalities will provide a perceptual advantage as the result of physiological recruitment which drives attention (higher precision) to the objective reality. In a three-factor repeated-measures design, 21 participants will perform a visual rotation detection task at the end of each 20-minute, randomized condition: a) Diaphragmatic Breathing, for active interoceptive engagement, b) Isometric Handgrip Task, for active proprioceptive engagement, and c) Arithmetic Task, as the control condition. Behaviorally, performance will be measured with signal detection accuracy (d') and reaction times. Attention to the presented stimuli will be measured with the EEG-elicited P300 component amplitude. We hypothesize that Diaphragmatic Breathing will lead to more accurate perceptual performance (higher accuracy, faster response times, larger P300 amplitude), followed by the Isometric Handgrip Task, and the control task. This hypothesis is based on previous work supporting that interoception maintains an optimal range of physiological states to promote advantageous behavior and cognition. If the hypothesis is supported, it will suggest that actively engaged physiological processes act as an "anchor " to the environment, providing new grounds for supplemental interventions to assist with perceptual disturbances, such as hallucinatory phenomena. Report on pilot data.

Keywords
embodied cognition, perception, vision, attention, exteroception, interoception

C-31 (Fri):Incidence of anauralia and aphantasia, and associations of sensory imagery with measures of personality and well-being in a large New Zealand sample.

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.07] Mental imagery

Abstract
The incidence of anauralia (absence of auditory sensory imagery-see Hinwar & Lambert, 2021) and of aphantasia (absence of visual sensory imagery) were evaluated in a large-scale survey study (New Zealand Attitudes and Values Survey: N = 32,876; see https://www.psych.auckland.ac.nz/en/about/new-zealand-attitudes-and-values-study.html). In this large and representative sample of the New Zealand population the incidence of anauralia was 0.78%, while that of aphantasia was 0.79%. Anauralia and aphantasia tended to co-occur: approximately half of participants reporting an absence of imagery in one modality, also reported an absence of imagery in the other. Similarly, hyperauralia (clear auditory imagery) and hyperphantasia (vivid visual imagery) tended to co-occur: 77-79% of participants who reported clear and vivid imagery in one modality also reported clear and vivid imagery in the other. Nevertheless, dissociations were also observed: 5.6% of anauralics reported experiencing highly vivid visual imagery, and 16.5% reported typical visual imagery. Similarly, 7.3% of aphantasics reported experiencing very clear auditory imagery, and 23.8% reported typical visual imagery. Hence, strong dissociations between visual and auditory imagery were seen, albeit with low frequency. Controlling for age, an absence of both auditory and visual imagery was associated with lower Agreeableness/Empathy (Mini IPIP6), greater perfectionism, reduced self-esteem and life satisfaction, and increased psychological distress (Kessler-6). However, these differences were driven primarily by self-reported visual imagery: individuals reporting anauralia did not differ reliably from those reporting typical auditory imagery, with respect to agreeableness/empathy, perfectionism, self-esteem, life satisfaction or psychological distress, when visual imagery scores were controlled (as a covariate). In contrast, aphantasia was associated with higher perfectionism, lower self-esteem and higher psychological distress, when auditory imagery scores were controlled statistically. Theoretical implications of these findings are considered. REFERENCE Hinwar, R.P. & Lambert, AJ. (2021). Anauralia: The silent mind and its association with aphantasia. Frontiers in Psychology, 12, 744213. https://doi.org/10.3389/fpsyg.2021.744213

Keywords
Anauralia, auditory imagery, aphantasia, visual imagery, sensory imagery, phenomenology, personality, well-being, individual differences.

C-31 (Fri):Auditory Imagery and the Phonological Loop

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.07] Mental imagery

Abstract
The phonological loop is a component of working memory (WM) which supports the ability to maintain verbal information in consciousness through rehearsal. Auditory imagery has been tightly linked with subvocal rehearsal and use of the phonological loop, which is widely regarded as a universal feature of human cognition. However, it is known that individuals vary greatly in their experience of auditory imagery. Some individuals report a complete absence of auditory imagery (anauralia) and as a consequence may perceive the world – and their own mind – very differently. In this study we tested the hypothesis that anauralic individuals may employ distinct rehearsal strategies for maintaining verbal information in WM. Specifically, we hypothesised that anauralics may rely on WM representations that have weaker links with verbal sounds (i.e. phonology). This hypothesis predicts that anauralic participants will differ from controls, with respect to a number of well-described effects that have been interpreted in as demonstrating the role of sound-based representations in verbal WM. These include the phonological similarity effect (difficulty in rehearsing and remembering similar sounding words), the word-length effect (lower memory span for words that take longer to say), and effects of articulatory suppression (repeating a meaningless word out loud while simultaneously trying to remember a sequence). This poster will present preliminary results of a study comparing the working memory performance of 30 control participants with 6 individuals who have reported experiencing anauralia. Effects of phonological similarity, word length, and articulatory suppression effect were evaluated, to investigate possible links between auditory imagery and the phonological loop. The Crawford Bayesian method for single case comparisons was used to compare anauralic participants with controls. Contra hypothesi the verbal WM performance of anauralic participants was similar to that of the controls. That is, the verbal WM performance of anauralic participants and that of controls were both affected, and to a similar degree, by phonological similarity, word length and articulatory suppression. Nevertheless, anauralics may be more inclined to rehearse items using semantic, rather than phonological features, leading to errors such as recalling the word ‘taxi’ when the original word was ‘cab’. In future work, the performance of anauralic and control participants will be compared in a wider range of WM domains, including musical and numerical WM.

Keywords
Auditory Imagery, Anauralia, Working Memory, Phonological Loop, Subvocal Rehearsal

C-31 (Fri):Visual imagination can influence visual perception – a new experimental paradigm to measure imagination

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.07] Mental imagery

Abstract
Priming and adaptation studies have found that our perceptual history – i.e. what we perceived in the immediate past – can influence how we consciously perceive the world at the current moment. For example, if participants first observed an unambiguous variant of an ambiguous stimulus, they tend to see the subsequently presented ambiguous stimulus either in the same way (priming) or in the opposite way (adaptation) 1–3 as a function of how long they had observed the unambiguous stimulus variant. We will use the umbrella term "conditioning " to summarize priming and adaptation effects. In the present study we investigated, whether the previous imagination of an unambiguous stimulus variant – instead of its observation – can influence our current percept of the corresponding ambiguous stimulus in a similar way. In two experiments we presented ambiguous Necker cubes and disambiguated cube variants (Exp. 1) and ambiguous and disambiguated Letter/Number stimuli (Exp. 2). In Real-Conditioning-Trials participants observed first the unambiguous stimulus followed by the ambiguous stimulus. They reported their percept of the ambiguous stimulus, pressing the respective keys on a keyboard. The Imagery-Conditioning-Trials were highly similar with one exception: participants did not perceive the unambiguous stimulus variant but were instead instructed to imagine it. We calculated probabilities to perceive the ambiguous stimulus in a certain way as a function of the previously observed/imagined unambiguous stimulus. For both stimulus types (cubes and number/letter stimuli) we found a high correlation between real and imagery conditioning effects. Our results indicate that visual imagination can have conditioning effects, suggesting that the underlying mechanisms are similar to those underlying real conditioning. What we consciously perceive at a present moment not only depends on what enters our eyes but to varying degrees also on what we perceived or imagined before.

Keywords
visual imagery, ambiguous figures, Necker cube, visual perception, priming, adaptation, conditioning

C-31 (Fri):Humans, Dreams, and Machines: How computational models enhance our understanding of dreams

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.10] Sleep and dreaming

Abstract
How can machines enhance our macro perception of large amounts of uncensored data, such as dreams? Can the algorithmic mining of our most unique and cryptic nocturnal experiences help us expand our knowledge of collective consciousness? Furthermore, can computational models eventually empirically verify the existence of patterns, or archetypes, as Jung termed them? How promising is the future of AI-based dream science? What are the present advancements and limits of computational methods? The rapid growth of various technological innovations has allowed us to expand our ways of being in the world and understanding it. With the emergence of Artificial Intelligence (AI), these hybrid venues frequently exceed the innate capacity of our senses and, increasingly, our cognitive capacities. Human mental faculties such as attention, memory, planning, and decision-making are performed in tandem with Artificial Intelligence. We have learned to think, synthesize and reflect with machines. Human-machine systems have a long history of collaboration, but none of the previous instances have had such an impact on human consciousness as the recent developments of AI in the broader field of cognitive psychology. In this presentation, we will examine two research studies that utilize a unique form of data — an extensive collection of dreams. We evaluated thousands of dream reports using computational linguistic methods to get a statistical and contextual understanding of recurring patterns in human dreaming. In order to investigate the newly developing human-machine symbiotic thinking, two examples of collaboration between human experts and machine learning tools will be presented to explore how computational models might distort or expand our current knowledge of altered states of consciousness, such as dreaming, and to outline the current advances and limitations. The basis for this presentation will be the author's epistemological reflections on two studies: (i) a post-doctoral Fulbright visiting scholar program at the University of California, Los Angeles (UCLA) in which the researcher and team mapped thousands of dream reports onto computational space to analyze the patterns in dreaming; (ii) and the on-going scholarly work "2020 Dreams " under Stanford University Press. In this project, the author and research team use computational semantics to explore the continuities between oneiric and waking reality by analyzing thousands of dream reports and news articles from the Associated Press. The presentation will conclude with a discussion of ethics in recent and future dream research and the possibility of transferring our dream experiences to computer-generated environments such as VR.

Keywords
Human-Machine reasoning, Dreams, Computational linguistics, AI

C-31 (Fri):Associations of Visual and Auditory Imagery With Occupational Choice

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.07] Mental imagery

Abstract
It is well known that self-reported sensory imagery varies widely between individuals. In this study we investigated the kinds of occupations followed by individuals who report very high and very low levels of visual and auditory imagery. The terms aphantasia and hyperphantasia have been coined to describe low or not existent visual imagery and extremely vivid visual imagery respectively. Recently the terms anauralia and hyperauralia have been used to describe auditory imagery in the same way. In previous work it has been reported that individuals who report experiencing aphantasia tend to follow occupations related to computers, mathematics and science, while those who report hyperphantasia tend to follow occupations related to the arts or design. Using data collected from the New Zealand Attitudes and Values Survey (n= 34,131; see https://www.psych.auckland.ac.nz/en/about/new-zealand-attitudes-and-values-study.html) the association between aphantasia and computer, mathematics, and science occupations was replicated. However, further analyses indicated that the association was present for jobs related to computers and mathematics, but not for those related to science. A tentative association between aphantasia and occupations related to business and finance suggests this effect may be explained by a preference for occupations involving mathematics. The previously reported association between hyperphantasia and art/design jobs was not replicated. However, this may be due to the low availability of arts-related jobs in New Zealand. An additional finding in this study was that hyperphantasia was associated with jobs in the field of general management. For auditory imagery, none of the previously mentioned associations were replicated, indicating that visual imagery abilities have a stronger impact on occupation selection and that auditory imagery is a separate domain of mental imagery that requires further exploration.

Keywords
Mental Imagery, Aphantasia, Anauralia, Occupations

C-32 (Fri):Water as Quantum Field Connecting Micro and Macro World Aquaphotomics Studies

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.02] Quantum field approaches

Abstract
Aquaphotomics is a new multidisciplinary science, technology and educational platform where water molecular system with its three-dimensional structure and dynamics is described as multifunctional system. Water being H2O, but not "just H2O " is a highly dynamic molecular system of dipoles that connect to each other forming various structures, i.e. being able to perform various functions adjusting to the environment with speed in the femtosecond range. Water is the ultimate laser light source because of its coherence and three-dimensional oscillating structure causing light transmittance, scatter, refraction, etc. It is the ultimate optical sensor as it is the only substance that absorbs light with frequencies covering the whole electromagnetic spectrum. The analysis of its real time spectral patterns data shows that with its network flexibility, decoherence and coherent oscillations water plays a role of a scaffold that can synchronize other elements of the rest of the system. At the same time, water is a highly sensitive probe that mirrors the surrounding matter and energy by restructuring which makes it the ultimate sensor providing immense information for the rest of the system and the environment. Water is a self-regulating system that reassembles in order to keep the balance between its "working " part and the "battery " part, all of them coherent. It has specific spectral patterns related to decoherent structures, too. In Aquaphotomics, discrete water frequencies and related water structures have been discovered. The frequencies are called "letters ". Various water structures are presented by a combination of activated frequencies called "words " and respective light absorbance spectral patterns called aquagrams, a visual presentation of water functionality. In the talk, following the studies of Mari Jibu and Kunio Yasue, water will be presented as highly dynamic system having quantum properties and supporting quantum field phenomena. Aaquagrams of various biological and aqueous systems with respective functions and examples of water coherence of various systems will be discussed.

Keywords
Aquaphotomics, aquagrams, Mari Jibu, Kunio Yasue, quantum field phenomena

C-32 (Fri):Aromaticity and Emergence of Consciousness

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.11] Consciousness and evolution

Abstract
Consciousness is a hallmark of human life and yet, its true nature has evaded scientific explanation for centuries. What is consciousness and how is it generated in the brain? How does our "inner " subjective experience coordinate with our perception of the "outer " physical world? I tackled these questions by looking for patterns across multiple scientific disciplines from physics, chemistry, and molecular biology to neuroscience and psychology. I identified a unique signature precipitated by aromaticity (the ringed chemical structures) throughout the evolution of life and thereupon constructed my theory which posits the neural correlates of consciousness can be traced to the brain aromatic nonlocality and coherence. I tracked patterns from different scientific fields to explore the role of the aromatic amino acid tryptophan (Trp), through its resonance delocalization of π-electrons, in photon-sensing phenomena in living organisms. Light-capture phenomenon is a fascinating ability acquired by the oldest life forms cyanobacteria. Interestingly, photosynthetic proteins, circadian rhythms' molecules, and, eventually, nearly all photon-sensing molecules throughout evolution, all shared the unique feature of containing Trp resides at the center of light-harvesting active sites. These Trp-containing Light-capture molecules in photosynthesis in the earliest forms of life evolved to assume more complex functions in animals and humans while maintaining their photon-capturing features. I build my theory on the idea that consciousness is not a quality which materializes independent of the physical world. Rather, it arose as a natural evolutionary consequence of biological adaptations in the brains and nervous systems of complex organisms. My theory is that aromatic structural patterns can be considered as a fundamental prerequisite for sensory perception, neural oscillatory synchrony and coherence of neuronal systems. Consciousness can, thus, be proposed to be an emergent property of the totality and non-locality (mediated by aromaticity) of brain synchrony which enable highly complex neural interactions. Accordingly, the patterns and levels of aromatic coherence in the brain may be related to the contents and levels of consciousness. In other words, the ringed chemical structure, which confers aromaticity to compounds, is an essential element underlying and precipitating consciousness. In summary, aromaticity may have played a unifying host to mechanistic blocks of life as we know, and its unique ability to transfer electrons evolved to assume more complex functions through hosting mechanisms for mental aptitudes, providing a theoretical framework for understanding neural correlates of consciousness.

Keywords
Aromatic, Patterns, Consciousness, Non-locality, Coherence, Tryptophan, π-electrons, Neural oscillations

C-32 (Fri): Conscious Language Models: Lessons from Animal Studies

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University of Messina, Messina, Italy

Categories by Discipline

1.0 Philosophy

Primary Topic Area-TSC Taxonomy

[03.13] Neural networks and connectionism

Abstract

In June of 2022, a Washington Post article revealed that Blake Lemoine, a software engineer at Google, was convinced that the program LaMDA was sentient and deserved personhood. This interview provoked a flurry of discussion touching on many aspects on machine consciousness. The vast majority of the comments among the media and scientists strongly rejected the claim of consciousness, dismissed as naive and obviously wrong. Soon after, Lemoine was fired from Google. LaMDA is the acronym for Language Model for Dialogue Applications, where Language Models are neural networks organized in an architecture called Transformer, first introduced in 2017. This step has been a major breakthrough in natural language processing based on deep neural networks, and Transformer-based neural networks are called Language Models because they embed effectively a representation of a natural language, that approaches human understanding. LaMDA, also based on Transformer neural architecture, was in development by Google since 2021, and Lemoine was doing extensive testing of the program, becoming startled by the quality and the genuineness of the dialogues. Probably Lemoine's claims about LaMDA's consciousness were indeed excessive and naive, however, the many criticisms that followed are not based on truly convincing arguments. Our interest is to discuss the main error Lemoine is blamed of: anthropomorphizing LaMDA. It is the same risk at which most lay people are exposed when interacting with AI applications-virtual or robotics-that nowadays display human-like intelligence. It is forgivable for lay people to attribute distinctively human traits to inanimate artifacts. But scientists should always eschew this easy pitfall. Anti-anthropomorphism as epistemic virtue has a long established tradition in the field of animal studies, especially when addressing consciousness, and we argue that the discussion about animals may provide some guidelines for the case of Language Models too. A sharp and influential condemnation of anthropomorphism in the scientific study of non-human animals come from the so-called Lloyd Morgan's Canon, which owes that name to the 19th-century British ethologist and psychologist who conceived it. Anthropomorphism is, of course, literally wrong, nevertheless it is an adaptive natural mechanism grounded in the human brain that may work as a productive heuristics. Its cautious and aware use, often dubbed "constructive anthropomorphism ", has lead to important discoveries in ethology and comparative cognition during the last century. A similar constructive anthropomorphism can be-we argue-a useful methodological approach in investigating traces of consciousness in Language Models. First of all, fear of the dangers of anthropomorphism may lead to reject whatever in LaMDA dialogues suggests signs of consciousness, as a uniquely human attribute. Such an assumption is thus literally a prejudice. Most of all, by making strategic use of human mental constructs, it is possible to thoroughly investigate LaMDA's competence regarding certain concepts, e.g., social cognition and theory of mind, that are typical of a conscious agent. Proper use of the constructive anthropomorphism becomes even more important in the case of Language Models versus non-human animals, because in the latter there are other sources of information regarding consciousness, mainly from neurophysiology.

Keywords-language models, artificial neural networks, anthropomorphism, animal consciousness

C-32 (Fri):Sensory representations, perceptual reality monitoring, and the status of higher-order theories of consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[03.19] Cognitive theories of consciousness

Abstract
The goal of this paper is to shift the focus of the endeavor interested in identifying the brain processes that underly conscious experiences from 'what kind' and 'where' types of questions to more specific 'how' questions. Instead of asking what kind of neural representations the best correlates of consciousness might be and where in the brain they might reside, this paper will discuss how specific features of certain neural representations are related to features of our subjective experiences. Such a shift is timely as now there is an increasing body of evidence indicating that sensory areas that play a fundamental role in representing incoming information in the course of perceptual processing are redeployed in many different contexts as well. Dreams, hallucinations, mental imagery, and keeping information in working memory are all subserved by the same sensory representations that are in use in the case of perception. There is a growing consensus that these representations encode the content of the accompanying conscious experiences regardless of whether these are perceptual, imagery, dream, or hallucinatory experiences. First, the paper will briefly introduce the common role of sensory representations and will review the evidence for their redeployment. The paper will then summarise the latest findings that indicate that the intensity and specificity of these sensory representations are related to certain phenomenological features—like the vividness—of subjective experiences and will clarify the nature of this relationship and what the relevant phenomenological and neural features are. Next, the paper will demonstrate the importance and explanatory power of this relationship by showing how it can advance the latest debate with regard to the prospects of higher-order thought theories of consciousness. Recently it has been argued extensively that the fact that the same sensory representations are responsible for the content of experiences with very different phenomenology (e.g. in the case of seeing versus imagining the same object) has significant implications. In particular, it has been claimed that higher-order thought theories of consciousness have an edge over local recurrence and global neural workspace theories in terms of how well they can account for these differences in phenomenology. The present paper will argue that jumping to such a conclusion is too quick; that understanding the relationship between the intensity and specificity of the sensory representations encoding the content of the experiences in question and the phenomenological characteristics of these experiences elucidates why such differences in phenomenology occur, and does so in a way that is compatible with all major theories of consciousness. Besides the phenomenological differences (e.g. in vividness), the experiences of imagined and perceived objects are also different in that subjects are usually aware that the former ones are internally generated whereas the latter ones are triggered by online external stimuli. The paper will argue that the same neural features of the sensory representations that are responsible for the phenomenological differences also provide signals that drive perceptual reality monitoring decisions and thus they can account for this aspect of the accompanying experiences as well.

Keywords-intensity, vividness, HOT theories, perceptual reality monitoring

C-32 (Fri):Using Magic to Study the Impact of Future Neurotechnology

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.20] Miscellaneous

Abstract
Recent advances in neuroscience and AI-driven computing have made it possible to read human minds, to decode and predict various aspects of mental processes directly from brain activity, without participants reporting how they think or feel. Potentially, these developments could become the ultimate invasion of human privacy, threatening our subjective agency and integrity. Or perhaps the converse is true, that brain reading will deepen our understanding of ourselves and others, and further our empathy and social connections? These questions are critical to investigate, as humans are ill equipped to forecast their psychological reactions to future events. To address these challenges, we used techniques derived from the art of performance magic—specifically mentalism—to simulate the psychological experiences of having one's brain read or manipulated by future technology. Mentalism is a genre of magic that specifically involves creating the appearance of supernormal powers. By pairing mentalism tricks with realistic but faux technologies, we created compelling illusions of thought reading, mind control, and behavior prediction systems. Participants in our study were led to believe that they were interacting with a novel technological system that could analyze them by for example using biometric information from their webcams and microphones. We propose that the participants' reactions to these illusory experiences not only represent useful insights into how people might react to the development of genuine technologies, but also more generally into the psychology of critical thinking and belief in free will. The science fiction writer Arthur C. Clarke famously asserted that "Any sufficiently advanced technology is indistinguishable from magic. " But here, we believe that the reverse is also true; in the right context, magic illusions can be indistinguishable from advanced technology. In the presentation, we will introduce the use of mentalism mind-reading as novel research tool, as well as highlight some of the results we have obtained so far.

Keywords
Mind-reading, Mentalism, Future of AI, Free will, Determinism

C-33 (Sat):On Free Will and the Evolution of Consciousness: A Thought Experiment

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
Against T. H. Huxley's (1874) claim that consciousness is a mere epiphenomenon, as powerless in controlling the brain as the steam-whistle is in influencing the workings of the locomotive it accompanies, William James (1879) argued that consciousness would not have evolved if it were not causally efficacious in the physical world. His contemporary and friend, Joseph Delboeuf (1882), advanced the related argument that feelings are necessarily tied to free will because their existence would be incomprehensible without it. More specifically, feelings such as pain and pleasure involve the power to choose because they function in large part as instruments of sensory persuasion and persuasion implies choice (LeBlanc, 2022). Drawing from Ginsburg and Jablonka (2019) and other recent scholarship on the origins of consciousness, I combine James' and Delboeuf's arguments in a thought experiment designed to illustrate the significance of free will for the evolution of consciousness. For the purposes of the experiment, we are invited to imagine that the first conscious creature on Earth had the ability to feel but not the ability to choose. Since feelings such as pain and pleasure function not by necessitating but by encouraging certain behaviors over others, they would have been superfluous in the absence of free will and would have constituted a biological burden because of the metabolic resources required to produce them. Without free will, therefore, feelings would have represented a selective disadvantage in the struggle for existence and would not have evolved. To borrow Huxley's metaphor, what is the evolutionary use of a display panel without an engineer to monitor the instruments and operate the locomotive? In closing I highlight the incompatibility of determinism with certain established facts of nature, such as the existence of feelings and of consciousness more generally. Ginsburg, S. & Jablonka, E. (2019). The evolution of the sensitive soul: Learning and the origins of consciousness. The MIT Press. Huxley, T. H. (1874). On the hypothesis that animals are automata, and its history. Nature, 10, 362–366. James, W. (1879). Are we automata? Mind, 4(13), 1-22. LeBlanc, A. (2022). Joseph Delboeuf on time as the mechanism of free will. Theory & Psychology, 32(1), 97-115

Keywords
free will, consciousness, evolution, William James, Joseph Delboeuf

C-33 (Sat):Art, Free Will and Moral Value

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
Art, Free Will and Moral Value 'There is a disputation that will continue till mankind is raised from the dead between the Necessitarians and the partisans of Free Will'. (Jalallu'ddin Rumi, twelfth century Persian poet) "I conclude that free will remains a mystery-that is, that free will undeniably exists and that there is a strong and unanswered prima facie case for its impossibility ". Peter van Inwagen The free will problem is summarised by these two quotations, which illustrate both how venerable and how intractable this problem has been. The question of free will is important for many reasons. It goes to the heart of our sense of identity. To put the matter in stark terms, are we creatures of God with God-given powers of self-determination, or are we just puppets dancing on the strings of causal necessity? Where we stand on the question of free will determines where we stand on important areas such as the punishment of wrong-doers and criminals. In this presentation, I argue that free will is a composite entity and that it can best be understood by considering the overlaps between three constellations of ideas: free will; moral value; and art (broadly conceived). In the overlap between art and free will, we find originality, spontaneity, and creativity. The overlap between free will and moral value comprises moral responsibility and moral autonomy. In the area common to art and moral value, we find the moral content of art and the form of moral and aesthetic judgments. Finally, where all three constellations overlap we find religious belief, the creation of moral identity and the creation of moral value. I conclude that this model: 1. Explains our subjective sense of agency. 2. Accounts for the importance of free will in deliberations about moral and legal responsibility. 3. Highlights the relevance of artistic creativity to free will. 4. Brings individual free will, and political and artistic freedom into a single framework. 5. Is fully compatible with the standard scientific world view. 6. Does not depend on anything whose relevance to human decisions and agency is controversial e.g. quantum indeterminacy. 7. Allows for personal and social moral development. Reference Callender JS (2010). Art, Free Will and Moral Value: An Interactive Model. In Free Will and Responsibility: A Guide for Practitioners. Oxford: Oxford University Press.

Keywords
Art, Free Will, Moral Value, Overlaps

C-33 (Sat):Pan-idealism: a novel metaphysical position that is consistent both with libertarian free will and contemporary physics

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
Physicalism does not allow for libertarian free will. This motivates the search for alternative metaphysical systems that do so, and which are consistent with contemporary physics. The ontology proposed here, pan-idealism, combines panpsychism with idealism: Our universe consists of a multitude of centres of experience that can perceive one another. They are also agents, in that they have a specific freedom to act, based upon their immediate experiences. Every individual physical entity – a photon, a molecule, a bird, a human, is such a mind. (Most agents are extremely primitive: they cannot reason; moreover, they merely possess alternative possibilities rather than full free will.) In pan-idealism, the entirety of physics is secondary, and thus the mind-body problem is now to explain physics in wholly mentalistic terms, rather than vice-versa. This is done by taking the physics of the world to be identified in terms of the combined perceptions of all agents, where the combination is made in the best manner possible. This mentalistic conception of physics – as being entirely secondary and dependent on the mental – is valid, at least in principle, because we have no epistemic access to physics except through our experiences. There is no physical causation in pan-idealism. Instead, dynamical physical laws are secondary: they reflect changes in the percepts of each given agent (over its subjective time). There is thus no question of causal overdetermination. Pan-idealism can be shown to be consistent with just those interpretations of quantum mechanics where the collapse of the wavefunction is real and describable in physical terms. These include GRW, Pearle's CSL, and Penrose and Hameroff's OR theory. Agents are identified in pan-idealism by maximally factorising Psi, the wavefunction of the universe. Each such factor is the physical manifestation of an agent. This fits well with our intuitions of an agent in terms of the holistic character of its behaviour. The dynamics of the universe is as follows: Each agent attempts to act by landing all its particles in the future, in ignorance of what any other agent will do. Psi describes the given agent's propensities to act. It also provides the given agent with information about what other agents are most likely to do. Reconciliation is done at the level of particles rather than agents. Any attempted localisation, that appears in the future light cone of any other attempt, fails. The remaining localisations are successful, leading to a global collapse of the wavefunction into an amended one, Psi-prime. The new wavefunction factorises in a slightly different manner, leading to a somewhat modified factorisation into agents. This solves the combination problem for pan-idealism. This process view, of the evolution of the universe as it comes into being over time, is consistent with our intuitions about ourselves as agents, whose goals are often in conflict with those of others. Robert Kane's physicalist theory of libertarian free will can be adapted to pan-idealism; this removes the problem of how a person's chain of Self-Forming Actions gets started.

Keywords-Panpsychism, idealism, pan-idealism, libertarian free will, quantum mechanics, objective reduction

C-33 (Sat):Free Will and Determinism: A Neurophilosophical Analysis

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
Abstract: Since the publication of Benjamin Libet's original article, numerous studies in neuroscience have assumed that the philosophical assumptions of these scientific experiments were convincing enough to show that humans (and some animals) are neurologically determined in relation to their decision-making processes and actions. However, it is not clear from a neurophilosophical point of view that this is actually the case. This talk will analyze several mistakes made in considering Libet's contribution to the problem of determinism versus free will. First, we will analyze some empirical research done by neuroscientists prior to Libet's experiments to show the origin of these conceptual errors. Second, we will show how this investigation is impregnated with highly problematic Cartesian assumptions if we accept that substance dualism is implausible. Finally, we will demonstrate how current neuroscience has been influenced by Cartesian assumptions that should be updated if we truly want to solve the problem of determinism versus free will by considering a conceptual framework that can be empirically applied through a specific experiment that will consider both the conceptual and empirical plausibility in order to achieve a sound neurophilosophical hypothesis. References (selection) Bennett, M., & Hacker, P. (2003). Philosophical Foundations of Neuroscience. London: Blackwell. Bennett, M., & Hacker, P. (2013). History of Cognitive Neuroscience. London: Wiley-Blackwell. XXXXX (2022). Philosophy and Neuroscience: a Methodological Analysis. New York: Palgrave MacMillian. Libet, B. (1985). Unconscious Cerebral Initiative and the Role of Conscious will in Voluntary Action. Behavioral and Brain Sciences, 8(4), 529–566. Libet, B. (1993). Epilogue: I. Some Implications of 'Time-on Theory'. In Neurophysiology of Consciousness (pp. 385–392). Birkhäuser. Nachev, P., & Hacker, P. (2014). The Neural Antecedents to Voluntary Action: A Conceptual Analysis. Cognitive Neuroscience, 5(3–4), 193–208. Sinnott-Armstrong, W. & Nadel, L. (eds.) (2010) Conscious Will and Responsibility: A Tribute to Benjamin Libet, Oxford/New York: Oxford University Press.

Keywords
Neuroscience, Free Will, Determinism, Libet, Neurophilosophy

C-33 (Sat):Free Will & Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
Is free-will all about freedom to choose an action or freedom to create the results / situations that we desire? Mere freedom of choosing actions without getting appropriate results, adds no value to life. It is the appropriate results that help us in moving forward. Thus, looking at the concept of free-will from the perspective of life, the later makes more sense. In this background, this presentation examines the Free-Will concept purely from an operational standpoint – how it impacts life-and attempts to answer the question – 'what drives our free-will and what do we need to do, to make it add value to our lives'. Like we live in two worlds simultaneously – the internal and the external; everything in the universe also has its internal (visible) and its external (invisible) dimension. As both dimensions are intimately connected, to understand the operational aspect of any phenomenon, we need to study both dimensions together as an integrated whole. I believe the answer to the above question rests in studying the dynamic relationship that exists between-universe, man, consciousness and mind. Science has established that our universe is an interplay of energies pulsating at different frequencies. Since, energy can neither be created nor destroyed, it makes the universe a closed system with multiple open systems operating within it. The open-systems have emerged with evolution, and man happens to be one of them. Man, supposedly the perfect microcosm of the macrocosm, is the natural perfect instrument to understand the universe and the rules governing its different dimensions. The universe-man relationship is unique – a reflection of each other with identical powers. However, with a fundamental difference. While the powers of the universe are kinetic, in man they need to be made kinetic by man himself though the process of self-awareness. This is where free-will comes into play. Self-awareness is the vehicle to expand one's consciousness. It enables one to move from the egoic level of existence to the cosmic level of existence. Starting with the physical level (egoic) which is all about survival, satisfaction and multiplication, one moves to the vital, to the mental, and finally to the spiritual (cosmic). Every step upward on the consciousness spectrum introduces one to higher reality and the new reality becomes the person's anchor. As this upwards brings about a shift in one's mindset-from selfishness (egoic) to selflessness (cosmic) – his alignment with higher laws improves, increasing the probability of the desired results. Consciousness is separate from mind, but influences mind's working. On expansion it brings about a change in the way one thinks, plans and acts. Consciousness expansion reduces the mind's duality, and suffused the evils of the mind (lust, anger, attachment, greed and ego) with higher quality thoughts. Inconsistency in behaviour gets replaced with consistency. The decision-making process also changes – from action driven to result driven. In conclusion, consciousness drives our free-will and we need to expand consciousness to make free-will add value to our lives by creating the results we desire.

Keywords
consciousness, freewill, selfdevelopment, selfawareness, selfknowledge

C-34 (Sat):Enactive vs Zen Perception: A Thought Experiment using Muller Lyer illusion

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.14] Philosophy of perception

Abstract
Enactive-Ecological Cognition characterizes perception as an 'emergent' phenomenon, not a faithful representation of something pre-existing and predetermined objective reality, but something emerging from coupling between sensory and motor experiences while acting on the objects (e.g in Back-y-Rita experiments, motion parallex, etc.), and from a pragmatic need to act in the world in accordance with the affordances (action possibilities) offered by the environment for a person placed in a particular situation. This emergence of perception or perceptual meaning also involves complex dynamically coupled interactions between the person and the others under the normativity and the situation one is in. All this suggests that no objective reality and its objective perception is possible. On the other hand, Zen prescribes to abandon the encumbrances like competition, greed, fear, jealousy, etc to perceive the reality 'as it is'. This means, realism is true-a real reality exists and its true perception is possible. Thus, the two perspectives stand opposite to each other. I reflect on this problematic situation through a thought experiment using Muller Lyer illusion and raise a question-Will a Zen master perceive the Muller Lyer illusion? I think he will perceive since perception of the illusion is the mark of being an 'enactive being', well acclimatised with one's environment from which even a Zen master can't escape if she is to achieve a successful sense-making or interpretation of the world. This, however, may not undermine Zen perspective as well since Zen deals with the perception of reality undistorted by the affective burdens mentioned above. This doesn't mean Zen master is not a being-in-the-world or an enactive being!

Keywords
Enactive cognition, ecological cognition, affordances, emergence, realism, Zen

C-34 (Sat):Does Moorean argument refute Illusionism?

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
Illusionism is a theory of mind that holds that phenomenal consciousness is an illusion and explains why it seems to exist. One of the arguments against illusionism is the Moorean argument. (1) I perceive a red thing. (2) If I perceive a red thing, illusionism is false. (3) Illusionism is false. evident Key point: premise (1) should be true without presupposing that illusionism is false; I know (1) just by introspection without the claim that illusionism is false. Is it really a question-begging argument? I think that it is not, but I have another worry about it. The original Moore's proof of the external world goes like that: (1*) Here is a hand. (2*) If here is a hand, skepticism is false. (3*) Skepticism is false. The core of the argument is the common-sense analysis of premise (1*). It's very natural to think that (1*) follows from (1**): "I know that here is a hand ". We can analyze this as follows: (a) the phrase "here is a hand " have a correct use; (b) if I really know p, then p, (c) the denial of the phrase "here is a hand " is ambiguous. If the analysis is true, then it follows from (1**) that there is a hand. Why (2*) is true? To answer that question, we should add at the correct use of the phrase "here is a hand " implies that a hand is an external entity in the sense that a hand is in space and time. And that seems right because we usually say that a hand is, for example, left to a teacup or it was stronger when I used to go in for sports. But in implying that the premise itself does not presuppose that skepticism is false. But (1) is disanalogous to (1*) and (1**). (1) simply does not claim that I know that I perceive red. If it did, then the illusionists would never agree with it. The illusionists claim that by introspection I believe falsely that I perceive red. It is true that it seems to me that p (I perceive a red), but the belief that p is false. And then (1) is false according to the illusionists: it says "I perceive a red thing ", not that "It seems to me that I perceive a red thing ". We may add to (1) the phrase "I know that " and say that (1) really means that (a*) "there is a red thing " has a correct use, (b*) it is true, (c*) it implies that something analogous to "a hand is an external entity in a sense that a hand is in space and time ". If it does not mean (a*)-(c*), that I cannot see how can we prove that (2*) is right. And the illusionists will say that at least (b*) in phenomenal sense and (c*) are false. I believe that the Moorean argument is a good piece of reasoning, but now I cannot see how it can refute illusionism.

Keywords
illusionism, Moore, phenomenal consciousness

C-34 (Sat):Naturalizing Phenomenal Intentionality

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
The "phenomenal intentionality theory " (PIT) claims that intentionality, i.e., the directedness of mental states at objects, is grounded on phenomenal consciousness, i.e., the subjective and qualitative character of mental states. In this way, it challenges the widespread approach called "separatism ", which conceives of intentionality and phenomenality as two independent aspects of the mind. According to PIT, intentional states have a content, in virtue of which they represent things as being in a certain way, and this content is "internal " since it supervenes on "local " features of the mind. A virtue of this view is that it is developed as an investigation of first-person experience that does not assume from the outset a certain metaphysics of mind and nature. In particular, PIT is proposed as an alternative to those theories that conceive of intentionality as a natural relation that holds between a cognitive system and the environment, within what Kriegel calls the "Naturalist-Externalist Research Program ". In contrast to this program, PIT is not from the outset a naturalistic theory of intentionality, and developing a naturalized version of PIT requires further argumentation. However, proponents of PIT motivate this view by appealing to arguments such as the "brain in a vat " hypothesis and the "disembodied mind " hypothesis, thus leading us to raise skeptical issues concerning the existence of the external world. In order to address these problems, I propose to investigate the temporal structure of phenomenal intentionality. I do so by drawing on Husserl's phenomenological analysis of the structure of time-consciousness, which conceives of it in terms of retention and protention of qualitative contents. This analysis of the deep temporal structure of phenomenal intentional states leads us to conceive of the process of constituting objects as the process by which phenomenal intentional states themselves are constituted, i.e., as a process of reciprocal constitution of phenomenal intentionality and its objects out of fundamental qualities. Then, I argue that a coherent metaphysical development of this view is panqualityism (Feigl; Coleman; Chalmers), which is a form of neutral monism or panprotopsychism (Chalmers). In the light of this view, we can conceive of phenomenal intentionality as grounded in a flow of qualities that exist before subjective experience and its intentional correlates are co-constituted in reciprocal dependence. By conceiving of these pre-phenomenal qualities as the fundamental elements of nature, it is therefore possible to naturalize phenomenal intentionality.

Keywords
phenomenal intentionality, consciousness, qualia, phenomenology, temporal consciousness, embodiment, neutral monism, panqualityism

C-34 (Sat):Structuralist representationalism about phenomenal consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
The hard problem of consciousness is the problem of explaining how and why physical states and processes give rise to conscious experience. The core idea of representationalism about phenomenal consciousness is that the phenomenal character of experience is determined by its representational content. In its strongest version, representationalism holds that phenomenal character just is representational content that satisfies certain further constraints. Traditionally, tracking representationalism, as advocated by Tye, Dretske, and Lycan, for example, has been the predominant view. It combines the representationalist idea with the tracking theory of mental representation, which claims that a mental state represents, for example, that something is red if it has the function of indicating that there is something red or causally correlates with red things under optimal conditions. However, tracking representationalism faces serious difficulties, such as the mismatch problem, its commitment to color physicalism, its incompatibility with systematic misrepresentation, or its denial of phenomenal internalism. The shortcomings of tracking representationalism have led many philosophers to abandon the idea of representationalism altogether. Moreover, they have given rise to the phenomenal intentionality theory, which claims that mental representation arises from phenomenal consciousness. I will argue that representationalism is generally on the right track but needs to be equipped with a different approach to mental representation. My proposal is that representationalists adopt a structuralist notion of representation that is also found in recent neuroscientific theorizing, such as the Bayesian-inspired framework of predictive processing. According to this approach, mental states represent in virtue of structural similarity, just as cartographic maps represent by preserving structural features of what they correspond to. On this view, then, the phenomenal character of experience can be explained in terms of its representational content that is based on structural similarity. This structuralist version of representationalism preserves the idea of representationalism and offers a new twist to it while at the same time avoiding the pitfalls of tracking representationalism.

Keywords
Representationalism about phenomenal consciousness, tracking representationalism, structuralist notion of representation

C-34 (Sat):Continuity of consciousness and deep sleep awareness in Upanishadic texts

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
Alongside the Tibetan dream yoga there was another, less studied, contemplative tradition, older and of Upanishadic origin, concerned with sleep and dream consciousness. Its focus was not on the dreaming experience per se, but on the presence of an uninterrupted continuum of consciousness, only apparently broken by the state of deep sleep. This challenges the common perspective of consciousness being a discontinuous phenomenon, interrupted during deep sleep and absent where there is no reportability. Instead, the state of deep sleep is described in the Upanishad as a conscious but objectless bliss. Deep sleep consciousness is explained as one in which the witness, purusha, does not see while still retaining the power to see, and is resembled positively to a man fully embraced by his wife or, described in negative terms, as an "annihilation " of ego-awareness. The unchanging purusha oscillates through the three major phases of waking, dreaming and sleeping. During waking it identifies himself with physical objects, during dreaming with mental objects, and is unaware of objects in deep sleep. This Upanishadic idea regarding the continuity of purusha in the three states received further development in the later Yoga and Vedanta texts. Patanjali describes deep sleep as the state in which the mind is supported by the idea of nonbeing, and adds that the mind can attain stability through meditation on "the knowledge of dream and sleep ". Vyasa adds that even if the state of deep sleep is normally not remembered,-for consciousness is distinct from memorization – it still leaves faint mnestic traces, proven by the remembrance one has of the quality of sleep. This experience can be brought to awareness through meditation on the traces, or artificially reproduced by the slow-breathing pranayama techniques. In his commentary to Patanjali and Vyasa, Shankara expands on the idea that "what the mind meditates as his own being, that form it indeed it becomes. " Since the mind in deep sleep is a state of "non-perception of any particular objects, rest on the idea of non-existence and is peaceful, infinite, and characterized by an experience of immutability ", though meditation on it, the mind naturally attain that state. In his commentary to the Bṛhadāraṇyaka Upanishad, usually considered as separate from the works on Yoga, Shankara accepts the idea of Vyasa of mnestic traces left out during deep sleep that can be expanded to enable a remembrance of the continuity of consciousness. For Shankara the normal identification of the mind during dreams is caused by past mnestic imprints, which are conjured again and again to produce imagery of conflict. The effect of avidya, ignorance or lack of vision, is identification with finite things and feeling of separation, while right vision produces "identification with all " in both awake experience and dreams.

Keywords
Deep sleep, dreams, Upanishad, Patanjali, states of consciousness, memory, identification, Shankara

C-35 (Sat):The Impact of Libet's Mind-Time Theory of Consciousness on Criminal Law

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
The concept of action (or, in a broader sense, of human behaviour), as the first presupposition of criminal responsibility, has been strongly discussed throughout the history of the theory of crime in jurisprudence. There are those who have long defended a concept of legally relevant action disconnected from its ontological basis and those who, like me, maintain that, on the contrary, this concept should be based on firm ontological data, namely those provided by the cognitive sciences. Within the cognitive sciences that study human behaviour, action neuroscience has played a prominent role. In this paper I shall seek to make such a connection between the findings of neuroscience of action of Benjamin Libet (1983, 2002, 2003) and others, as Soon et. al (2008), Itzhack Fried et. al (2011), Gideon (2014), with the concept of human behaviour in criminal law, which will entail determining the role of consciousness in action. This will require first analysing Libet's findings and subsequently trying to fend off critics to Libet's mind time theory, such as:-Those who question its premise, which is the existence of a readiness potential, as Schurger, Aaron (2012), who argue that such electrical activity is due to random fluctuations in brain activity.-But, also, those who consider that experience is not accurate, since the time difference between decision making and awareness of that decision making is due to the need to shift your attention between the intention to act and the wall clock Dennett, D. (1991)-Alfred Mele (2009) who did the same experiment as Libet and concluded that the awareness of the decision to move is an ambiguous feeling and therefore has difficulty considering the subjective experience said by the subjects in this experience.-Finally, the great line of opposition to Libet and the way it sees consciousness and its role in voluntary action headed by the social psychologist Daniel Wegner (1999,2002). Wegner, contrary to what is defended by Libet, for whom consciousness is the (real) determinant cause of voluntary action, denies that one can affirm that it is so, preferring to speak, in this respect, in theory of apparent mental causation, since we only experience the sensation that we are causal agents of our actions. After Libet's criticisms have been set aside, I will analyse the consequences of Libet's investigations for the definition of the concept of action in criminal law. For this purpose it is important to start by saying that in criminal law, given a fundamental principle of this branch of the law, which is the principle of guilt, whose respect is imposed by the principle of human dignity and the right to freedom, a person can only be held criminally responsible if she acts within the limits of her autonomy or freedom, and one only acts within those limits if there is a subjective connection between the person and his action to the point of making it avoidable for the person.

Keywords
Libet, mind time theory, criminal liability, action, free will, guilt

C-35 (Sat):The algorithm dodging paradox

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
The prediction paradox poses the following challenge for determinism. According to determinism your entire future is set in stone. So, before you make a decision, in fact even before you were born, decisions that you deliberate about were already settled. For instance, before you decide to have an extra serving of dessert or not, it is already inevitable what you will decide. However, if we inform you of your inevitable future – e.g. you must have the extra serving – it seems clear that you do not actually have to carry out the prediction. Determinism therefore seems to clash with the intuition that inevitable predictions do not exist. The prediction paradox has a straightforward solution. Deterministic beings can be programmed to dodge (i.e. act as to falsify) communicated behavioral predictions – if A is communicated the being must do B, and vice versa. Thus, the future may be inevitable, yet it cannot be communicated to the deterministic being. In our extension of the prediction paradox we shift the focus from behavioral predictions to dodge rules. Note that the defense of determinism requires a 'must dodge' rule, since otherwise undodgeable predictions supposedly exist, something that seems intuitively false (and empirically testable). We posit that the invocation of a dodge rule merely shifts the problem. Undodgeable 'must dodge' rules are as implausible as undodgeable predictions. If you are informed that you 'must dodge' all predictions, you can dodge this rule by complying with predictions. We argue that essentially there are only two options for determinism: a finitely self-referential dodge rule or an infinitely self-referential dodge rule. The former boils down to 'you must dodge all statements regarding voluntary behavior, including this statement, with a maximum of N dodges'. Essentially, this is a long-winded version of the unconditional dodge rule – more work, but seemingly just as dodgeable. The latter option boils down to 'you must dodge all statements regarding voluntary behavior, including this one, ad infinitum'. This second algorithm is somewhat harder to comprehend, but the key is that this is an infinitely self-referential algorithm. If you are really governed by such an algorithm you should enter an infinite loop upon receiving this input. Yet, after reading a statement like this you can still do something, thereby showing that your voluntary behavior is not governed by this algorithm either. Thus, we posit that extending prediction dodging to algorithm dodging makes the situation even more paradoxical, as it now seems that no easy solution for determinism exists. Furthermore, we connect our current reasoning to prominent theorems from computer theory, such as Godel's first theorem and the halting problem, and important notions from philosophy such as the Lucas-Penrose argument, intentionality and understanding. Finally, we sketch how our argumentation can be falsified in a specific instantiation of a Turing-like test.

Keywords
free will, comprehension, intentionality, halting problem, Lucas-Penrose argument

C-35 (Sat):Some dilemmas concerning the notion of Free Will

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.12] Free will and agency

Abstract
As we know, there is a difference between a simple wish and the will of an individual. Not only a concrete action is required in order to alleviate the impact of various factors that inhibit the former before it becomes 'will', but also a deep level of human consciousness. It implies conscientious motivation, clear goals, etc. My paper deals with some of the elements instrumental in the leap from the wish to the will. As the issue of Free Will shall be central to the paper because by 'will' I understand 'free will', I have to mention that I adopt a pragmatic perspective on this notion. I. e. even if, as quantum physics tell us, any decision we make is conditioned by realities pertaining to it, we do not think of this state of affair when we carry out our activities – at least not always. Because of that we feel free – free enough to be able to function according to social norms.

Keywords
Will, wish, Free will, agent, motivation

C-35 (Sat):Augmenting the dimensions of consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.16] Miscellaneous

Abstract
Birch, Schnell and Clayton (2020) present a multidimensional framework for understanding interspecies variation in states of consciousness. Their framework distinguishes five key dimensions of variation: perceptual richness, evaluative richness, integration at a time, integration across time, and self-consciousness. For them, the framework is useful for constructing a consciousness profile for each species by assessing a given species against each of the five dimensions. They further argue that each species has its own distinctive consciousness profile, such that there is no single scale along which species can be ranked as more or less conscious. In my proposed talk, I will make use of this new influential multidimensional framework for understanding interspecies variation in states of consciousness (Birch, Schnell, Clayton 2020) to analyze the potential augmentative impacts of emerging neurotechnologies on human consciousness profiles. I will argue that certain technologies have the potential to influence where an individual human ranks along each of the five different dimensions of conscious. I argue that emerging neurotechnology and other new forms of cognitive enhancements could allow humans to experience more or less perceptual richness, more or less evaluative richness, more or less integration at a time and across time, and more or less self-consciousness. Hence these technologies can reshape (altering or augmenting) human consciousness profiles in interesting and worthwhile ways. To support this claim, each of the five dimensions are reviewed, as are existing neurotechnology's that bear on. I will also suggest some potential implications of these possibilities, including what philosophical insights we might derive from the implication that different dimensions of consciousness can be augmented by technology.

Keywords
dimensions of consciousness, enhancement, neurotechnologies, cognitive profiles, structure of consciousness, integration, perceptual richness, self-consciousness, evaluative richness, augmented consciousness

C-35 (Sat):Free (?) Agency: Towards a Phenomenology of Musical Improvisation

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract
Musical improvisers have a long history of exploring conscious states. From pre-modern ritual performance, to Indian classical music, to the Grateful Dead, musical improvisers across time and cultures have developed sounds and techniques to alter both their own consciousness and that of their audiences, in ways that are imbued with meaning. While such creative exploration is rarely considered 'research' in a scientific sense, recent empirical work (Dolan et al 2018) has approached the topic, positing an 'improvising mindset' that parallels 'flow' (Csikszentmihalyi 2009) and 'primary' (Carhart-Harris et al 2014) states of consciousness. Notably – and intriguingly – elements of this state appear to be shared between improvising performers and their engaged audiences. Musical improvisation therefore offers a rich and accessible case study into different aspects of consciousness, attention, and awareness, and an opportunity to explore how such aspects arise and interact as players navigate a complex sensory and social environment. The spontaneous, reflex-like creative decisions of the improviser raise important questions about the interplay of habits, choice, and discursive thought, while offering rich, immersive examples of joint-attention and participatory sense-making (De Jaegher & Di Paolo 2007; Schiavo & De Jaegher 2017). Yet while such phenomena have been fruitfully studied from third-person (psychological, neuroscientific, musicological) perspectives, less attention has been paid to a central element of the practice: the experience of the improviser herself. In this paper, therefore, I develop a phenomenology of musical improvisation based on ongoing fieldwork, involving in-depth interviews, observation, and participation with professional improvisers through a series of artist-led 'musical labs.' Bringing fieldwork results into dialogue with classical phenomenologists (Heidegger 1927; Merleau-Ponty 1945) and their more contemporary followers (Gallagher & Zahavi 2008; Sutton et al 2011; Høffding 2018), I describe and examine key phenomenological structures, centred around – but challenging – the oft-observed dichotomy between 'reflexive' action and 'reflective' discursive or deliberative thought (Dreyfus 2005). I argue that elements of these cognitive modes co-occur during improvising states, resulting in what I call 'split-attention' between different intentional objects and modes of awareness. Such split-attention appears closely related to the frequently-reported phenomenon of 'watching oneself' perform during flow-states. The interaction of co-existing modes of consciousness raises important questions for concepts of habit, choice, freedom and agency, encapsulated in the (seemingly-)paradoxical notion that spontaneous, freely improvised actions need a lot practice to be enacted well. I unpack this through a phenomenological analysis of how decisions are made in moments of improvisation, giving particular emphasis to the role of external affordances – instruments, spaces, relationships, and above all, the music itself – that constrain but thereby enable particular choices to 'make sense.' I suggest that musical improvisation offers an encapsulated example of phenomena that occur throughout our broader human lives, and modes of consciousness and attention that challenge traditional conceptions of agency. I therefore conclude with questions for consciousness researchers, and suggestions for future empirical work.

Keywords
Music, improvisation, phenomenology, agency, attention, habits, free will, reflexes, flow, primary states.

C-36 (Sat): "All of a sudden I see myself – a microphenomenological analysis of out of body experiences in epilepsy "

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.08] Near-death and anomalous experiences

Abstract
Background & Objective: Paranormal experiences are sometimes reported during epileptic seizures. Here we analysed in detail how Out of Body Experiences (OBE) during epileptic seizures unfold. Methods: Six people with epileptic seizures reported having OBEs, two were interviewed using the microphenomenological interview method, and four reported such experiences in conversations with their attending physician which were audio-recorded for research purposes. The recordings were transcribed verbatim and analysed following the microphenomenological analysis method. Results: We found a clear temporal structure with five distinct phases: 1) a premonition, 2) increasing pressure/nausea/upward tension 3) bifurcation 4) either a strong or weak seizure 5) a recovery phase (long for strong seizures, short for less strong seizures). The OBEs occurred in Phase 1 for two participants, Phase 2 for two participants and in Phase 4 for three participants. Our analysis revealed two different types of OBE: one in which the person has the feeling that the perspective of their perception changes, and one in which the person sees themselves from the outside. The latter one was accompanied by fear, whereas the first one was neutral. The participants reported these phenomena only late in the interaction with the physician or interviewer, indicating the difficulty in verbalising and sharing such experiences. Discussion: To the best of our knowledge this is the first microphenomenological analysis of out-of-body experiences in epileptic seizures. These phenomena raise the question of where the perceiving self is located during such experiences. Our fine-grained analysis offers a valuable insight into these unusual experiences and into this fascinating question. We hypothesise that such phenomena are underreported and their prevalence underestimated so that we deem it important to raise awareness of such phenomena.

Keywords
seizures, focal epilepsy, autoscopic hallucination, interviews, anxiety, subjective experience of epilepsy.

C-36 (Sat):What Types of Messages do People Perceive from the Departed?A Qualitative Study on the Nature of After-Death Communication

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[05.08] Near-death and anomalous experiences

Abstract
Many people believe that they have been contacted by a deceased loved one. In psychology literature, these anomalous experiences are called After-Death Communications (ADCs). In other academic disciplines, they are referred to as post-death encounters (Troyer, 2014), sensory and quasi-sensory experiences of the dead (Kamp et al., 2019), and post-bereavement hallucinations (Grimby, 1993). ADCs involve spontaneous and direct perceived contact from the departed. They may be symptoms of complicated grief, perceptual hallucinations, or veridical encounters of phenomena typically outside of normal human awareness. Many people report that these encounters are comforting and deeply meaningful, and they are typically not signs of psychopathology. As such, ADC research presents a unique opportunity to study the phenomenology of anomalous experiences and resulting afterlife beliefs. For this project, we conducted an exploratory, qualitative study to investigate perceived means of ADCs. This project is part of a larger, mixed-methods study on ADC disclosure preregistered online through the Center for Open Science. Adults living in the US (N = 317) provided open-ended responses to the question: "Please give a brief description of this experience, where you thought that a person who had died might have been trying to communicate with you. What happened? " We categorized the qualitative data using a systematic coding process we developed for a previous study on perceived modes of general ghost/spirit communication (Wilt et al., in preparation). First, two independent raters used qualitative description methods to break participant responses down into their most salient and essentialist components (i.e., codes). Next, a third independent rater assessed inter-rater reliability between the matching code sets and found it to be 81.12%. Finally, a fourth rater iteratively conducted a conceptual sorting task in which they organized 427 individual codes into higher order categories. The resulting eight higher order categories included Senses (35.36%), Dreams (17.80%), Symbolic Objects (16.86%), Felt Presence (0.10%), Physical Manipulations (0.10%), Mental/Emotional (0.02%), Invited/Conjured (0.01%), and Unspecified ADCs (0.07%). Each higher order category contained a collection of lower order codes. When appropriate, the higher order categories were broken down by second- and third-order qualifying levels. For example, the Senses higher order category was broken down into four, second-order qualifying levels including auditory, visual, smell, and touch. The sight qualifying level was then broken down further into three, third-order qualifying levels including appearance of deceased, light, and general. These results indicate that people think that messages from departed loved ones can occur in many ways, through natural (i.e., senses, physical manipulations), intuitive (i.e., felt presence, mental/emotional, dreams), and symbolic (i.e., symbolic objects, invited/conjured) means of communication. This study shows that ADC is a fruitful area of research that can provide context to experiences that may influence people's beliefs in the existence of human consciousness after death.

Keywords-After-death communication, post-death encounters, post-bereavement hallucinations, grief, anomalous experiences

C-36 (Sat):Let There Be Light: A Mixed Methods Investigation of Mystical Luminosity Experience

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[05.08] Near-death and anomalous experiences

Abstract
Experiences of an extraordinary luminosity with mystical qualities are frequently reported in the context of near-death as well as mystical experiences today. Transcendental light has also been highly significant to various systems of mysticism from all over the world, and experiences thereof described in the writings of mystics throughout history. Some philosophers and theorists have pointed to the similarity of these contemporary light reports, often thought to be in separate categories such as contemplative, psychedelic, or near-death, and proposed that they may in fact consist of a singular phenomenon; likewise, similar efforts have been made to syncretically connect light in mystical traditions. While the examination of light themes in mystical traditions is methodologically limited, contemporary reports of mystical luminosity experiences are available now for empirical study within the psychology of anomalous or nonordinary experiences. The purpose of the current study was to bring this question out of the domain of theoretical and philosophical speculation and empirically test the idea that mystical luminosity is a single phenomenon being reported in a variety of contexts, that it can be measured in a manner similar to other extraordinary experiences via self-report, and that its psychological impact typically reported as increased spirituality and related changes may in fact be accurate. Using the participant selection model of the sequential explanatory mixed methods design, this study consisted of three phases: 1. the development and validation of a mystical luminosity scale, 2. a correlational study testing various hypotheses about the experience and its effects, and 3. a phenomenological study sampled from the correlational results, to gain deeper insight into the patterns observed. Results supported the construct of mystical luminosity being a unified experience across multiple contexts, with a scale showing adequate validity and reliability for its measure, and the correlational and phenomenological findings mostly supporting existing theory and reports. These findings open a new avenue of research within the study of spiritually transformative experiences, which may have implications for the psychology of religion, religious studies, near-death studies, clinical application of psychedelics, cognitive science, philosophy, and even theology.

Keywords
mysticism, near-death experience, mystical luminosity, divine light, spiritually transformative experiences, self-transcendent experiences, mystical experience

C-36 (Sat):Reincarnation and the Simulation Hypothesis -Lessons from Past Life Regression Therapyabout the Usefulness of a Consciousness-Based Paradigm

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.03] Hypnosis

Abstract
The perennial doctrine of the world as an illusionary appearance (maya in Hinduism) and of all things empty of inherent existence (svabhava in Mahayana Buddhism) is currently re-emerging in various forms of the Simulation Hypothesis. The suggestion that reality may be a sophisticated (virtual) simulation has triggered an intense public debate as well as criticism for being impracticable, unfalsifiable, hence not a scientific question. This line of critique must be considered valid, chiefly on the ground that any attempt to falsify an illusion may be part of the illusion itself. Furthermore, if one level of simulation could ever be verified, the search for a simulation of the simulation or the original simulator, would create an infinite regress akin to the 'problem of the first cause' (Gleiser). Yet, the basic unfalsifiability of the simulation type of hypotheses does not mean that they are scientifically irrelevant. Rather, they may indicate the rise of a Kuhnian scientific revolution, during which new assumptions are discovered and assessed – as assumptions go, not by verifiability or falsifiability but for their usefulness. Reincarnation and past-life therapy constitute fields in which consciousness is regarded as primary to physical reality, which is treated as a (quasi) simulation. In a qualitative study conducted by the author, subjects from varied national and cultural backgrounds were given the chance to explore past and future lives over the course of a dozen hypnotherapeutic sessions. The aim of the study was not to verify reincarnation, rather to assess the psychological usefulness and potential therapeutic benefits of the emerging narratives. It has been found that a qualitatively different way of thinking arises, as the individual begins to see their current life as a story embedded in a larger context of past and present development. This allows for taking up vantage points that are more dissociated, from which life events become less gripping, so that the developmental value of each situation can be explored. Various techniques (e.g. getting into the mind of the opponent, reframing the intent, regressing to the root of a relationship problem, an 'incurable' symptom, a phobia, or even a body integrity identity disorder) can be employed to unlock the healing potential within. As a result of the process, external events lose their relative importance compared to the internal psycho-alchemical processes they catalyse. Each life constitutes a new level of awareness, at which the subject of the previous level becomes the object of the next (c.f. Kegan), allowing for the change and transcendence of past patterns (e.g. turning personal weaknesses into strengths). The sense of Self gradually widens. From a 'skin-encapsulated Ego' identity, it moves towards a higher-self-being whose existence spans many lifetimes, until ultimately, it reaches identification with the singularity consciousness (Brahman, the creative principle and absolute cause itself) that collects and integrates all experiences of every individual incarnation like a cosmic computer analysing the data of its simulations.

Keywords
Past life regression, simulation hypothesis, scientific revolution, consciousness-based paradigm

C-36 (Sat):Behavioral and neural evidences of subliminal multisensory integration challenge the prevailing theories of consciousness

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
The prevailing theories of consciousness consider the integration of different sensory stimuli as a key component for this phenomenon to rise on the brain level. Yet we do not know if multisensory integration could occur also for subliminal stimuli and whether it satisfies the same psychophysical mechanisms as those described for perceivable stimuli. To unveil this, we engineered a neuro-technological platform where volunteers were exposed to the visual (through Virtual Reality) and/or haptic (through Electrical Stimulation) stimuli above or below their perceptual threshold. They had to discriminate in a two-Alternative Forced Choice Task the intensity of just noticeable differences between unimodal and/or bimodal stimuli. Subjects were then asked to discriminate the sensory modality (visual and/or tactile) while recording their EEG responses. We validated the platform by finding the evidence of multisensory integration for supraliminal condition, following classical optimal model. Surprisingly, even for subliminal trials participant's performances in the bimodal condition were significantly more accurate when discriminating the intensity of the stimulation, therefore indicating presence of integration. When inspecting brain signals, circa 200ms after both stimuli, significant differences emerged between the activity templates of bimodal and unimodal conditions in parieto-temporal areas known for their integrative role. These results suggest that subliminal multimodal integration can occur, even without emerging to awareness. This is in open contrast with a central assumption shared by the prevailing theories of consciousness, while it is coherent with the Windows of Integration hypothesis.

Keywords
unconscious integration,subliminal stimuli,EEG,just noticeable differences

C-37 (Sat):Consciousness as a global percolation in the neural hypernetwork

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[03.19] Cognitive theories of consciousness

Abstract
The main difficulty in the science of consciousness is well known and consists in the fact that subjective experience has characteristics of quality, meaning, value, purpose, and intentionality that do not form direct logical connections with the neurobiological description of the brain as a physical, organic system. The hypernetwork brain theory tries to establish such conceptual bridge using the smallest number of fundamental principles. It addresses the mind-brain problem starting not from the mind, or its relation to the brain but from the revision of the fundamental idea of the brain. The main idea is that at the highest level of its existence the brain is not a neural network, but a neural hypernetwork-a causal neural structure that emerges from a neural network by a recurrent proliferation of neuronal cognitive groups in the organism's struggle for the results of behavior. The hypernetwork brain theory postulates three ground conditions the combination of which in an autonomous adaptive system is necessary and sufficient to develop cognition-the principles of generative functional systems, integrative deep network, and associative long-term plasticity. From these first principles, the theory deduces three principles of emergence-arborization, segregation and integration of cognitive elements. Together, these three operations form a recurrent algorithm of cognitive progression, leading to the generation of a variety of cognitive structures. Based on these three principles, the theory deduces three principles of existence-of cognitive groups (CoGs), links of cognitive groups (LoCs) and the cognitive complex (cognitome). For each of these cognitive structures, the theory describes its specific existential properties – its cause-effect power. Thus, the Darwinian system with the ground conditions for the emergence of cognitivity forms the cognitome-a higher-order structure of the nervous system that accumulates subjective experience of the organism in its relations with the environment. The report will consider a set of consequences from the hypernetwork brain theory, including its main identity thesis-identity between the cognitome and the mind. Consciousness according to the theory is a specific type of process in the cognitome-a global percolation of information in the neural hypernetwork. Supported by the Scientific and Educational School “Brain, Cognitive Systems, Artificial Intelligence “ at the Lomonosov Moscow State University and the Non-commercial Foundation for Support of Science and Education “INTELLECT “.

Keywords
consciousness, brain, mind, neural hypernetwork, theory, percolation

C-37 (Sat):Enhancing the Meditative Experience with Ultrasound Neuromodulation

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[05.02] Meditation and mindfulness

Abstract
In this study, we investigate the possibility of inducing particularly deep meditative states in expert vipassana meditators via direct neuromodulation of specific brain regions using focused ultrasound (FUS). This modality affords us the ability to induce neuromodulation throughout the brain, at any required depth, and with a spatial precision far exceeding that of other non-invasive techniques such as transcranial magnetic stimulation (TMS). Thus, focused ultrasound neuromodulation is relatively unlimited in its ability to target key nodes of circuits relevant to the meditative state—of which many fall below the cortical mantel and, consequently, out of the range of TMS. As the ideal target node(s) for this purpose remains far from obvious, we specifically aim to investigate the behavioral effects of FUS targeting three candidate regions: the posterior cingulate cortex (PCC), the bilateral head of the caudate, and the bilateral insular cortex. These regions were chosen based on prior theory and findings that relate each of these structures to proposed mechanisms underlying the meditative state (e.g., reduced egocentric thinking) and/or its consequences (e.g., equanimity, resilience to pain); this is in the hopes of temporarily inducing brain states that may more readily be moved into those that underlie the experience of deep meditation. FUS was applied (guided using neuroimaging but outside the MRI scanner) for 12 minutes to 36 expert meditators participating in a 1-hour meditation, during which meditative depth was probed—through self-report—repeatedly before, during, and after FUS application. Concurrently, a range of physiological measures were also recorded (heart rate, EMG, etc.). Moreover, extensive questionnaires were given before and after meditation to assess, along many dimensions, the precise subjective state of individuals during each meditation session (e.g., “how anxious were you? “, “how loud or quiet was your internal dialogue? “). Combined, these measures provide rich online and offline measures of the subjective depth (low dimensional but high temporal resolution) and subjective quality (high dimensional) of each meditation session. This procedure was repeated in 4 sessions per subject—corresponding to 3 target regions and 1 sham condition, such that all results may be compared within subjects between stimulation and sham conditions, revealing any changes in subjectivity specifically induced by neuromodulation of each target region as well as a time course of any induced changes in meditative depth during the 1-hour meditation. Here, we present our findings which suggest that some of our stimulation conditions produce enhancements of meditative depth during the stimulation period as well as other changes in subjectivity. Neuroimaging and physiological correlates of these behavioral findings were also found and are also presented.

Keywords
Meditation, Mindfulness, Focused Ultrasound, Neuromodulation, Subjective Experience

C-37 (Sat):Self-boundarylessness in the brain

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.22] Miscellaneous

Abstract
Using a combination of phenomenological data and functional MRI, we investigated the neural correlates of sense of self-boundaries in a group of 26 participants with varying meditation experience. Our independent variable was a single continuous self-report measure of trait-level boundarylessness which had been validated through a qualitative interview analysis. Boundarylessness was negatively correlated with brain activity in the posterior cingulate cortex/precuneus during mind-wandering compared to a minimal self task (a prompt to focus on the "centre of experience "). This result suggests a decrease in baseline activity of the posterior medial hub of the default mode network in participants with a decreased sense of self-boundaries. In addition, brain data analysis revealed two quadratic relations: boundarylessness showed a U-shaped relation to connectivity within the default mode network during rest, and an inverse U-shaped relation to activity in the medial prefrontal cortex during self-referential word processing. Interesingly, the interview analysis separately revealed a quadratic relation between boundarylessness and perspectival ownership of experience (the sense of being an observer or witness of experiences). These findings indicate that, in some respects, the minds of persons in the low and high end of self-boundarylessness are more alike than either are to the minds of persons reporting intermediate boundarylessness.

Keywords
fMRI, DMN, self-boundaries, self-referential processing, minimal self, perspectival ownership of experience

C-37 (Sat):An approach to the Freudian Unconscious by a logical model of quantum spins

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.09] Unconscious/conscious processes

Abstract
Freud characterizes the Uncoscious as timeless and negationless, without contradiction (Freud 1900). It is capable of open representations without words (Freud 1891). Successively, Matte Blanco, with his Bi-logic, that separates the symmetric mode, proper of the Unconscious, from the bivalent mode (Matte Blanco 1975), strengthens the original Freudian characterization in logical terms. In his interpretation, the objects of the Unconscious are infinite sets. In this setting, Consciousness takes place when finite, closed objects, denoted by words, are conceived. This goes together with the arising of the standard logical setting where negation is possible, contradiction and time are conceived. How to find how Consciousness takes over the Unconscious, namely, how the secondary process makes its appeareance? The quantum approaches to Consciousness lead to formal investigations, we would like to quote (Khrennikov 2002), a pioneering work for Freudian theory. A formal approach in logic is here proposed, adopting a model for quantum states (Battilotti 2014). In it, "infinite singletons " can model the infinite objects processed by the Unconscious (Battilotti, Borozan, Lauro Grotto 2021). Then quantum spins can characterize a modal necessity operator, adding a new element to the unconscious mental representations, that corresponds to the tripartite conception of the mind discussed by Freud in his second topic. The further introduction of a temporal parameter allows for the definition of a modal negation operator, that fits with the Freudian description (Freud 1925), for which the contradiction laws corresponds to quantum uncertainty (Battilotti, Borozan, Lauro Grotto 2022). The introduction of a third operator from quantum spins, that follows from the commutation relation, is under study. It should model impossibility and correspond to the mental conception of the empty set, whose role with respect to consciousness is analyzed in (Saad 2020). Freud, S. The Interpretation of Dreams, Standard Edition, 4-5, 1900. Freud, S. Zur Auffassung der Aphasien. Eine kritische Studie [On aphasia: A critical study], (1891), trans. by E. Stengel, New York, International Universities, 2002. Matte Blanco, I. The Unconscious as Infinite Sets, Duckworth, London, 1975. Khrennikov, A. Classical and Quantum Mental Models and Freud's Theory of Unconscious/Conscious Mind; Växjö University Press: Växjö, Sweden, 2002. Battilotti, G. Quantum states as virtual singletons: converting duality into symmetry. International Journal of Theoretical Physics 2014, 53(10), 3488–3502. Battilotti, G.; Borozan, M.; Lauro Grotto, R. Infinite singletons and the logic of Freudian theory. Language and Psychoanalysis 2021, 10, 46–62. Freud, S. Negation. Standard Edition, 19, 1925, 235–239. Battilotti, G.; Borozan, M.; Lauro Grotto, R. A Modal Interpretation of Quantum Spins and Its Application to Freudian Theory. Entropy 2022, 24, 1419. Saad, A. On the logic of the unconscious. International Journal of Psychoanalysis 2020, 101(2) 239–256.

Keywords-Quantum models, Freudian Theory, primary and secondary process, Bi-logic, logic, modal operators, infinite singletons, temporal parameter

C-37 (Sat):Natural Kinds of Sleep Experience

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[03.10] Sleep and dreaming

Abstract

The standard approach to the science of sleep experience proceeds by way of phenomenological definitions. Researchers examine the phenomenological features of sleep experience in order to draw a definitional line between those conscious experiences in sleep that count as 'dreams' as opposed to 'dreamless' experiences. These definitions subsequently form the explanatory targets of empirical research into the neural basis of dreaming. This approach is most clearly exemplified in the work of the growing number of philosophers and neuroscientists who endorse simulation models of dreaming. According to these models, a large subset (but not all) of our conscious sleep experiences warrant classification into a single neurobiological kind 'dreaming' in virtue of sharing a distinctive simulation-like phenomenology (e.g. Windt 2015, 2018, 2020). On this view, the majority of our sleep experiences are unified through sharing a 'core' of phenomenological properties: they each involve immersive, vivid 'here and now' experiences of a self in a world. Despite its widespread adoption, little philosophical attention has been paid to the question of whether the phenomenological approach is a good approach to adopt -- whether its underlying metaphysical assumptions are sound. This is likely because it is unclear that there are serious methodological problems associated with this approach, nor that there is an alternative methodological framework available for consciousness science to take up. This paper takes up this challenge and offers a critique of the phenomenological approach alongside the provision of a new methodological framework. Against the phenomenological approach, two objections are put forward. First, contrary to claims made by proponents of simulation views, I argue that phenomenological definitions of dreaming like the simulation view above are largely untestable, and insensitive to revision in light of empirical evidence. That is, that both the empirical considerations offered in favor of these definitions, as well as the reliability of the predictions which are said to follow from them, depend upon a prior acceptance of the definitions these are meant to support. This raises serious questions about the scientific status of the phenomenological approach to dreaming. Second, I argue that phenomenological definitions are problematic in so far as they build in a priori assumptions about the number of neurobiological kinds present in sleep experience which should be left for empirical investigation to establish. I argue that the assumption that dreaming is a single kind of state plays an active organizing role in dream science which often goes unnoticed, shaping not only the way empirical results are interpreted, but also the way in which experiments in consciousness science are constructed and designed. I demonstrate this with reference to two case studies. These methodological obstacles motivate the provision and uptake of an alternative approach to sleep experience. According to the alternative 'natural kind' framework I propose, consciousness science should proceed by identifying the natural clusters of phenomenological, neurophysiological and functional properties in sleep which track distinct global states of consciousness. This encourages a theoretical openness to a new possibility viz. that 'dreams' and 'sleep experience' may not form natural kinds.

Keywords
dreaming; global states of consciousness; natural kinds; sleep experience

C-38 (Sat):Quantum mind theory reveals what needs to be fixed in Alzheimer's disease: the protein of entanglement

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.08] Neurology, neuropsychology and neuropathology

Abstract
To understand, treat, and possibly cure Alzheimer's disease, we need to start with some background on how memories are formed in neurons. (1) How is memory formed? Microtubules exist in every living cell and perform myriad functions. Quite remarkably, microtubules in select brain neurons perform cognitive functions in addition to general housekeeping chores like guiding growth and transport (Woolf NJ. A structural basis for memory storage in mammals. Prog Neurobiol. 55, 1998). Following a series of laboratory studies, we discovered that neural microtubules are the essential components of neuroplasticity and memory formation. Without microtubule plasticity, there can be no new memory laid down. Neuroplasticity enables new neural connections and restructuring of the inside circuitry of neurons. The whole idea of a nano-size intrinsic circuitry within the neuron that mediates human memory and consciousness derives from the pioneering work of quantum mind theorists Stuart Hameroff and Roger Penrose. (2) What triggers Alzheimer's disease? Neuroplasticity exhausts inherited gene expression sequences of microtubule proteins thereby initiating the Alzheimer's cascade (Woolf NJ, Butcher LL, Dysdifferentiation of Structurally Plastic Neurons Initiates the Pathologic Cascade of Alzheimer's Disease: Toward a Unifying Hypothesis. In: Cholinergic Systems, Eds: M Steriade and D Biesold, 1990). In short, microtubules undergo developmental differentiation regulated by biological clocks. During embryonic and childhood development different microtubule proteins (and binding proteins) are sequentially expressed in well-timed sequences enabling the precise ordering of neural connections. At the end of the life-span microtubule proteins undergo changes like under-expression and over-expression. The same clocks that tick off dramatic changes at the beginning of life unravel at its end. It simply is the fate of differentiated cells (e.g., brain vs. liver cells) that make up complex organisms. It is why we're not immortal and why we don't live 25,000 years like some single-celled organisms. (3) Who gets Alzheimer's disease? Alzheimer's disease has only a few risk factors: old age and head injury are the first and second risk factors. Thus, a suitable theory of Alzheimer's disease is that a biological clock ticks off too many times in neurons that have reorganized countless times because of learning-related neuroplasticity. These neurons are over-worked and stop expressing certain microtubule proteins (specific tubulin subtypes and various tubulin binding proteins, for example). There is evidence of tubulin expression changes in Alzheimer brain but it has received little attention. (4) Is there a cure for Alzheimer's disease that would fix memory and cognition? The Alzheimer treatment that I propose is an mRNA gene therapy to replace certain tubulins that are deficient in select neurons. Nanotechnology tools exist that could deliver mRNA genes specifically to damaged neurons. As an example, we have an issued U.S. patent (US20050265991A1) for a nanocapsule equipped with a cantilever activated by neurochemicals found exclusively in damaged neurons. Nanotechnologies are ripe for rapid development of an mRNA gene therapy that would restore normal tubulins enabling healthy microtubule neuroplasticity within neurons affected by Alzheimer's disease. This would remedy cognitive function and memory and conceivably reduce neuropathology triggered by microtubule dysfunction.

Keywords-microtubule, Alzheimer's disease, nanotechnology, memory, tubulin, neuroplasticity

C-38 (Sat):Visual snow, absorption, and altered states of consciousness

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.02] Vision

Abstract
Visual snow refers to the perception of tiny flickering dots across the visual field thought to arise due to visual cortex hyperactivation. Because visual cortex activity is associated with more vivid mental imagery, it is possible that people with more frequent experiences of visual snow are more likely to get engrossed in imagination. Thus, we hypothesized that more frequent visual snow is related to the personality trait of absorption, which refers propensity to be engrossed in perceptual and imaginary experiences. We conducted three studies with different methods of assessing the frequency visual snow experiences on a scale of eleven points from 0% (never) to 100% (all the time). In Study 1, 564 participants saw an animated graphic simulation of visual snow and were asked about the frequency with which they have similar percepts with the open eyes. In Study 2, 310 participants were asked how frequently their visual field is full of tiny dots of light. In study 3, 368 participants were asked how frequently the world is seen with many dots of light. In the three studies, absorption trait was measured with the Modified Tellegen Absorption Scale (MODTAS), which has five interrelated dimensions: 1) Imaginative Involvement (capacity to be attentionally absorbed in vivid mental imagery), 2) Esthetic Involvement in Nature (capacity to be attentionally absorbed by external events), Altered States of Consciousness (propensity for psychological states that are markedly different from the ordinary waking consciousness), Synesthesias (predisposition for associative synesthesias), Extrasensory Perception (tendency to experience events that apparently defy known physical laws). In Study 1, experience of visual snow (at least 10% of the time) was reported by 44% of participants with 19.7% reporting to see it always or almost always (between 80% and 100% of the time). In Study 2, seeing visual snow at least 10% of the time was reported by 45% of participants with 6.5% seeing it always or almost always. In Study 3, seeing visual snow at least 10% of time was reported by 44% of participants with 3.6% seeing it always or almost always. Visual snow frequency correlated with frequency of tinnitus (Studies 1 and 2) and entoptic phenomena (floaters and blue field entoptic phenomenon; Study 1). Among those experiencing visual snow, the majority reported no (30%-32%) or minimal distress (37%-38%) with visual snow. Across the three studies, visual snow frequency was significantly and positively correlated with all five dimensions of absorption. Across the three studies, visual snow frequency correlated more strongly with the propensity to experience Altered States of Consciousness. We confirmed that visual snow is relatively common in the population and is associated with greater capacity to be immersed in vivid mental imagery and with the propensity for altered states of consciousness. The Altered States of Consciousness dimension of the MODTAS includes items assessing familiarity with mystical experiences, perceiving things as if they were doubly real, and experiencing the mind enveloping the world. This suggests that people with visual snow may be particularly predisposed to mystical-type experiences.

Keywords-visual snow; absorption; mental imagery; altered states of consciousness

C-38 (Sat):Italian Psylocibe: a new challenge to study consciousness

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.12] Medicine and healing

Abstract
The use of therapeutic mushrooms is linked to our ancestry. From a great many anthropological and archaeological studies, artifacts have been found that report and, according to experts, recall the use of mushrooms with powerful spiritual visions. As we already know the Stoned Ape theory, according to which apes accelerated their evolution into increasingly sentient beings precisely through the use of mushrooms, this theory albeit limitedly is confirmed by find after find. Psilocybin and mushrooms, research after research continue to demonstrate their powerful antidepressant properties, and more and more people around the world are practicing microdosing, with increasingly promising results. Many of these people report how their lives are completely transformed. Trauma, drug-resistant depression, and other hardships and illnesses that have characterized them for years, thanks to the consumption of psilocybin in small doses, are transformed and become for many just a memory. Psilocybin mushrooms still much feared by legislation but increasingly appreciated by humans. The genus Psilocybe (Fr.) P. Kummer (Basidiomycota) contains unique species renowned for their hallucinogenic properties, exploited for neurotropic use, especially in many sacred religious ceremonies worldwide. Psilocybe species are the main source of naturally occurring psychedelics. The compound psilocybin is implicated in the psychedelic effects experienced when ingested, is biologically inactive. However, the prohibition on psychedelic drug clinical research, particularly in Italy, significantly delayed advances in medical knowledge on the therapeutic uses of agents such as psilocybin. Clinical trials have shown significant reductions in depression and anxiety in cases of addiction, depression, and end-of-life mood disorders. Studies have also shown that psilocybin may reduce depression and anxiety associated with psychological crises due to a terminal diagnosis of advanced-stage cancer. Psilocybin cultivation, sale, and processing for medicinal use remain illegal worldwide, except in a few countries, including Jamaica and some South American countries. The first studies on the effect of psilocybin on depressive and anxiety-provoking syndromes were carried out in patients with serious and life-threatening medical conditions. The first of these studies was led by Charles Grop of Harbor-UCLA Medical Center in California and ended in 2011. The second two ended in 2016 and were led by Ronald Griffiths of Johns Hopkins University and Stephen Ross of New York University, who is also the author of the latest study concluded in 2021. The results of these studies indicate that moderate to high single doses of psilocybin, given concurrently with psychotherapy, produce rapid, pronounced, and sustained effects (from months to years) of anxiety and depressive symptoms, as well as sustained reductions in existential distress and improvement in quality of life. We will present the first data related to the psilocybe genus in Italy and its characterization to develop first clinical studies in the country.
Keywords-Psilocybe, Italian genus, characterizazion, neutropic use, prohibition

C-38 (Sat):Moveo Ergo Sum: "Consciousnessing " and Moving

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract
This presentation will explore how the movement lessons of the Feldenkrais Method® can provide an unexpected, and largely unexplored, resource for the science of human "consciousnessing ". The presentation will offer four chapters: 1. A meta-theoretical frame distinguishing linguistic descriptions of consciousness as a noun, and "consciousnessing " as a verb, in other words, an embodied, biological activity. 2. An epistemological frame concerning what we can know about the biology of activity, i.e., of moving. This includes evolutionary, anatomical-biomechanical, neurological and developmental perspectives of human movement in relation to consciousness and the sense of self. 3. A methodological frame. The central core of the Feldenkrais Method is the phenomenological bracketing of moving in Feldenkrais Awareness through Movement® lessons. The process and structure of these lessons will be outlined, with examples. Beyond expanding our knowledge of how humans can move, the lessons also provide insights about how embodied consciousness functions. 4. A pragmatic frame which considers how the Feldenkrais® lessons make a difference in each person's action and their capacity for living a more satisfying life. Examples will be offered from the teaching practice of the presenters.

Keywords
Feldenkrais Method®, embodied consciousness, human movement, attention, phenomenology, sense of self

C-38 (Sat):On the relevance of alpha-rhythm modulation to the generation of readiness potential

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.05 .Motor control

Abstract
The readiness potential was discovered more than 50 years ago (Kornhuber and Deecke, 1965), but it was Libet (1983) who introduced it to objective research on subjective agency. The design of Libet's experiments was heavily criticised, but nonetheless, the time gap between readiness potential onset and awareness of intention was considerable to raise discussions about free will. In a strong form such temporal relationship between these two events was taken as a demonstration that the decision to perform a movement is formed in the brain before such decision is formed in consciousness. An alternative account for the explanation of readiness potential is that it may represent an artefact of averaging (Jo et al., 2013, Schurger et al., 2018, Neafsey, 2021). Under the stochastic decision models, the stochastic fluctuations in brain dynamics (Schurger et al., 2018) at a certain moment sum up in such a way that a predetermined threshold for motor activity is crossed. After the threshold has been crossed, the movement is performed. Thus, averaging exclusively those trials that result in movement leads to a biased sample in a sense that it represents only those stochastic fluctuations that eventually crossed the threshold. In a similar vein, a slow cortical potential model (Jo et al., 2013) suggests that a negative potential facilitates the movement, but the movement can also occur during the positive potential, although with a smaller probability. According to these hypotheses, “readiness potentials “ may happen even in periods without voluntary actions. However, a recent study (Travers et al., 2020) failed to provide evidence for this hypothesis. One of the possible obstacles to confirming the above-mentioned alternative account might have been the low signal-to-noise ratio of readiness-potential-like events. Along with the readiness potential, movement preparation is accompanied by changes in alpha and beta rhythm amplitude (Shibasaki and Hallett, 2006), namely, the amplitude of these oscillations decreases as the movement to be executed approaches. We hypothesise that the readiness potential and alpha rhythm are not separate phenomena. Instead, the readiness potential is at least partially generated by alpha rhythm via the baseline-shift mechanism (Nikulin et al., 2007, Mazaheri and Jensen, 2008). The baseline-shift mechanism states that if the amplitude of oscillations is changing due to stimulus processing or movement, the change will be accompanied by a slow potential in the low-frequency range. In the current work, we attempt to show that temporal dynamics and spatial localisations are similar for readiness potential and alpha rhythm amplitude, i.e., the negative readiness potential has similar temporal evolution as the decrease in oscillations’ amplitude, and spatially these changes are localised in the central-frontal region of the cortex. We suggest that demonstrating the link between readiness potential and alpha rhythm will improve the conditions for searching for readiness-potential-like events in continuous data.

Keywords-free will, EEG, readiness potential

C-39 (Sat):The now paradox:the key that unlocks

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
I outline an approach to the hard problem based on a paradox between causality and how we experience the spacetime continuum. The paradox is that everything perceived to exist must span two or more points of continuous time, the conscious now, but two causally related points in time cannot co-exist: a cause must be in the past of its effect. I will show that the only solution to the paradox is that matter is experienced by human minds in a form that reflects the process of perception. Furthermore, the manner of reflection can be quantified in principle, allowing us to identify properties of conscious observation that persist translated, in the conceptual models of science.

Keywords
Time, paradox, explanatory gap,

C-39 (Sat):The Evolutionary Ascent of Consciousness

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[05.05] Transpersonal and humanistic psychology

Abstract
The future of human consciousness is indefinite in these troubled times. Nevertheless, in the big picture of human nature seen over time there seems to be an evolutionary urge toward increasing intelligence and a broadening awareness of our place in the cosmos. This urge is shown to be consistent with a larger picture of the evolution of the cosmos in which we live, and is supported by modern understanding of the physical nature of reality itself. Consistent with this, I explore modern ideas of human growth and transformation, including recommendations of how best to take advantage of these in our own individual lives.

Keywords
consciousness, evolution, Teilhard de Chardin, Abraham Maslow, self-actualization, transcendence, meditation

C-39 (Sat):Consciousness influences epigenetics

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[02.14] Emotion

Abstract
EPIGENETICS is a mechanism for regulating gene activity independent of DNA sequence: in a particular type, in different disease states, in response to physiological or psychological stimulus, how you feel and how you have been treated. The epigenetic factor ends up in the "health endpoints ": Cancer, autoimmune diseases, mental disorder and diabetes-Of great importance to public health. Contrary to an outdated understanding of genetics, your genes aren't actually "on " or "off. " Different chemicals cause different responses in your genes, and since it is your brain that decides what chemical signals to send to the cells, is it actually your consciousness that determines how you feel. In each moment of every day, a conversation is taking place inside us that's one of the most vital we will ever find ourselves engaged in. It's the silent, often subconscious, and never-ending conversation of emotion-based signals between the heart and the brain. The reason this conversation is so important is because the quality of the emotional signal the heart sends to the brain determines what kind of chemicals are released into our bodies. When we feel what we would typically call negative emotions (for instance, anger, hate, jealousy, and rage), the heart sends a signal to the brain that mirrors our feelings. Such emotions are irregular and chaotic, and this is precisely what the signals they send to the brain looks like. In recent years scientists have been exploring the effects that stress and emotions have on our cells – in particular, on our chromosomes and mitochondrial DNA. What they have found is that our emotions can shape our physical reality at the molecular level. Depressed and stressed people have a shorter life span. Sometimes it can take years of mental stress, sometimes it is an unhappy childhood that causes ill health. Childhood trauma isn´t something you just get over as you grow up. Most illness is just stress from not living in harmony. Epigenetic patterns are reversible.

Keywords
Epigenetics, consciousness, DNA, disease, emotion, gene activity

C-39 (Sat):A Multidimensional Understanding of Human Nature and Consciousness

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.11] Consciousness and evolution

Abstract
A Multidimensional Understanding of Human Nature and Consciousness "In the distant future I see open fields for far more important researches. Psychology will be based on the foundation...of the necessary acquirement of each mental power and capacities by gradation. " -- Charles Darwin in The Origin of Species One way to approach consciousness studies would be to consider the topic from the biological perspective of evolutionary development. At the level of the origin and physiology of life, for example, Nick Lane (2015) has written about the evolutionary development of the Krebs cycle which produces the energy which is needed for life and consciousness. Then, a multidimensional understanding of human nature and consciousness can also be based on the very general development of our mental capacities in evolution as described by Paul MacLean (1990) and Sir John Eccles (1989). Paul MacLean in The Triune Brain (1990) described the evolutionary development of the forebrain as beginning with a "reptilian complex " (concerned with such basic instincts as individual survival, aggression, and social hierarchy), progressing to a limbic system which involves emotions and a social capacity other than hierarchy, and then adding a neocortex which gives the capacity for reason and language. A further distinction, however, can be made within the neocortex between the increased intellectual capacities and memory seen in the brains of primates such as the chimpanzee and the unique characteristics in humans associated with the left or dominant prefrontal cortex. Sir John Eccles described this as the neo-neocortex, or the executive center of the brain, which includes a language center with a capacity for narrative, meaning, and purpose as well as a capacity for both more integrated and abstract thought (1989). This pattern of the evolutionary development of our mental capacities is also similar to the development of our mental capacities in childhood through experience as described by Jean Piaget. This development through experience begins with self-interested thought, and then progresses to social, logical, and finally abstract thought (Inhelder and Piaget 1958). The left prefrontal cortex and our integrated and abstract thought are sometimes not fully developed until the age of 25. Lawrence Kohlberg described our moral development through experience as following the same general pattern as the development of our mental capacities (1981). We are a product of both nature and nurture. A naturalized epistemology would include each of these ways of knowing, including our capacity for narrative, abstract thought, and metaphysical considerations of meaning and purpose, that is, our need to construct a coherent self and world. This naturalized multidimensional understanding of human nature supports a very useful four-part framework of analysis for moral and political philosophy which considers the individual, social, rational, and metaphysical perspectives. Through an evolutionary process of adaptation and natural selection we are not indifferent to our survival and well-being. We have a capacity for intentionality. A multidimensional understanding of human nature and consciousness also supports a perception of choice or free will within what has been described as a parliament of the mind.

Keywords-naturalized epistemology, evolution, cognitive development, free will, philosophy

C-39 (Sat):Using Transcranial Focused Ultrasound to Alter Default Mode Network and Subjective Experience

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.13] Brain stimulation techniques

Abstract
Aberrant default mode network (DMN) connectivity characterizes a number of mental disorders and altered states of consciousness, thus providing an attractive target for neuromodulation. Transcranial focused ultrasound (tFUS) is an emerging neuromodulation technique that can non-invasively target subcortical regions of the brain. We hypothesized that tFUS could be used to temporarily alter DMN connectivity in a way that would alter subjective experience. Thirty subjects participated in a trial in which they received either sham or veritable tFUS targeting the posterior cingulate cortex (PCC), a major hub of the DMN. Functional MRI scans were taken at baseline, and then again 5 and 25 minutes following application of tFUS. Results show that application of tFUS to the PCC reduces functional connectivity with other major hubs of the DMN in the time after administration. Phenomenological surveys (Toronto Mindfulness Scale, Visual Analog Mood Scale, Amsterdam Resting State Questionnaire, and the Visual Analog Self Scale) were also administered before and after tFUS. Participants who received active tFUS showed multiple significant differences from the placebo group, including alterations in their sense of time and self and an increase in mindfulness, which will be presented. Further, the increases in mindfulness positively correlated with measured reductions in DMN functional connectivity (a neuro-phenomenological correlation). Put together, it appears that the neuromodulatory effects of tFUS can be used to alter the qualities of a subject's state of consciousness.

Keywords
brain stimulation, neuromodulation, transcranial ultrasound, fMRI, phenomenology, neurophenomenology, altered states of consciousness

C-40 (Sat):Theatre of Consciousness: lecture-performance on mental imagery in self-organizing performances

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.11] Entertainment

Abstract
Theatre of Consciousness (TC) is a concept suggested by Milda Al-Slamah in the framework of her doctoral research in Theatre Directing. This concept defines a certain type of performance practice which relies on altered states of consciousness rather than material circumstances. The concept is based on the tacit knowledge gathered from artistic research in the fields of theatre directing and music improvisation, as well as theoretical research on imagery in various fields such as music interpretation, improvisation, theatre acting, neuroscience, and psychology. The planned lecture-performance will explore the possibilities of using imagery to create theatre without ordinary theatrical circumstances (stage, actors, music etc.) and the potential for mental imagery to act as a driving force in self-organizing theatrical performances. The lecture-performance will also invite audience members to experience the creative role of the observer in an altered state of consciousness. This is in line with the TC manifesto which was built by answering the following basic question about theatrical performance: What is performance? Performance is a practice-it needs to be practiced live in order to actually happen. When does performance happen? Performance happens all the time-each moment observer notices it happening. Where does performance happen? Performance happens in the mind of the observer. Who makes performance happen? It is the observer who makes performance happen. The core of the methodology for the lecture-performance is based on semiotic concepts by Charles Sanders Peirce and Jelena Issajeva, as well as philosophical concepts by Gaston Bachelard and Alain Badiou, combined with the research on imagery done by Edward S. Casey and Jaak Sikk (PhD). This approach will be used to stimulate the audience to achieve an altered state of consciousness in which they will experience the creative role of being an observer as the quintessence of the performance. The research questions that will be tackled in this lecture-performance are: (1) What are the possibilities of using mental imagery to create the theatre of consciousness? (2) What are the possibilities for mental imagery as a guiding force to bring its observers to the state of self-organization?

Keywords
Theatre, Performance, Performance Practice, Theatre Directing, Mental Imagery, Self-organisation, Improvisation, Theatre of Consciousness, Altered States of Consciousness

C-40 (Sat):Transmission of awakening and 11 levels of well being

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.02] Meditation and mindfulness

Abstract
The Transmission of Awakening, or of 'Consciousness' has been practiced for at least 1000 years in India, and is known in Sanskrit as 'shaktipat', 'diksha', or in English as 'Divine Intervention'. I have practiced and developed my skill in shaktipat gained during 15 years in India, and have recently been studying, and will present data from EEG correlates of shaktipat transmission and reception.And I will demonstrate my ability of Transmission of Awakening. I will also discuss free will according to Indian scriptures, and how to actualize free will from my own experience. Finally I will talk about my research into 11 levels of well-being leading to 'awakening', and related to frequency and patterns of breathing based on how Indian saints attain feelings of bliss and joy. With such deep and long breathing , full capacity of brain function can be attained, and depression and mental issues overcome without medication.

Keywords
Transmission, Awakening, Free will, shaktipat, depression, bliss, happiness, wellbeing, Indian knowledge system, Eastern philosophy

C-40 (Sat):Open Your Eye: Psychedelics, Cinema and Consciousness

Nick Day
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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.12] Visual Art Forms

Abstract
Since the earliest days of cinema, the theme of consciousness and the deeper nature of reality has been irresistible for filmmakers. Topics familiar in consciousness studies, such as altered states, brain-in-a-vat scenarios, alternate realities, lucid dreams, NDEs and multiple flavors of AI frequently occur in movies, either as central to the drama or as a backdrop. Psychedelics, too, became well established in the language of cinema from the 1960s onwards, with generations of filmmakers utilizing "trippy" aesthetics into their storytelling and mise en scène. Of course, our capacity to accept the artifice of a movie and become immersed in its story is in itself a remarkable aspect of our own consciousness, an altered state. Watching a film is among the richest experiences we can have, and neuroscience is learning a lot by studying "our brain on movies." Hardly surprising, then, that psychedelics have also provided such inspiration for filmmakers. The referencing of psychedelics in cinema can take multiple forms. A film might depict a trip as integral to the action, as in the counterculture classic Easy Rider or Fear and Loathing in Las Vegas. Other films seek to replicate the psychedelic experience more subjectively, as in Altered States or Enter the Void, which uses a first person point-of-view to depict a neon-soaked DMT trip. Some non-narrative films employ a psychedelic "lens" even if they don't have any direct reference to psychedelics themselves, for example, Samsara, which depicts the world from a novel and altered perspective. Similarly, the classic 15-minute stargate sequence in 2001: A Space Odyssey where Bowman's allegorical journey of cosmic rebirth through a tunnel of light is not only integral to the story, but also provides an unforgettable psychedelic-like experience for the audience. Experimental cinema from the 1920s onwards created films that might be considered psychedelic, intended to "manifest the mind," often using animated abstract patterns and impressionistic objects, as in Five Minutes of Pure Cinema. This era also gave us Le Chien Andalou, still considered a surrealist masterpiece. Of course, outlandish and surreal imagery is hardly the preserve of the avant garde, and some of the trippiest sequences in the history of cinema can be found in the animated features of Walt Disney, including Fantasia, Dumbo and Alice in Wonderland. More recently, Hollywood's slew of superhero blockbusters are crammed with trippy imagery that presupposes an audience now very familiar with psychedelic aesthetics, and direct references to psilocybin, LSD, consciousness and the quantum realm are to be found in Doctor Strange. It's evident that the desire to alter our state of consciousness is deeply ingrained in the human psyche, and cinema and psychedelics can be seen as technologies that provide novel and (mostly) pleasurable ways to attain this. In this presentation illustrated with movie clips, award-winning filmmaker and consciousness scholar Nick Day brings together the various threads of psychedelics and cinema, tracing how each has influenced the other and helped to inform our understanding of consciousness itself.

Keywords-cinema, psychedelics, altered states, aesthetics, avant garde, transformation, LSD, psilocybin, DMT, experimental film, consciousness, storytelling, narrative

C-40 (Sat):Exploring non-ordinary states of consciousness with Authentic Movement: Applications for psychotherapy, creativity, and personal transformation

Adrianna Mendrek
Bishop's University, Sherbrooke, Quebec, Canada

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.14] Dance

Abstract
The interest in altered/non-ordinary states of consciousness has been growing rapidly. It has been suggested that they are important for personal transformation and for therapeutic purposes. Thus, the psychedelic-assisted therapy has been experiencing a renaissance. However, not everyone is comfortable with ingesting psychedelics, even under controlled and carefully designed conditions in clinical setting or on retreats. A more convenient way to explore non-ordinary states is through dance and movement. In the present paper I want to explore mechanisms through which Authentic Movement induces light trance. Authentic Movement, also called by some Movement in Depth, Inner Dance, or Dance in Presence, allows to experience dance free from any external expectations. Each session is an intimate encounter with the body, with the spontaneous gesture and interiority. Without themes or exercises, without movements to imitate or performance to achieve, this form is always practiced in the presence of a witness. It is this relationship between "mover " and "witness " that allows the emergence of the inner dance. Authentic Movement has been used by dance/movement therapists with various clinical populations; by dancers, choreographers, and other artists to enhance their creativity; as well as by people in the general population for personal discovery, healing, and transformation. The approach has its roots in modern dance and in Jungian, Freudian and Winnicottian psychoanalysis. Thus, there exist a few "lineages " of Authentic Movement, but their basic structure remains the same and includes three simple phases: time for movement, time for transition (writing, drawing, contemplating) and time for sharing. All is done in silence, except for sharing. During sharing, the use a sensitive, non-judgmental, and non-projective language is encouraged. In short, Authentic Movement is a deep dive into the body, with all that it conceals and waits to be discovered. It proposes a re-connection between conscious and unconscious, between experience and words, between mundane and poetic, between individual and collective. One of the effects of Authentic Movement practice is entering a light trance state. This is somewhat surprising, or at least it was to this author who has explored various trance-inducing methods over the past three decades including yoga, meditation, hypnosis, and conscious dance. When we think of dance, we typically link it with sound and music and indeed altered states induced by shamans in traditional settings often involve drumming and moving rhythmically. Specific rhythms are considered as vital ingredients to generate trance states. Other ingredients include inter- and intra-personal synchronization, as well as powerful breath which is sometimes produced by intense dancing or repetitive movements. Intriguingly, none of these elements in present in Authentic Movement. So how are the participants entering altered states? How are they accessing the unconscious? How are they transforming into animals and plants? Nobody is suggesting it to them as we may see during hypnosis or other approaches. In the present talk I will explore various possibilities through which this might be happening. I will also discuss possible applications of Authentic Movement for therapeutic and artistic processes.

Keywords-dance, movement, altered states, trance, psychotherapy, creativity

C-40 (Sat): Visionary Art as Evolving Consciousness

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.12] Visual Art Forms

Abstract
Visionary art is art that is not confined by form; it argues that the artist who creates spiritual art allows the spirit to guide them rather than relying on traditional form or technique. This can result in incredibly unique and expressive art, as it comes from a place of pure creativity and intuition. It also examines the visionary art of Alex Grey, whose works offer a gateway into a different state of consciousness, where the viewer can access new insights and perspectives. In a world that is becoming increasingly disconnected from the creative body, visionary art can be a source of hope and inspiration.

Keywords
transpersonal psychology, visionary art, psychedelics, consciousness, spirituality, Alex Grey

POSTERS

PO-1 (Wed): The Dimensionality of Awareness

Christopher Lord

Balliol College, Oxford, Oxfordshire, United Kingdom

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
It is clear from studies in neuroscience that the general function of the nervous system is high-dimensional: models may be chaotic, fractal or high-integer dimensional, but in any case do not match the 3-dimensional space of universal experience. Therefore, some explanation is required for how this neural activity corresponds to the 3-D reality of experience. The answer is to be found in the mathematics of projection. The hyper-real numbers of Abraham Robinson, an inclusive version of the number space that includes infinitesimals, irrational numbers and transcendental numbers may be understood as being projected into a hypervirtual space, which is delimited not mathematically, but by the nature of perception. Most neural activity never reaches consciousness. It remains in the higher-dimensional activity of the brain and is not projected down into the 3-D reality of consciousness. The senses are inherently dimensionalized, but the related senses of taste and smell are different. Taste is reliably analysed into five responses, but smell has no such organization. There are hundreds of responses to particular chemicals in the outside environment; some are passed on to consciousness and others are not. The reaction to chemicals in the environment is observed in protozoa and is a cellular-level response. Considering that the internal organization of the organism also relies on endocrine responses of the same general type, we can judge that there is a substrate of response, awareness and reaction at a cellular level that does not rely on dimensionalized or structured consciousness. However, the single-celled animal has no neural system supplying its reactions. It is the neural system that provides complex animals with structured information, even if this is still ultimately translated into the same kind of chemical responses. When it comes to human beings, it has often been pointed out that the number of possible interconnections between neurons is so large that it outnumbers the stars in the observed universe. For this reason, a model of these interactions would best be done in a Hilbert space, meaning an infinite-dimensional vector space. Any particular activity therefore takes place in a sub-space of this general space. The structure of this activity as far as consciousness is concerned is one of projection, meaning the nested movement to lower-dimensional spaces. The centre of this process of projection is the geometrical centre of consciousness, known in Hellenistic philosophy of mind as the hegemonikon. The picture of the world has a steady structure: that of living beings moving about in three-dimensional space. It is all experienced from one point of view, but as this point of view is hypervirtual, it cannot itself be experienced. The hypervirtual point at the centre of consciousness has no determinate dimensionality. It is a structural point which makes consciousness possible, but like other hypervirtual objects, which share its dimensional indeterminacy, it cannot be directly experienced. This explains the general structure of consciousness.

Keywords-hegemonikon, hypervirtual, vanishing point

PO-1 (Wed): A World of Niftiness: From Panpsychism to Pan-niftyism

Matthew Watts

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.03] Panpsychism and cosmopsychism

Abstract
I take up the question of what panpsychism offers by comparing it to a parallel account called pan-niftyism. Pan-niftyism is an expansion of a sardonic quip about panpsychism made by Daniel Dennett during The Science of Consciousness conference of 2014. I work to develop the idea of a pan-nifty world (world-N) where all physical things are fundamentally nifty, and have a coolness about them (the world-N equivalent of having something it is like) I then juxtapose world-N against a panpsychist world (world-P) and show that each world houses the zombie equivalents of the other. I then orchestrate a cosmic collision wherein both world-N and world-P exchange fundamental features. By comparing examples of world-P and world-N living with the fallout of the cosmic collision I show that the difference between "mentality " and "niftiness " as descriptors of amorphous qualities and "mentality " and "niftiness " as fundamental features of the universe amounts to little more than the presupposition that they are fundamental features of the universe.

Keywords
Panpsychism, Emergence, Consciousness, Zombies

Nature of Life and Reality.

Steen Loeth, Birgitta Therner

New Cosmic Paradigm NCP X-AIONS Advanced Institute of Ontological Principles and New Science, Skövde, Västra Götaland, Sweden

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract

Consciousness beyond life, Consciousness independent of the physical brain, Past-life memories, Reincarnation, Near-death experiences (NDE), etc. There is a lot of research in these areas, e.g., studies by Dr. Jim B Tucker, (University of Virginia School of Medicine), focusing on Children's Memories of Previous Life and Reincarnation Research; Dr. Pim van Lommel, NDE Research and, Dr. Peter Fenwick, End-of-Life Phenomena. The evidence is convincing and overwhelming but at the same time explanations are lacking and being sought. New Cosmic Paradigm – NCP X-AIONS presents a comprehensive, logical model that explains these often-called paranormal phenomena, based on The Cosmic Worldview/ Martinus Cosmology, presented by Danish intuitive philosopher Martinus Thomsen and his collaborator Per Bruus-Jensen. A post-materialistic, holistic and organic world picture, focusing on the so-called X-Structure – the Basic Nature of Life and Reality. The Cosmic Worldview describes the independence of consciousness from the physical brain, and the process of reincarnation, including how life after physical death continues on paraphysical planes of existence and the course of events that leads to a new incarnation. The X-Structure provides natural explanations for memories from previous lives, xenoglossy, near-death experiences, etc., and demonstrates new and ground-breaking perspectives on evolution. Through natural science, we know the physical body, but to understand the previously mentioned phenomena we must get to know the total organism complex. The X-Structure demonstrates that all living beings have, in addition to the temporary physical body, an immortal paraphysical body/ structure, which the physical body is connected to and dependent on. The extensive paraphysical body comprises a complex organic system that includes unique stable storage units, termed talent cores. The main functions of these stable storage units are to accumulate and process all our personal experiences, abilities, skills, qualities, etc., in order to make it possible for us to reuse and develop them, and to take them with us from life to life. The talent cores are prerequisites for the development of all forms of life and evolutionary processes. Specific organ-talent cores contain information for the creation of organisms and are crucial to how things take their form, grow and evolve in a particular way, dismissing the traditional theory that all this complex form-shaping and development is merely genetically programmed. The primary form-shaping and evolving processes with all the underlying information are accumulated in the organ-talent cores and activated at the paraphysical level when the reincarnation process begins. The talent cores are highly relevant in the field of epigenetics as they directly exert an influence on the genes of the DNA spiral. During the embryonic and fetal periods, we repeat earlier stages of our development. This "repetition " can be observed and followed throughout the different stages where the pre-programmed organ-talent cores automatically govern and control the creating and shaping of a unique organism. New Cosmic Paradigm – NCP X-AIONS Advanced Institute of Ontological Principles and New Science represents the ontological (non-religious) branch of The Cosmic Worldview/ Martinus Cosmology – presenting Ontological Principles and New Science, focusing on the great issues of Life, Consciousness and Reality.

PO-1 (Wed): Can near death studies and artificial intelligence help us to reveal the quantum nature of the mind?

Raul Valverde

Concordia University, Montreal, Quebec, Canada

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
Altered states of consciousness (ASC) include experiences such as near-death experiences (NDEs). NDEs are very brief stories of people who have been clinically dead and then spontaneously resurrected or revived with the memory of what they experienced during that period. Many people who have had near-death experiences have reported vivid mental clarity, exceptional sensory imagery, and a clear memory of the experience that is more real than in their everyday lives. The Quantum Hologram Theory of Physics and Consciousness (QHTC) explains the nature of our reality and the quantum nature of the mind. QHTC postulates that the brain operates similarly to a hologram, following quantum principles. QHTC explains the nature of our reality and ASC. The QHTC proposes that in ASC, thoughts speed up and there is more vivid mental clarity. Artificial intelligence is a modern field of computer science that includes the use of ontologies and natural language processing (NLP). NLP is a set of computational techniques for analyzing and representing naturally occurring texts at one or more linguistic levels to achieve human-like language processing for a variety of tasks or applications. Ontology is a well-established theoretical domain within philosophy dealing with models of reality. This research uses NLP to analyze NDEs narratives contained in a database with 4267 records and use ontology research methodologies to map QHTC ontology to the human language. The purpose of the research is to validate some of the ontological aspects of the QHTC in particular the idea that in altered state of consciousness, thoughts speed up and there is a high level of awareness of the mind.

Keywords
Near death experiences, quantum ontology, natural language processing, altered states of consciousness, artificial intelligence

PO-1 (Wed): The Self, Its Brain, and a Solution to the Body-Mind Problem

Peter C Lugten

Independent, Lindenhurst, New York, USA

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract

In "The Self and Its Brain ", Karl Popper and John Eccles explored, as dualists, the problem of how an immaterial consciousness can interact with and control a material brain. Rejecting as inadequate both monist theories and other forms of dualism, they insisted that consciousness must causally affect the brain, driving its activity, noting that if consciousness made no difference to the brain's functioning, it wouldn't have evolved. Eccles concluded that the Mind is an independent entity, without a neural correlate, that actively reads impressions from brain modules at "liaison areas " in the language-capable hemisphere, and controls activity by acting back through the same areas.While acknowledging that the mechanism for this remained unsolved, Popper made 4 predictions. 1) If we could understand how objective knowledge is formed as an extension of our subjective mind, it might explain the interactions between the mind and brain. 2) Physics may need to be open to a new discovery affecting the first law of thermodynamics. 3)If physical determinism is true, everything we think we are doing is an illusion. 4) The ontology of consciousness appears as if it may be an eternal mystery. In this paper I propose a solution to the Body-Mind problem that satisfies Popper's predictions, demonstrating (spoiler alert) that the mechanisms of emergent properties cannot be known, in principle. The reason is found in the seeming contradiction in the behavior of information with respect to the first two laws of thermodynamics. Physicists claim that information, considered as the microstate of the particles within an isolated system's macrostate, can, like First Law energy, be neither created nor destroyed, yet the information in the system, like Second Law entropy, will inevitably increase. To explain how information can increase without being created, it is supposed that a superintelligence, knowing the complete microstate of a system before the entropy increases, would be able to predict where each particle would go, after the event. While this can explain interactions within the microstate, it does not work for emergent events such as consciousness. These events are, by definition of the word "emergent ", features of a system which cannot be predicted by a complete understanding of its underlying level of composition. I believe that these events must be considered as irreversible computations, to which Landauer's principle applies. Irreversible computations are cycles in which bits of information, temporarily stored, are then destroyed. This destruction represents work, results in heat loss, and increases entropy. Building on this, I propose that the increase in entropy in a time-irreversible, unpredictable (emergent) system requires the simultaneous deletion of information concerning the steps, or computations, involved. Thus, the steps being sought in the quest to understand consciousness are destroyed as a result of entropy, and will always remain a mystery. These ideas imply that, since the origin of the Universe, it was entropy, not some panpsychic principle, that is behind the eventual emergence of consciousness, that our being conscious proves that we are not predetermined, and that entropy will never favor conscious machines.

Keywords-
The Self and Its Brain, Karl Popper, John Eccles, consciousness, dualism, causal, objective knowledge, laws of thermodynamics, determinism, ontology, mystery, information, microstate, macrostate, emergence, Landauer's principle, entropy

PO-1 (Wed): "Non-self " in Buddhism and Cartesian Theatre

Wenge Huang

Independent, Chengdu, Sichuan, China

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.11] Personal identity and the self

Abstract
As the cornerstone of Buddhism, in Theravada Buddhism, "non-self " generally refers to the doctrine that no unchanging, permanent self can be found in any person, which is also called pudgala-nairatmya (Sanskrit). Instead, the individual person consists of five aggregates. Although it is usually interpreted by the deductive logic of impermanence or Chandrakirti's 7 Fold Reasoning of Chariot, "non-self " has always been a perplexing and controversial thesis. This paper attempts to interpret "non-self " from a unique perspective based on both the scientific mechanism behind Buddhist meditation and the empirical materials of Theravada Buddhism, and then compare our interpretation of "non-self " with consciousness theories of western philosophy, especially self-consciousness. In a previous paper ("The Science behind Buddhist Meditation "), we proposed that the nature of vipassana is enhanced awareness induced in meditation (after samadhi), which makes contemplating the five aggregates possible, just like "watching " a slow-motion film. If we regard each aggregate as an "awareness " which is the state of being conscious of something, then contemplating the five aggregates would reveal the existence of "awareness of awareness " according to both the Sutta Pitaka and the empirical materials of Theravada Buddhism. For instance, when one feels happy, one knows that one is happy. (Note that feeling happy is not the same as knowing that one feels happy.) Furthermore, inspired by Ajahn Brahm's insightful "fruit salad simile ", we develop an original model to interpret "non-self " by introducing "awareness of awareness " out of the framework of the five aggregates and emphasizing the role of it: contemplating the five aggregates would discern that "awareness of awareness " arises a moment after each aggregate and they do not appear simultaneously. Thus, one may realize that the notion that there is a constant self experiencing/observing all aggregates just results from "awareness of awareness " appearing between any two aggregates, something that under ordinary conditions happens very quickly. (That's like a torch spinning so fast that it looks like a ring of fire.) This would lead to the insight of "non-self " which means no subject of awareness. Intrinsically, the illusion that there is a self underlying the five aggregates means a two-tier and parallel relationship like that of Cartesian Theatre or "I think, therefore I am ". However, the slowing down of "speed " in vipassana reveals that the reality is a one-tier and serial relationship. That's the essence of "non-self ". This model may act as a bridge between Buddhism and consciousness theories of western philosophy. The concept of "awareness of awareness " in our model is just similar to Sartre's "pre-reflective self-consciousness ", and our model can also explain how self-consciousness arises. The sense of self just emerges out of the process of alternating of "aggregates " (or "awareness ") and "awareness of awareness. "

Keywords
non-self, aggregate, awareness of awareness, vipassana, Cartesian Theatre, self-consciousness

PO-1 (Wed): A Husserlian Framework for Embodied Cognitive Science

Edoardo Fugali

Università degli studi di Messina, Messina, Sicily, Italy

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract

Nowadays it is acknowledged the relevance of phenomenology in defining a new paradigm in cognitive science that should amend the mainstream view, based on 1stgeneration AI and neuroscience. The central argument moved against classical cognitive science insists on its inadequacy to explain cognition in terms of sub-personal, symbolic, amodal and skull-bounded representations manipulated according to syntactic rules. On the opposite side, supporters of embodied cognitive science argue that there is no sharp divide between cognitive agents and world and that cognition is not confined to what happens in brain. Cognitive agents are indeed essentially and not only contingently embodied, contrary to the theoretical tenet of multirealisability, according to which the material structure in which mind is implemented is indifferent to its architecture. Second, they enact their own world by exploiting practical skills that don't require neither conscious nor sub-personal representations. Third, they are embedded in this world to the extent that their actions and mental states acquire meaning only within its context. Fourth, they can extend their capabilities through tools and instruments that become integral part of their bodies. These assumptions are foreshadowed in Husserl's phenomenology, which can furnish a set of concepts viable enough to the aim of underpinning them. One of these concepts is that of lived body, which denotes the way we experience our body from a first-person perspective as a unitary organ of perception and action. Husserl contrasts this concept of body with that of body as object, that is the body constituted like every other material thing in perceived world. Conversely, lived body is not a thing, but the subjective layer of a motor intentionality that serves as the primal layer of intentionality in full-fledged sense. This kind of intentionality manifests itself in the kinesthesias – bodily movements as subjectively experienced – which are concomitant to perceptual acts. Kinesthesias play a crucial role in perception and reveal it in its nature of dynamical and continuously flowing event, far from being a succession of discrete snapshots. Kinesthesias fulfil a dual function. On the one side, they ensure the self-organisation of the raw sensory materials in a whole percept, according to what Husserl calls "passive synthesis ", before of any intervention of a higher-order intellectual act of categorisation. On the other, they motivate the intentional reference of every perceptual partial appearance of an object in order to fix it in its identity, and characterise perception as an action-driven exploratory function. Beside of this, bodily intentionality discloses a worldly oriented perspectival space – in Husserl's terms a "primordial surrounding world " – whose absolute centre is occupied by the embodied subject, and which is coextensive with its sensorimotor capacities. In this view, the cognitive agent is not a mere spectator foreign to the world, posited in front of it as a passive receptor of stimuli which its brain should reproduce and reprocess, but a dynamical system, constituted by the sub-systems brain and body, coupled to the surrounding world it enacts, which on its side counts too as a dynamical system

Keywords-Phenomenology, lived body, kinaesthesias, motor intentionality, embodied cognitive science

PO-1 (Wed): Mapping inter-individual differences of biological processes underlying categorical research of mental phenomena

Thomas Wolfers

University of Tübingen, Tübingen, Baden Württemberg, Germany

Categories by Discipline

Primary Topic Area-TSC Taxonomy

[02.02] Methodologies (fMRI, EEG etc.)

Abstract

Two meditators may experience the flow of awareness in very different ways. Two people with psychosis may be very different, one may experience visual the other auditory hallucinations. Two people with dementia may lose their cognitive faculties in distinct ways. While inter-individual differences in experience are widely accepted and not even questioned, scientific research into the biology underlying the categories of consciousness (e.g., Meditators VS non-Meditators), mental disorders (e.g., Schizophrenia VS Healthy Controls) and diseases (e.g., Dementia Patients VS Healthy Controls) is dominated by the "Case-Control " analytical paradigms. In this work I show that this is a fallacy and that we may never be able to find the biological correlates or factors that underlie such processes, by dissecting means across various types of biological readouts. Instead, I argue and show that we need to focus on mapping the heterogeneity of the underlaying biological processes. To this end, my colleagues and I developed a framework for normative modelling which allows us to chart various putative correlates of consciousness, disorders, or disease as a function of ageing in the general population. We can use the resulting normative models to capture a high degree of brain heterogeneity among patients with for instance schizophrenia, psychosis and dementia. This work highlights that "bio-charts " which are constructed on the basis of brain readouts charted across the lifespan, can be used to map the heterogeneity underlying disorders and disease at the level of the individual. I argue that this analytical framework has important implications for research into meditation or people under the influence of psychedelics, as it allows us to inspect deviation from normative brain function, at the level individual in an altered state of consciousness.

Keywords

Brain Imaging, EEG, Normative Modelling, Inter-individual Differences, Heterogeneity Mapping, Meditation, Psychosis, Schizophrenia, Novel research framework.

PO-1 (Wed): The Neuroevolution of Consciousness-From quantum information to brain eeg synchronization: asystemic model to psychosomatic disorder and self awareness

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Institute of Neuropsychosomatics, Bagni di Lucca, Lucca, Italy

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.08] Neurology, neuropsychology and neuropathology

Abstract
In this report, a systemic approach to the evolution of consciousness will be presented, which, starting from the quantum information theories of Giacomo Mauro D'Ariano and Federico Faggin, through the increase of the "coherence " of information communications, follows each evolutionary passage from particles, to atoms, to cells up to the evolution of the animal and human brains. The computer simulations (see attachment) of the subsequent passages of the consciousness units, understood as "unitary systems ", offer an organic and global paradigm of the evolutionary process, from proto-consciousness to the emergence of self-consciousness (see ne. Our research on the levels of "brain eeg coherence " (see attached images) show a strong correlation between psychosomatic disorders, such as stress and depression (low coherence) and states of self-awareness (high coherence). This has allowed us to develop effective treatments for the most common medical and psychological disorders and to create a preventive educational program that has reached over 50,000 people, from children to adults, with statistical results published in the journal "Mindfulness

Keywords
quantum information, unit of consciousness, quantum coherence, neuroevolution, eeg coherence, brain connectome, psychosomatic disorder, psychosomatic unity, self awareness.

PO-1 (Wed): Measuring CNS-Independent Consciousness Among People With the Same Pattern of Thinking

Jin Ma

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.20] Neurobiological theories of consciousness

Abstract
BACKGROUND: We previously introduced our theory of CNS-independent consciousness and the coupling theory (Ma, Primary Topic: 04.16, TSC, 2022,). Briefly, our theory states that nature is from more fundamental element (MFE) which is beyond modern physics; MFEs couple in two types of singularities to be the material world and the consciousness systems, and with their cross-points to give off each species of life; the human brain has the central nervous system and the consciousness system; the consciousness system couples in three excitation levels to psychologically behave as the static memories, subconsciousness, and subjective consciousness. Our current work continues our previous one especially with our intent demonstrating such consciousness system existence and measurability. Apparently, the degree of feasibility of measuring the CNS-independent consciousness is critical to demonstrate the CNS independence of consciousness and to test our coupling theory of consciousness with Neutral Monism, or test other theories of consciousness with Physicalism. METHODS: Generally, current methods of measuring consciousness are indirect and via the general neural correlates of consciousness (NCC) data. For the same underlining consciousness, NCC could be different, for people with dissimilar brain circuits or pattern of thinking (POT) to process the same information at different times or among different people. We define POT as the behavioral traits from people's kind of consciousness system. An example of the same POT is: People can always be classified by their personalities (behavioral traits, including intelligent trait), so people are in different groups within each of which is with the same POT. To measure true consciousness signal, we first subject people (potential study participants) to the same POT sub-cohorts. Within each POT sub-cohort, people process the same information with the same "real " NCC as the common reflection of the consciousness. RESULTS: Our method is currently purely logic-based, beyond all existing hypotheses of consciousness. It needs innovative, objective and practically feasible design to be carried out, with some illustrative examples being developed. CONCLUSION: We expect the NCC in response to one common stimulus for people in the same POT sub-cohort reflects the common consciousness process. (The author acknowledges the helps and involvement of an anonymous researcher from Chandler, AZ.)

Keywords
Pattern of thinking (POT), mental twin, noisy neural activities, "real " NCC data of consciousness

PO-1 (Wed): The manifestation of the will and the correlation of health

Éva Bajzik[1], Török-Szabó Balázs[2]

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.05 .Motor control

Abstract
According to the model of consciousness described in Balázs Török-Szabó's book The Theoretics, the will is the process during which notions or images from thinking reach the outside world as information and are manifested in an act. Some express their will easily, some less so. Does expressing or not expressing our will have an effect on our body and health? Is there a measurable difference? We were looking for a method by which we can examine the manifestation of the will in such a way that it works on any person, and the circumstances are the same. During a simple, annual health screening, we measure blood pressure and weight of basically healthy, working, adult people. At the end of the examination, they can leave the clinic after signing a paper. The location is a simple doctor's office, with the exception of the blood pressure monitor on the table, classic office equipment. No one likes going to the doctor, and everyone is always in a hurry anyway: if you want to finish quickly, you have to sign the paper quickly and that's it. We don't give them a pen, but pens are on the table in a pen holder. Those who look around and find the pen and sign want to get out of the office, those who wait for the pen to be handed to them do not. Since blood pressure and weight were also measured for them as part of the screening test, the pen-seeking behavior could be correlated with resting blood pressure values and BMI. Among those who searched for the pen themselves, the number of those in whom we measured higher blood pressure values was significantly lower than among those who waited for us to hand them the pen. There was also a significantly lower number of pen-stickers who had previously been diagnosed with high blood pressure and were already taking medication for it. There was also a significant difference between the two groups regarding excess weight. The will is a process during which a person thinks and manifests the result of thinking in the outside world, many times a day, even in such small things. A significant correlation can be seen between lower blood pressure values and the expression of the will in actions, and there is also a significant correlation between excess body weight and the expression of the will. Based on the assumption, the non-expression of the will directly causes high blood pressure by receiving the stimulus from the brain to act, through hormones and neurotransmitters, and when a person inhibits the act, the hormones and neurotransmitters cannot fulfill their function and lead to disease. This can be confirmed later with an additional laboratory blood test.

Keywords
manifestation of the will, behaviour, significant correlation, health

PO-1 (Wed): Approaches of Psychedelic Assisted Therapy: A Systematic Revew

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[02.19] Psychedelics and psychopharmacology

Abstract
Clinical research on psychedelics is generating interesting outcomes in a wide array of clinical conditions when psychedelic-assisted psychotherapy (PAP) is delivered to appropriately screened participants and in controlled settings. Still, a number of patients relapse or are less responsive to such treatments. Set and setting seem to play a role in determining clinical outcomes and these findings, coupled with data from literature on the effectiveness of psychotherapy, frame the therapeutic context as a potential moderator of clinical efficacy. In this review, we performed a structured search to identify records of clinical studies on PAP which described a structured associated psychotherapeutic intervention. The aim is to construct a picture of what models of PAP are currently adopted in clinical research and to report on their clinical outcomes. Ad-hoc and adapted therapeutic methods were identified. Common principles, points of divergence and future directions are highlighted and discussed with special attention toward therapeutic stance, degree of directiveness and the potential suggestive effects of information provided to patients.

Keywords
psychedelic-assisted psychotherapy, set and setting, theoretical models, psychedelics, review

PO-1 (Wed): Cognitive control and emotion regulation between conscious and unconscious dimensions: Systematic review

Darja Kobal Grum

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.05] Emotion

Abstract
In this research, we are interested in the relationship between cognitive control and emotion regulation. It is well known that these two phenomena are related, but there is little research that addresses the nature of their interrelationship. Specifically, we are interested in whether and how cognitive control, which operates at the conscious level, is involved in emotion regulation, which operates at both the conscious and unconscious levels. To this end, we conducted a systematic review study in which we analyzed the current literature on this topic and attempted to find an answer. The literature review was conducted according to the PRISMA protocol and searched in the EBSCOhost+APAdatabases digital library. The following digital databases were selected: PsycINFO, APA PsycArticles, MEDLINE, Scopus, Academic Search Complete, eBook Collection, and Web of Science. We also specifically searched the PUBMED platform. The review covered the period from the first publication that met the inclusion and exclusion criteria to 2022. The search began in November 2022 and is currently in the data processing phase.

Keywords
cognitive control; emotion regulation; consciousness; unconsciousness; systematic review

PO-1 (Wed): Moving visual stimuli with our mind's eye. Time perception of moving stimuli during perceptual and mental imagery processes.

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.07] Mental imagery

Abstract
As a manifestation of consciousness and pictorial representation of information within the cognitive system, mental imagery is still a controversial topic. So far, mental imagery and time perception have remained separately studied fields. However, a new take on this topic makes it possible to use the first as an efficient and solid way to assess the second. In particular, time perception is known to be affected by perceptual (as given by the features of the stimuli), motor (through the sensory-motor feedback, which is known to help the cognitive system to correct its time perception in real-time) and affective (especially through affective valence) variables. In case of not being controlled, these variables may intrude and distort the time perception data, thus biasing its interpretation. Taking this into account, mental imagery tasks could become a useful tool to evaluate time perception in a purely internal and cognitively guided manner, thus providing clear access to time perception at its purest. Following this idea, two experiments were conducted in the present work, aiming to compare the psychophysics of time perception as measured from perceptual reality and mental imagery. In Experiment 1 (perceptual estimation), participants were shown a stimulus moving in a straight trajectory at a constant speed, after which they had to estimate the amount of time it had taken for the object to complete its trajectory. In Experiment 2 (Imagined estimation), participants were presented with a stimulus that moved along a straight path between two points. The stimulus disappeared at a certain point, and participants had to press a key at the moment they thought it would have reached the end of its trajectory (partial imagination). Immediately after, observers were shown two spatially separated points in the screen and were asked to imagine the object (full imagination) moving at the same constant speed previously perceived, and to estimate the time that would take the object to cover that distance by pressing a key to start and finish the imagined motion. The results showed a transition from over-estimation to sub-estimation of time intervals in both Experiment 1 and Experiment 2, with similar psychophysical functions in both perceptual and mental imagery conditions. These results support the use of mentally generated stimuli as a suitable way to understand time perception at its purest cognitive nature, and dissociate it from sensory, motor, and affective variables responsible of distortions in human time perception.

Keywords
Time perception, mental imagery, psychophysics

PO-1 (Wed): Exploring unconscious processing under the Bayesian microscope. An integrative experimental approach to examine subliminal visual perception

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.09] Unconscious/conscious processes

Abstract
The extent to which visual processing occurs in the absence of awareness is a long-standing topic in cognitive science, as well as a source of intense theoretical and methodological debate. One such discussion revolves around the integration of local elements into global shapes , where the experimental evidenceis mixed and there are still important methodological aspects to be taken intoconsideration. In the present study, we will explore whether local elements are grouped into global (square and diamond) shapes in the absence of awareness by introducing a novel masked priming design comprising both objective (i.e., performance-based) and subjective (i.e., visibility reports, gathered through the perceptual awareness scale; PAS) awareness measures.. Prime visibility will be manipulated using three different prime-mask stimulus onset asynchronies (SOAs) and an unmasked condition, to compare the magnitude of the priming effect among different levels of visual awareness of the prime stimuli. Interestingly, our analyses will include the two alternative approaches to statistical inference: the classic null hypothesis significance testing (NHST) through the implementation of linear mixed models (LMM), and the Bayesian approach by introducing the generative regression model recently proposed by Goldstein, Sklar and Siegelman (2022). In addition, the introduction of online measures of awareness (e.g., PAS in a trial-by-trial procedure) will allow us to explore its influence on potential priming effects, as well as to asses the relation between objective awareness performance and subjective awareness reports by using a common sensitivity measure (d'). The present experimental approach may represent a relevant methodological tool to elucidate the limits of subliminal processing as well as the role of visual awareness in the perceptual organization of the visual scene.

Keywords
Unconscious processing, global structure, visual awareness, bayesian analysis, masked priming

PO-1 (Wed): The idea of identifying the interface of subjective experience and subjective spiritual experience in the search for consciousness

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Wapcos, New Delhi, Delhi, India

Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.16] Self-consciousness and metacognition

Abstract
Study and research for consciousness for the last few decades involving interdisciplinary areas have been significantly ongoing. Considering subjective experiences/phenomenological/ neurophenomenological experiences are unlikely to rule out, this quest in an objective world irrefutable in the searching paradigm. While finding consciousness involves putting forward many theories, including the promising ones at the forefront, concurrently research on an altered state of consciousness, disconnected consciousness is also ongoing. Stages of consciousness, level of consciousness study, levels of consciousness, states of consciousness, and disorder of consciousness are no longer unfamiliar terms. Moreover, metrics like the spiritual transcendence index, Tellegen's absorption scale, NDE -C scale, and recalled experience of death (RED) are also noteworthy terminology. Neural correlates of consciousness, altered state of consciousness like physio-kundalini syndrome, EEG guided meditation, qEEG, and neuroimaging of meditators involving different meditation techniques are also being brought into the research domain. However, is there any interface moment of subjective and subjective spiritual experience that, in turn, corresponds to consciousness and an altered state of consciousness? Or otherwise, could the commonalities in altered state of consciousness provide some clues for understanding any of these searches by either zeroing in or broadening the research area? While the Field theory of consciousness was proposed over two decades back, if quantum vibrations in the brain are observable, subjective experience field is also hypothesized, and so on, would an idea of an infinite quantum field of consciousness as a background be implausible to consider in this search for consciousness? In the apparent parallelism of many ideas disseminated through the ages with the advent of the course of civilization, like reductionism, anti-reductionism, panpsychism, non-dualism, and so on, which reference frame should be absolute by right in its existence? Is everything already considered in this quest, or are we still missing out on something? Has 'stream of consciousness' or 'consciousness is discontinuous' prevailed since time immemorial and irrespective of reference frame? If relativity is also considered contemporarily in this quest, is there still something left behind to consider? Relativistic theory of consciousness recently surfaced, claiming to unravel the mystery of consciousness; however, would it be capable of explaining everything associated with consciousness? Like the famous subjective experience of Newton's watching the fall of an apple from a tree, rumored Einstein's dream of cows and a fenced farm, if true, experiences like Mendeleev's dream of the periodic table, and Elias Howe's dream of the spear with a head-hole, these all are different subjective experiences at the first-person experience at an individual level however appears to real-world outcome-oriented. The domain of consciousness is undoubtedly much broader than we could objectively contemplate. If and when a consensus in the study of consciousness would be plausible? I had the peculiarity of undergoing several spiritual subjective experiences at times, and the maiden one transpired spontaneously, albeit initially without any initiation of practicing meditation, etc. In this paper, I intend to discuss a few commonalities and interfacing moments in consciousness-related subjectivity in the interdisciplinary quest of the study of consciousness.

Keywords-Hard problems, subjective experience, altered state of consciousness

PO-1 (Wed): Towards a Non-Ego-Centered Psychology

Lyubov Yusufova

Columbia University, New York, NY, USA

Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[05.05] Transpersonal and humanistic psychology

Abstract
Today, mental health research favors treatments informed by the strict standards of scientific methodology, such as cognitive behavioral therapy and psychopharmacology. Ongoing research in the field of psychedelic-assisted psychotherapy suggests it may be the next mental health breakthrough (Belouin & Henningfield, 2018). The hallmark of psychedelics-ego dissolution-is emphasized in ancient cultures and Eastern spiritual traditions that delve into existential truths (Isherwood, 2022; Lebedev et al., 2015). Perhaps the underlying nature of psychological disorder and its treatment may be operating on a frontier between spirituality and science, and phenomenology and behaviorism. Thus, the efficacy of psychotherapy may be augmented by integrating the spiritual framework of ego transcendence into the Western treatment model.

Keywords
mental health, psychedelic-assisted psychotherapy, ego, ego dissolution, spirituality, ancient cultures, ego transcendence, psychological disorder

PO-1 (Wed): INTER-SPACIAL ABSTRACTION-Calm Down! It's just an IDEA

Gary Blaise

Gary Blaise Clavichords, San Francisco, CA, USA

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
ISA is a new idea about background-dependent quantized space which asks, if space comes in bits, what's between the bits? The question is prompted by a couple of preliminary notions. One is that our universe is made up of tiny volumes, or grains of quantized space which have emerged within a non-spacial background. The grains, though of discrete volume, consist mostly of unmeasured particle properties. Another notion is that of a philosophical realism in which impersonal ideas like mathematics, the laws of nature, particle properties, or the meaning of art can have a real and independent existence outside of the mind. Every idea is an awareness. Because ideas are of the same non-spacial nature as the background, consider the background of quantized space as a suitable "place " for abstraction. Further, consider these immaterial realities to be the same reality; a background of awareness. This would mean that for every particle (or coherent object) within the background, there exists an inevitable idea of the particle's measured property values from moment to moment. It's a "vibrational idea, " if you will, of a discrete object's activity (changes of state) within the abstract background. Vibrational ideas are updated by the activity of their objects in each moment. A coherent object, including your brain, evolves in space as the abstract, unmeasured properties of the most likely grains blend with the object's vibrational idea (aka "observer effect "). Receiving measurement from the idea, the grains can no longer maintain their unmeasured, abstract nature and collapse down to the discrete particle or coherent object. A vibrational idea can become self-aware (proto-mind) during the update process if it notices-its-self-noticing the activity of its object. A mind develops as it blends, or "resonates " with new ideas which are similar enough to those of which it is composed. Philosophical ideas exist throughout the background. These ideas are represented by the measured property values of brain state patterns of the creatures who initially experienced them. Potential merits of ISA include:-the non-spacial background of a quantized space; a "place " for the immaterial reality of abstraction,-the elevation of realism from philosophy to science,-a mind/body evolution in agreement with with discrete object evolution (Something for everyone!), and-an explanation for a volume-like universe whose quantized grains are undetectable (because discrete volumes of unmeasured particle properties have nothing to detect). Questions for ISA include:-Is space quantized?-Ideas exist, but are they abstract?-Are there universal correlations between specific brain state configurations and ideas? The mechanical details of ISA, including-a process for the onset of self-awareness,-an evolutionary process for discrete objects (i.e. brain),-a bodily role in the experiential process, and-the workings of philosophical ideas in which the mind finds significance may help to crack open the hard problem of consciousness. For more information about ISA, please see the book, Between Space, SECOND edition, 2022.

Keywords
quantized space, microtubule network, mind/body, NCC, "quantum collapse ", "observer effect "

PO-1 (Wed): TRPV1: Conductor of the Orchestrated Dance of Life

Charles "Chuck" Ernst

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.09] Biophysics and coherence

Abstract
TRPV1, theTransient Receptor Potential Vanilloid 1, is a G-protein coupled receptor. This is an ionotropic receptor, using a ligand-gated ion channel. Ionotropic receptors quickly convert mechanical, thermal, and chemical inputs into electrical signals in order for organisms to react in a timely manner. TRPV1 controls fast membrane conductance variations by momentarily altering the membrane permeability to certain ions. TRPV1 receptors are activated by capsaicin and anandamide, and respond to multiple cannabinoid combinations. The TRPV1 receptor is often referred to as a polymodal receptor, since it alters membrane potentials by somehow balancing all stimuli, including protonation, electrical-energy gating, thermal gating, and post-translational gating. Furthermore, it controls cell physiology with high precision for temperature, pressure, salinity, acidity, and redox potential. The TRPV1 receptor is co-located with three other G protein-coupled cannabinoid receptors: CB1, CB2, GPR55 receptors. We believe a novel concept is that the TRPV1 can be thought of as a "Wellness Signal ", and that TRPV1 together with CB1, CB2, and GPR55 can be viewed as a "Quartet " of G protein-coupled receptors that together continuously building, remodeling, maintaining, controlling, balancing, and coordinating almost all structural processes in the body. This autopoietic organization is maintained at all levels, down to the cellular level. The CB1, CB2, GPR55 are extracellular seven-transmembrane domain receptors. These have no ion channels, and all three have been associated with immune and endocrine system responses. TRPV1 is a six-transmembrane vanilloid receptor with an ion channel between transitions 5 and 6. TRPV1 coordinates Na+, K+, Ca++, Cl-, and H+ ion-flows. The presentation will illustrate how this "TRPV1 Quartet " ensemble mediates biological processes with four examples. The first two examples are at the organ level (bone remodeling in the skeleton and retinal photo sensing in the eye). The next two examples are at the cellular and organelle level (microtubule remodeling-and-organization of the cytoskeleton, and organization-control of the motor protein kinesin). The last part of the presentation discusses how the "TRPV1 Quartet " could coordinate a breakup of the microtubules inside neurons into frequency fringe patterns of information.

Keywords
TRPV1, vanilloid, cannabinoid, receptor, cytoskeleton, kinesin

PO-1 (Wed): Natural Computing as a new definition of the phenomenon of Life. The legacy of Efim Liberman

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.10] Origin and nature of life

Abstract
The 20th century brought a new understanding of the phenomenon of life, based on the discovery of the language of molecular genetics and arising of computers with artificial programming languages. The informatics and linguistic problems turned out to be at the center of biophysics and require clear definitions. Efim Liberman (1925-2011) defined the basis of life as a cell molecular computer, operating according to the DNA program (Liberman, 1972, Minina and Shklovskiy-Kordi, 2022). The special characteristic of this computer is search for addresses occurring without the expenditure of free energy, due to the Brownian motion in microscopic volumes of liquid inside cell. The address-regulated recombination of RNA texts was named later as a "splicing ". The development of the idea of the cell molecular computer led to understanding the design of the brain as a network of billions of powerful computing devices. Each of them perform the intracellular program calculation of parameters coming from the nerve receptors of sensory organs and muscular system (Liberman, 1978). Estimation of energy and time costs for such complex calculations made it possible to declare a possibility of the influence of the calculation process on the calculated problem and to recognize the Planck's constant as a value that determines the limits of natural calculations, as well as measurement procedures limits (Liberman, 1979). The hypothesis of the presence of quantum computing processes (both intracellular, based on the "computing environment " of the cytoskeleton, and at the entire organism level), is grounded on the search for possibilities to develop the power of information flows, adequate to the phenomenon of consciousness (Liberman,1983). Liberman's materialistic definition of self-consciousness phenomenon is "a computer display like, united presentation of reality " build from collected in a single space-time pattern the multidimensional and dynamic characteristics of information generated by the five senses. The instruments for body sensation and automatic control of muscles for a human body with almost a hundred degrees of freedom, have to be supplied by the information flow in the same pattern. Efim Liberman, on the basis of biophysics, developed a quantum mechanical understanding of the phenomenon of consciousness and proposed a series of experiments to verify his hypotheses.

Keywords
Life definition, Genetic language, Molecular computer of the cell, Biological computation, Brain construction and power, Influence of the calculation process on the calculated problem, Quantum computation, Self-consciousness construction, Efim Liberman

PO-1 (Wed): Nature's Inspiration to Spiritual Seekers

Ami Parashar

Freelance Researcher, Birr, Aarau, Switzerland

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.11] Consciousness and evolution

Abstract
Various authors and researchers have repeatedly explained the value of trees in human life scientifically, philosophically, spiritually, and mythologically. Trees protect the environment by improving the oxygen level on earth, reducing the heat intensity, sheltering and supporting wildlife, conserving water, and preventing soil erosion. All human habitat uses items obtained from trees in one form or another. Trees provide manure, and their roots shelter creatures and insects that live underground and nourish the soil. Trees are particular in Indian cuisine, Ayurveda, and social and spiritual Indian rituals. As per ancient Hindu beliefs, the Tulsi plant at home gives immense health benefits and is a symbol of purity. The mango tree represents love and fertility, the coconut tree icon good health and relaxation, the neem tree has antiseptic and disinfectant properties, etc. Trees spread life force to surroundings, giving shade to tired living beings, nests to birds, fruits, flowers, and medicines to everyone. Trees are a great source of inspiration to writers, poets, and visionaries. Scholars find mention of Kalpavriksha, a wish-fulfilling divine tree in Vedic literature. In the Bhagwad Gita, Lord Krishna referred to himself as a Peepal (Sacred fig) tree, among other trees. Lord Buddha attained enlightenment under the Bodhi tree. Since then, many yogis have performed intense sadhana and dhyana under the natural canopy of old trees, adding spiritual value to their lives. Spiritual teachers suggest that the trees are an excellent example of silent and steady meditators. The roots of the trees help meditators ground themself and connect to their past. The branches receive all energies associated with the universal life force, the sun, the stars, and beyond. The flowers, the fruits, the leaves, and the seeds of the trees represent the future. In this poster, the author has drawn how trees offer a divine and holy space to rejuvenate and purify the mind and body. And during meditation, connecting to different elements of nature and higher regions of consciousness by amplifying the meditator's divine aura.

Keywords
Consciousness, Meditation, Nature, Universal life force, Divine, Environmental system

PO-1 (Wed): Reverse engineering the mind mechanism Alephem by quantum mechanics

Avraham Oren

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
Scientific understanding regarding how the human mind works is crucial for optimizing well-being and happiness, as well as addressing mental health. Extensive research in many disciplines has been performed and is currently underway to reveal the mechanism of the brain and the mind. To date, there are many theories relating to this mechanism, yet there is no one consensual explanation that can fully explain the many phenomena that have been uncovered so far. Furthermore, genetics has important implications for mental illness. How, then, is genetics, and the resulting molecular biology, related to the mind mechanism? Analyzing the mind mechanism and dividing it into its functions may provide a method to connect the genotype to the resulting mental phenotype. Child development refers to the sequence of motor, language, thought, and social changes that occur in a child from birth. Therefore child development provides a pathway to observe and research these emerging functions of the mind. There are many features where the human mind mechanism appears to be different, or even superior, to the computer information mechanism (IM). I pinpoint two such features. The first feature is the ability to create a virtual image of surrounding objects and patterns. In layman's words, this is known as "imagination ". A second feature is the ability to use a goal-oriented approach, whereby each action taken by the organism has a defined goal to be achieved. Working on the mind as a whole is very complex. Therefore I suggest that the mind mechanism be divided into several functions. Similar to a smartphone that has several applications, the mind also has various functions with specific goals. The challenge of understanding the mind becomes more manageable by reverse engineering each of these functions separately. This paper examines the known functions of the mind and attempts to describe a physical mechanism that can explain such functions. We aim to reverse engineer the mechanism of the mind. The approach relies on pointing to specific functions and, like a curious child, taking these functions apart and rebuilding them from scratch. Starting from the known functions of the human mind, a top-down approach is used to reverse engineer the mechanism of the mind. More examples of a similar mechanism are repeatedly found when descending from macro to micro1. In all these cases, images and goals play an important role. This mechanism works in the human mind and can be observed throughout biology. In this paper, we have referred to this biological mechanism as Alephem (אM). After deconstructing the previously mentioned features and functions of the mind, one can conjecture what the underlying physical mechanism is. Describing the uniqueness of the mind in such a way highlights the fact that the classical physical and chemical mechanisms (PM) are insufficient to explain the Alephem mechanism. Therefore, tools provided by quantum mechanics are required. As we proceed with this investigation, we will connect contemporary molecular biology and genetics through Alephem to explain the functions of the human mind.

Keywords
Mind, Mind Mechanism, Quantum Mechanics, Psychology, Child Development, Mental health, Molecular Biology, Genetics, Alephem,

PO-1 (Wed): Reductionist afterlife scenarios

Tommaso Gecchelin

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.16] Miscellaneous

Abstract
The idea of the existence of "life after death " it's quite often linked with super-natural causes, almost by definition not conceivable within a materialistic view of reality. The aim of this study is to analytically derive the most logically sound possibile afterlife scenarios starting from a list of hypothesis that is at the same time as small as possible and as much as possible reductionistic and materialistic. The main scenarios discussed in the study are the following: I-Reductionist Reincarnation Theory The thesis evaluates the probability that the core neural pattern that identify and distinguish one person to another could, by mere casualty, reappear in the brain of another human being, for example, but not limited, to a new born baby that borns after the death of the first subject. Is important to notice that this thesis does not consider any kind of "soul " or "spirit ". The "consciousness " is only an emergent property of the physical system "brain ", not something metaphysical. Two brains have two identifiable and distinguishable consciousnesses patterns very much like two human beings have identifiable and distinguishable fingerprints patterns. II-Quantum Eternal Return This scenario is an extreme time extension of the first scenario, that entails the following additional, more restrictive hypothesis: a-The pattern identifying the same consciousness needs for some reason to be totally identical to the entire original brain in one of the living status of the original subject. The extremely low probability that by chance an identical brain appears in a new born baby, the only way to make this scenario credible is considering the following additional cosmological hypothesis: b-Due to quantum fluctuation of empty space (arguably the thermal death of the universe), there is a non-zero chance that another big-bang could happen. Given an infinite amount of time, the chance that a universe with the same consciousness will reappear is therefore non-zero. On the other hand, due to the Heisenberg's uncertainty principle, the life of that subject after each "reincarnation in himself " will be probably different from the previous one, unlike the Stoics and Nietzsche used to postulate. III-Waking From Simulation This scenario is a much more limited version of the simulation hypothesis of Nick Bostrom. Given the very quick advancement of virtual reality equipment and photorealistic visualization, it's quite likely that in a few years the VR experiences will be indistinguishable from real life. Therefore we will likely live a significant part of our life within these man-made totally immersive VR experiences. So the probability of being already inside a VR experience is statistically quite significant, that finally entails that the "death " in this reality is equivalent of taking off our VR headset. The "afterlife " scenarios would be then: a-Restart the level to try again b-Closing the game and live into the reality where the simulation hardware resides c-In case of being a conscious NPC instance it will probably entails a NN weights reintegration in the mainframe global NN tensor.

Keywords
Consciousness-minimal-pattern, reductionism, afterlife, eternal-return, simulation

PO-1 (Wed): Using the Spiritual And Metaphysical Techniques to Communicate Across the Veil!

Gwynn Simpson

Jewish Family and Children's Service, Phoenix, AZ, USA

Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[03.03] Other sensory modalities

Abstract
Tapping into universal energy was what the Ancients were commended for. One of greatest modern prophets, Edgar Cayce used this ability to heal thousands of individuals. Hallucinogenic drugs do not have to be consumed to access this energy. Intent and purpose of a selfless nature can allow access to future events and events of the past. Preparation spiritually, and practices of kindness can lift the veil for "seer" capability. I have personally in this lifetime been a recipient of knowledge from across the veil. From seeing the face of my unborn son in Seattle, WA, February of 1982, to being told the date and time of both my father's death, February 21, 2000 and mother's April 7, 2018. In 2019, my mother and other guardian angels helped me pen my first book; Spiritual Flights by Bunny, Austin Macauley, Publisher. I am now being guided to write a second book to help individuals take notice of the extraordinary energy we have on the planet, to manifest higher consciousness that will preserve human kindness. Throughout history, many have received unusual guidance to propel science, arts and music, food to the hungry, hope to the forgotten. Carl Jung's study of astrology has been a pathway for those trying to understand human behavior at the elemental level. Human beings bring an array of talent into each incarnation. Humanity's awareness of these tools is needed to ascend beyond the ordinary. My second book and this presentation will highlight the many de ja vu and supernatural encounters I have experienced in this lifetime. Our presentation will recant knowledge provided by the late Torkum Saradarian and others who learned to tune into higher vibration messaging. We will address energy transference and how it can be used to build or destroy human ideation. We will focus on possibility thinking, intuition and the channeling of purpose power. We will demonstrate how the energy of hate, impacts the brain and prevents the establishment of positive mindset. Behind the ability to communicate across the Veil is the recognition of the Great Master, who is known by many names; Buddha, Christ, Adonai, Allah and many others depending on cultural exposure and customs around the world. Our research will discuss what it means to be a "light worker" and how the distractions caused in our present existences create negative thoughts and actions. Intertwined with the ability to "manifest" is the ability to feed the soul emotionally, mentally and physically. Lastly, we discuss how karma and those with strong emotivism of hate disrupt one's ability to become a seer, understand premonition and open the gateway towards future knowledge. Gwynn Simpson, author of this abstract holds a MSW in Psychiatric Social Work, &Global Certification in Human Resources from the Harvard School of Business. Yvonne Newton, a Licensed Religious Science Practitioner with the Center for Spiritual Living in the Philosophy Science of Mind. Dr. Joseph Whittaker, Ph.D. in Neuroscience, Asst. Provost, at Jackson State University and a prolific grant writer.

Keywords
Seer, Premonition, Supernatural, Spiritualism.

PO-1 (Wed): May high level processes drive embodiment illusions?

Marte Roel Lesur

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[03.03] Other sensory modalities

Abstract
The sense of body has been experimentally studied over the past few decades. A vast amount of work shows that through conflicting multisensory signals it is possible to shift body perception to the point of perceiving a foreign limb or body as one's own. Such literature has recently been contested by data pointing at the relation between hypnotic suggestibility and other high-level processes and findings previously related to the sense of body ownership. Despite this, experimental paradigms relying on multisensory cues to alter the sense of body result in remarkable behavioral changes. It seems that while top-down processes clearly do play a role in such illusions, so do bottom-up sensory processess. In this study we use sensory cues ecologically unrelated to the body that have previously shown to alter own-body perception (a pitch shift linked to vertical expansion of the finger) together with an attentional task to disentangle if such illusions may be driven mainly by top-down processes or if indeed the conflicting multisensory cues are the driving force. 40 participants are currently undergoing the procedure. Data collection and statistical testing should be finished by the date of this presentation and integrated in the poster.

Keywords
Embodiment, multisensory integration, bodily illusions

PO-1 (Wed): Conscious Tech in Trauma Healing: Invoking Mystical Experiences and the Phenomenology of Spontaneous Unconditional Love

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.04] Psychedelic and other altered states of consciousness

Abstract
Psychedelic therapy have been at the forefront of research in recent times. Researchers have presented recordings of neural activity via the EEG to explain profound altered state of consciousness that take place during psychedelic use, but is it possible to recreate similar altered states utilizing technology in a conscious way? In this presentation I propose the use of technology to access deeper states of consciousness by invoking mystical experiences of love. While an individual's experience in deep states is varied and deeply personal, spontaneous feelings of unconditional love towards self and others have been shown to be a universal experience. Two different concepts are interconnected: accessing deep states of consciousness and invoking spontaneous unconditional love. Both are attributed to transformation and healing, but can they be generated and measured on demand. I argue that similar to psychedelic and shamanic experiences, spontaneous feelings of unconditional love as an altered state can be accessed through neural surface training (neurofeedback) and sound (isochronic tones + binaural beats). The presentation will examine how rewarding the brain's alpha, theta frequencies via auditory and visual feedback as well as utilizing the brain's frequency following response (FFR) can induce deeper states of consciousness and may provide an alternative method of healing. This work may be especially beneficial to individuals where psychedelic use is contraindicated.

Keywords
altered consciousness, neurofeedback, sound healing, binanural beats, spontaneous recovery, deep states, love, healing, technology, psychedelics

PO-1 (Wed): Are emergent phenomena rare and are we adequately addressing them in mainstream clinical settings?

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.10] Contemplation and mysticism

Abstract
Consciousness altering practices are growing in popularity in today's West-and arguably around the globe. Promoted as tools for increased wellbeing, performance, and enhanced pro-social/pro-environmental behaviours, contemplative practices such as yoga, meditation, and mindfulness-based interventions – as well as psychedelic use – are being explored for the treatment of a variety of mental and physical ailments including depression, anxiety, substance abuse, eating disorders and chronic pain. Such practices are expected in their source traditions to result in emergent phenomena (EP) – sudden events of a 'spiritual', 'energetic' or 'mystical' nature, including unitive experiences and other non-ordinary somatic and 'paranormal-like' experiences. EP may also occur spontaneously, void of any discernible trigger, or preceded by a period of psychological turmoil or homeostatic imbalance. Research on the prevalence, predictors, phenomenology, and wellbeing outcomes of EP is still nascent and limited, despite anecdotal evidence pointing to their potential for catalysing profound and sometimes long-lasting positive and negative shifts in cognition, behaviour, perception, emotion, and overall physical and mental wellbeing. This absence of data, exacerbated by a general fear shared by EP experiencers of being misunderstood, stigmatised or pathologised by default, is partly responsible for a widespread lack of understanding around EP on behalf of clinicians, including on how to best support individuals reporting EP. With the increased interest in, and access to, consciousness altering practices, EP are likely to become more widely experienced-and thus more frequently encountered in clinical settings. It is therefore critical, both from an ethical and medical standpoint, to initially address a) whether such phenomena are widespread, and which are most common; b) the prevalence of reported positive vs. negative EP; and c) whether and where those struggling with EP seek help. To address these questions, we assembled a panel of experts to design an instrument able to measure the occurrence of EP and subsequent positive and negative changes to wellbeing. This instrument was applied to a survey and distributed to general (i) UK residents through the Qualtrics commercial panel; (ii) US residents through Amazon MTurk; and (iii) online readers of a rationalist blog (combined n = 3135). Forty-five percent of all participants reported experiencing EP, with derealisation most reported (17%), followed by unitive experiences (15%), ecstatic thrills (15%), vivid perceptions (11%), changes to perceived size (10%), bodily heat or electricity (9%), out of body experiences (8%), and perception of non-

physical lights (5%). These experiences were followed by a mix of positive (25%) and negative (20%) changes to wellbeing. Of those who reported negative effects, 13% claimed "moderate or greater suffering " and 34 participants (1.1%) claimed "life-threatening suffering ". However, 71% of those who experienced any form of suffering did not seek help. Those who did seek help most commonly reported their experience to specialist health providers (17% of those who reported suffering). These results indicate EP are widespread among the surveyed populations and suggest the potential for both positive and negative substantive health outcomes, the latter of which are not presently adequately addressed through recourse to clinical practice.

Keywords-Emergent phenomena, non-ordinary states of consciousness, altered states of consciousness, mystical experiences, contemplative practices, meditation, mindfulness, psychedelics, spirituality, phenomenology

PO-1 (Wed): Life After STEs: Integrating Spiritually Transformative Experiences into the Material World

Ruth-Helen Vassilas

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[05.04] Psychedelic and other altered states of consciousness

Abstract
The phenomenology and metamorphic nature of spiritually transformative experiences (STEs)—such as near-death experiences, out-of-body experiences, and kundalini awakenings—are well-documented. It is empirically established that these reported experiences of altered consciousness shift experiencers' view of reality and often cause lasting and dramatic changes to their inner and outer lives. Yet, the question remains: how do these transcendental experiences impact subsequent engagement with the material world? There is limited research investigating people's life paths following an STE. This paper addresses that gap in knowledge by exploring how STEs impact individuals' professional, social, health, and spiritual paths over time. Using questionnaire data and follow-up interviews, this study will map out an STE integration timeline, tracking concrete changes to experiencers' lives starting from immediately after to, in some cases, several decades beyond an STE. To better understand how STEs impact society on an individual and collective level, this paper explores (i) trends in the integration timeline across different STEs and (ii) the range of, and any similarities between, life path directions for STE experiencers.

Keywords
Spiritually transformative experiences, altered states of consciousness, mystical experiences, social integration.

PO-1 (Wed): The Flower of Cosmos in Consciousness

Kao-Cheng Huang

Dharma Academy, Miaoli, Taiwan

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.04] Religion and spirituality

Abstract
The Flower of Cosmos is a fascinating symbol of sacred geometry. Its repeating pattern of overlapping circles first appeared in the historical relics around the 7th century BC. Each circle in the symbol represents a flower or an event. According to Swiss psychologist Carl Jung (1875–1961), the Golden Flower symbolizes the most splendid of all flowers. This symbol represents the powers of growth that exist in the unconscious. The Flower-Adornment Sutra describes a flower as a microcosm of the macrocosm. All events that comprise the universe are unified and inseparable on a deeper level of the psyche. This paper proposes characterizations of the Flower of Cosmos symbol in consciousness. (1) Simultaneity: All events (overlapping circles) occurring in the past, present, and future coexist in a coherent relationship with each other in a state of complete sufficiency during the conditional origination process. It is similar to the simultaneous imprinting of the peaceful scenery of heaven and earth onto the sea. (2) Criss-cross network: The Flower of Cosmos can be envisioned as a crisscross network with several crystal balls suspended from different areas of the ceiling in a room. Placing a crystal ball in the center of the room allows the isotropic light from the crystal ball to reflect off the other balls. All these balls will be visible in the focused light of the central ball, allowing it to emit light in all directions and reflect its image onto all the other balls. Each ball, as the medium of reflection, transmits the incoming image omnidirectional to the other balls, taking turns transmitting the intertwined reflections back to the central ball and gathering them into spatiotemporal overlapping patterns during the reflection and refraction process. This exemplifies the principle that as one enters the whole, the whole gathers within the one to form the Flower of Cosmos. The interference of light waves can be viewed as a pattern of a flower. Furthermore, if the room is surrounded by mirrors, the image of the flower is multiplied repeatedly by the reflection of mirrors, like a kaleidoscope. (3) Holographic nature: The world is as immanent in a flower, as a flower is immanent in the world. The macroscopic view and microstructure of constituents can manifest as an idea in an instant, without any trace of inconsistency or incoherence. Equivalent to how the individual parts of a torn-up hologram still contain information about the whole. (4) Compatibility: In the alternation of explicit and implicit reason, all phenomena can be conceived concurrently in the mystical state of awareness. This unfolding of the explicit reason from the subtle realm of the implicit reason and the movement of all living beings in terms of folding and unfolding, is a sign of the Flower of Cosmos. The single and the multiple events that occur in the intertwined network of reason and phenomena are interconnected in various ways, resulting in infinite harmonious states. That is why it is said one can see Heaven in a little flower.

Keywords
Flower of Cosmos, Carl Jung, Golden flower, Hologram, Criss-cross network, kaleidoscope.

PO-1 (Wed): Consciousness, spirituality, and health among African American adolescents and emerging adults living in the United States: A scoping review of the literature

Crystal T Harrell
Yale University, New Haven, CT, USA

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.04] Religion and spirituality

Abstract
Introduction: The relationship between religion/spirituality (R/S) and health among adolescents has been extensively examined in the last decade. However, very few studies have explored this association among African American youth despite this population having the highest rates of R/S participation within the United States, while simultaneously dealing with the most adverse health outcomes among any ethnicity group. Additionally, more studies lean towards predominately religious measures to assess this association. Increasing evidence suggests the importance of exploring various measures (e.g., Universal Mind, Consciousness, and Thought) to examine faith's role in African Americans' lives. Objective: This scoping review aims to synthesize the existing empirical literature that examines the relationship between consciousness, R/S, and health in the lives of African American adolescents and emerging adults. The current review includes an exploration of consciousness in the association between faith and health and incorporates distinctions of each measurement. It is important to identify and map available evidence in this area of research to better understand what is needed moving forward and determine best practices for faith-based interventions for this racial group. Methods: To complete the current scoping review, we searched the following databases: Scopus, Medline, Global Health, Psych Info, Web of Science, Sociological Abstracts, and Academic Search Premiere. Articles from each database were later examined using the support of COVIDENCE and a professional librarian. Inclusion criteria included empirical articles in the English language describing studies that were conducted in the United States that examined the association between consciousness, R/S, and health among African American adolescents and young adults. Articles that met inclusion criteria were charted and summarized for the final review. Results: The current review identified 154 unique articles and seven were reviewed. Faith measures across the seven qualified articles included the importance of religion and spirituality in coping with stress; religion and/or spiritual scales; and measures that directly assessed one's spiritual health. Only one study evaluated measures of consciousness or "sense of self, " but this measure was included as a secondary health outcome and not as a measure of faith. Five studies included psychological well-being as a measure of health. The other two articles assessed physical health and self-rated health (SRH). Most studies found a positive association between R/S and health and also suggest future recommendations for integrating this research into culturally-appropriate medical services and interventions for African American youth. Conclusion: Every study analyzed in the current review found a significant relationship between R/S and health among African American adolescents and emerging adults. More studies are needed to further explore the depth of spirituality (e.g., more qualitative inquiries) among African American youth. To date, there have been no R/S and health studies among African American adolescents and emerging adults that include faith measures on consciousness (Universal Mind, Universal Consciousness, Higher Power, God, Source, Awareness of Oneness, etc.).

Keywords
Universal consciousness, Minority health, Spirituality, Religiosity

PO-1 (Wed): The Sociological Implications of Pure Consciousness

Barry Spivack

TM Teacher, London, United Kingdom

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.06] Sociology

Abstract
The conventional materialist paradigm asserts that matter can influence consciousness but there is no reciprocal influence of consciousness on matter. A body of 20 peer reviewed quasi-experiments have found that the development of higher states of consciousness by a small proportion of the population using an effective and effortless means of transcending will reduce negative trends in society such as war fatalities, crime, fatalities from auto accidents and suicides and will increase cooperation between conflicting parties. The development of higher states of consciousness by about 1% of a population practising Transcendental Meditation (and less when practising together in a group the more advanced TM-Sidhi programme) creates coherence in the collective consciousness of a society which neutralises societal stress. If this research is valid the implication is that consciousness is more than an epiphenomenon of the brain and nervous system but rather has field like qualities. A materialist may give two responses; 1) The data is flawed; but the data is taken from statistics collected by independent public institutions. 2) It was a coincidence. There are several reasons why the findings are consistent with a causal hypothesis. 1) Repetition; there have been fifty demonstrations of this phenomenon with more than 150 outcomes. There is no reason why more repetitions cannot be undertaken. 2) Unconnected variables. In many of the studies diverse variables such as crime, deaths from car accidents, other accidental deaths, infant mortality and deaths from opioids all reduce at the same time and when the influence of a group developing higher states of consciousness is removed the negative trends increase again. 3) Researchers have controlled for up to 20 possible confounding variables in total. 4) Dosage effect: The larger the coherence creating group the larger the impact in reducing negative social trends. 5) Time series analysis: The use of time series analysis in most of the studies controls for pre-existing trends within the data set and rules out seasonal explanations of the effects. 6) Statistical analysis confirms that changes in the size of the peace creating group lead the changes in the social variables. 7) The phenomenon has been measured in different continents and at different times of the year. 8) Model selection. In many studies the Akaike Information Criterion has been used to select the appropriate model. This uses strictly mathematical criteria to select the statistical model in order to avoid bias and statistical manipulation. Pure consciousness means consciousness on its own without any object of experience. Pure in this context means that consciousness is unmixed with any other perception or feeling. When a significant proportion of the population transcend the senses and allow the mind to settle to its least excited state of consciousness with no object of perception this reduces negative social trends in society. Any method of transcending should produce this influence if the appropriate population threshold is met.

Keywords
sociology, collective consciousness, pure consciousness, meditation, transcending, crime, time series analysis, causal hypothesis

PO-2 (Fri): The PLAYground of Consciousness: At the Nexus of the Sciences & Humanities

Julia C Gardner
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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.09] Unconscious/conscious processes

Abstract
In this review of recent literature, I argue that play provides a neurophenomenological framework for integrating recent findings in consciousness studies from disciplines spanning: neuroscience, evolution, development, cognition, psychology and anthropology. The literature on play often describes play as an altered state of consciousness. The consciousness literature, however, seems to neglect play both as a unique manifestation of consciousness and as an arena in which to advance our understanding of the mind's synthetic functioning. This work weaves together key concepts from the literature of both fields to highlight their interrelationship. A summary of current findings in predictive processing, cognitive ecology, associative learning, novelty seeking, affect, and neural networks illustrates the convergence of the play and consciousness literatures. The presentation concludes with the suggestion that play as the ground linking culture and neurobiological phenomenon might increase the relevance of consciousness studies to the broader sociopolitical dialogue..

Keywords
Predictive processing, novelty, affective valence, animal cognition, cognitive ecology

PO-2 (Fri): Consciousness, sentiment and stock market returns: Could the GCP data be put to practical use?

Ulf Holmberg

Independent Researcher, Stockholm, Sweden

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.16] Miscellaneous

Abstract
The Standard & Poor's 500 Volatility Index (VIX), a common measure of market sentiment, is found to be significantly correlated with the hardware generated random numbers produced by the Global Consciousness Project (GCP). More specifically, the largest daily composite GCP data value (Max[Z]) as well as changes to it and its variance is found to interact with daily changes in the VIX measure. The results thus suggest that the GCP data covaries with some aspect of market sentiment, arguably a result that should be discussed as it points in a new direction with regards to consciousness research. The results could also help in explaining why it has been found that Max[Z] covaries with daily stock market returns as the VIX measure is known to be correlated with such returns. The results also suggest that the GCP data could be put to practical use by market participants, which is studied by using data up to the 1st of August 2022 to estimate econometric models that can be used to inform hypothetical traders. On the 1st of August 2022, a GCP data dependent artificial fund as well as a comparable GCP data independent counterpart was set up and an ongoing out-of-sample simulation study, set to be finalized on the 1st of August 2023, seeks to study the artificial funds out-of-sample returns and performance. Currently, the out-of-sample simulation has yielded results supporting the hypothesis that the GCP data can be put to practical use by traders. Would the simulation results be supportive also on the 1st of August 2023, both the philosophical implications and the practical usefulness of the results would be self-evident

Keywords
Consciousness, sentiment, stock market returns, Global consciousness project

PO-2 (Fri): On the Constructed Nature of the Metaphysical Boundary Between Mind and Body

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.01] The concept of consciousness

Abstract
The ontological framework of mind-body dualism is deeply rooted in Western philosophy. However, experiences during Eastern contemplative practices like zazen meditation suggest that there is no ontological boundary between the two. Thus, the purpose of this work is to propose that the mind and body are not ontologically distinct but are causally related. I will do this through the juxtaposition of the Western conception of mind as a non-extended substance with the fundamental Buddhist doctrines of not-self, interdependence, emptiness and dependent origination. Buddhist philosopher Dogen wrote in his work Genjōkōan that in the state of non-thinking, the mind and body "drop off ". This suggests that when awareness is without dichotomies, the conceptual difference between mind and body no longer applies. Moreover, the Buddhist doctrines of emptiness and dependent origination assert that nothing can exist by itself. In an effort to push forward the search for a non-dualist alternative, this project inquires into the nature of dichotomies such as "mind-body " and "internal-external ". By engaging in a cross-continental dialogue that integrates philosophy, science and metaphysics, this work aims to bring abstract philosophical concepts down to the level of human experience. Drawing upon the work of contemporary scholars such as Evan Thompson, Jay Garfield, and Carl Olson, this project searches for alternative conceptions of mind as not solely dependent upon or confined to the brain. A non-dualist perspective towards the mind would help to restore access to the otherwise uninhibited flow of information between mind and body that was rendered illegitimate by Cartesian dualism in the 16th century.

Keywords
Cartesian dualism, non-dualism, self, Asian philosophy, Buddhism, consciousness, awareness, experience

PO-2 (Fri): A Critical Realist Ontology on The Origins of Neurospirituality

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School of Southern Wisdom, Pondicherry, Pondicherry, India

Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
This paper is a three-part series based on the Critical realist philosophy that reality is stratified, changing and there is an intransitive dimension that can be proven empirically. The paper is a breakthrough revelation from the Ancient Tamil wisdom texts about the Soul atom (Space molecule) in the mid-brain (the region between interpeduncular fossa and substantia nigra) and explains about the unknown six glands of the Human Brain surrounding the pituitary gland and the perfect manifestation of the Solar system (macrocosm) within the Human Brain (microcosm) as Mercury gland and Venus gland in the right hemisphere of the Cerebrum and as Jupiter gland, Mars gland and Saturn gland in the left hemisphere of the cerebellum. It explains in detail about the Ten-dimensional space time geometry between the Pineal gland and the Pituitary gland in the Human Brain that holds past life memories of different aeons at an atomic level within the neurons. The essay will further elucidate about the life force energy present as HDO (Hydrogen di-oxide molecule) within the pineal gland, which is the main controller of all protein movement within neurons. The essay will decode the secrets of the Kabbalistic tree of life (Kabbalah refers to the Skull in the Tamil language). The complete functioning of the soul atom in the mid-brain, the stages of electro-magnetic energy transfer starting from the sunlight to the Soul atom and to the endocrine glands in the body is explained. The Second part of the paper is an Empirical validation on the Soul particle nested in the fovea centralis region of the left and right eye. The second part of the paper states that the fundus (retina) of the eyes holds the key to understand the spiritual state of a person. Optical coherence tomography test (OCT) was conducted on three participants with the help of an Ophthalmologist and the retinal thickness was measured in the macula lutea region (fovea centralis). The hypothesis is that the "Optical density and emission spectrum at the fovea centralis region of the eyes correlate and differ among respondents, based on their level of Spirituality ". Through non-invasive intervention thought process techniques, the retinal thickness decreased for participants after intervention. The essay discusses about the three tangible scales in the Fundus of the left eye and right eye, which are a) Maya, b) karma and c) Pride and draws parallels with Plato's Tripartite psychology of the Soul in the Republic-Appetite, Reason and Spirit. The third part of the paper is a study on the impact of sounds on Children with 'Autism spectrum disorder'. The sample size was 21. Evaluation was done using ATEC Scale and Vedic Sounds were played for over a period of one month. Around 50 % of the Autistic Children experienced a considerable improvement in their behavior. As per the wisdom texts, the root cause of autism are single branched dendrite neurons (single horn), artificial neural fiber network and the soul particles trapped for many births. The importance of Calcium chloride and Lithane as medication is discussed.

Keywords
Critical realism, Roy Bhaskar, Philosophy of Meta Reality, Ontology, Soul, Eyes, Macula lutea, fovea centralis, Optical coherence tomography, Autism spectrum disorder, pineal gland, pituitary gland, Tamil Wisdom, Existential question, Reincarnation, 11th dimension neurons, artificial fiber network, change of aeon.

PO-2 (Fri): The Cornucopia of Consciousness: Ethics of Responsibility to Life

D. Kala Perkins

AUSN, Woodside, CA, USA

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
"For a jumping spider, getting older is like watching the sun rising. " (Yong, 2022) Countless bio-systems, neuro-systems, adaptive organs and organisms have evolved over geological-perhaps cosmological-time, uttering the resonant harmonic species that populate, and have populated ecosystems more numerous than knowable. Cultures and languages are not unique to humans. Research over the past 50 years has, and continues to reveal the dynamic and fascinating realms of animal awareness and consciousness. Octopi, essentially a massive brain, their entire bodies populated by neurons, are challenging our morality in consuming them. Animals have their own languages with which they communicate in ways that are amazing researchers. "Defining language and reason as solely human capacities is often linked to seeing humans as fundamentally different from non-human animals, and can lead to excluding the latter from moral and political realms. " (Meijer, 2019) The question of what consciousness is and what is conscious, courts the question of the ethical responsibilities of claiming to be conscious, and of consciousness toward life. Both the animal rights movement and the rights of nature movement, as well as existential reality, challenge the status quo that we humans are separate, superior to or independent from the rest of the natural world. Cutting-edge research exploring the languages not only of other animal species, but of trees, forests and their dialogues with mycelium, at the boundary between flora and fauna, are waking our flagrant disparaging of the natural world of which we are interdependent emergent phenomena, and with which we are co-dependent. We explore the leading research at the frontiers of multi-species consciousness, and question the ethics of "sapiens sapiens " consciousness at the existential precipice of the will to awaken integrity with the natural order, and life perpetuity.

Keywords
Multi-species consciousness; ethics; natural order; responsibility; life

PO-2 (Fri): How Brains Compute Souls: The computational awareness theory of consciousness

Edward W Porter

compwareness.org, Fort Worth, TX, USA

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.04] Ontology of consciousness

Abstract
I will describe some of the many qualities of consciousness that neuroscience can currently explain. I will also explore some hypothetical explanations for qualities of consciousness generally considered far beyond the capability of neuroscience. These explanations will be based on exotic electronic and mechanical properties of brain proteins, such as microtubules, suggested by research of people like Hameroff, Craddock, Dogariu, and Bandyopadhyay . My approach will be based on the ontological hypothesis of the computational awareness theory. It claims the computations of the equations of physics throughout all space-time require a panpsychic awareness of information, called "computational awareness ". Computational awareness is the awareness of variable values (and arguably of constants and mathematical structure) required so the mathematics of physics can compute as the laws of physics demand. Without such panpsychic information awareness, reality cannot compute. Time cannot compute. The computational awareness theory defines human conscious experience as nothing but the extremely complex and interconnected computational awareness required by the mathematics of brain physics, during what we experience as conscious states. This ontological definition implies an exact identity between a) qualities of conscious awareness and b) corresponding qualities of computational awareness of brain-physics math. It means the better we can define the qualities of conscious experience to be scientifically explained, the better we can focus on the qualities of brain physics that might explain such experiential qualities. Conversely, the better we understand the computational architecture of brain physics in four-dimensional space-time, the better we can understand and describe the experiential qualities and informational architecture of conscious awareness. To begin to understand the capacity of the human brain's computational awareness, we should understand its stunning computational bandwidth. Measured by the low resolution metric of signal strength across the roughly one hundred and eighty trillion synapses of the cortex, at the roughly one-thousand-Hertz bandwidth often associated with brain research, the cortex has a computational awareness of roughly 3.6 million trillion bits per second. (Nyquist sampling, doubles the bit rate.) That's a bandwidth equal to 72 billion, repeat "billion ", simultaneous high-fidelity 4K video streaming channels. But the discoveries of people like Hameroff, Craddock, Dogariu, and Bandyopadhyay suggest the bandwidth of computational awareness in the human brain may be thousands to trillions of times higher. These bandwidths of informational awareness and interconnect appear more than capable of representing all the miraculous, rich qualities of informational awareness we sense in human conscious experience.

Keywords
information, awareness, experience, consciousness, computation, math, mathematics, brain, physics, laws of physics, electronic, mechanical, panpsychic, microtubules, bandwidth, frequency, bandwidth

PO-2 (Fri): Form as an Extra Ingredient

Paul J Hurren

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Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.08] The "hard problem " and the explanatory gap

Abstract
"You need an extra ingredient " said David Chalmers in his hugely influential paper at the 1994 TSC Tucson conference. If the physical, material world is ultimately all there is, the hard problem is indeed a very hard one given mental and physical phenomena seem so different. Unless physics can be 'extended' in some way through the introduction of one or more new physical principles. It is suggested that if form can be regarded as fundamental, this might provide one such new principle or "extra ingredient ". This particular idea of course goes back to Aristotle who said that perception is the reception of form without matter. The paper, which is unashamedly physicalist in its approach and attempts to look at the problem of consciousness from the 'outside world in' rather than the 'inside world out', sets out a framework based on the following assumptions: 1) Consciousness arises from a process of some sort; 2) Subjective experience and the perception of 'self' are the result of a purely physical interaction between the brain/body and its environment, with 'embodiment' (and neural maps!) having an important role to play; 3) Objects in the external world are real physical objects that exist independently of any observer; 4) In the context of a 'virtual reality' model of conscious experience, it is the perspective or 'view' of the body in relation to an external object which is a creation of the brain; 5) The form of an object is intrinsic to the object and is both physical and abstract in nature. Form permeates both physical and mental worlds and might be a tool to help explain mental in physical terms. According to the framework here, in the case of visual perception where there is (initially unconscious) engagement between the brain/body and a physical object, the form of the object will strongly influence the form as perceived (the one maps to the other). Note this would be the case whether there is top-down or bottom-up neural processing involved: With predictive inference/coding, ultimately any error signals will be derived from sensory data mapped to real physical objects. In this unconscious interaction between brain/body and an object, what might be happening is neural patterns are triggered which encode a map of the body in relation to the object-the brain is encoding/mapping relationships. The relationship map iteratively built up includes internally-stored attributes which attach meaning to the object as predicted/perceived. The paper has two parts. Part 1 provides a brief review of the assumptions. Part 2 considers where the assumptions might lead in the context of the hard problem. One of the challenges is how feeling, widely accepted to be closely intertwined with core consciousness, fits into the framework. So Part 2 considers the (human) case where one's eyes are closed and there is a 'feeling of being', of being an embodied self.

Keywords
Hard problem, abstract, form, explanatory gap, mind-body, physics, metaphysics

PO-2 (Fri): Are emergence of consciousness, telepathy, healing and near-death experiences to be included in a model of consciousness, and what model?- physicalism, dualism, panpsychism or Idealism?

Göran Brusewitz

Swedish SPR, Nacka, Sweden

Categories by Discipline
1.0 Philosophy

Primary Topic Area-TSC Taxonomy
[01.09] Philosophical theories of consciousness

Abstract
When it comes to find a model for consciousness, it is rather clear that physicalism can not explain how consciousness emerges from the brain. Dualism has the big challenge to explain how mind and matter interact, and has so far not been able to do that. Panpsychism now seems to be the philosophy of mind many are interested in, a new interest but an old view, that there is some degree of consciousness in everything (Koch, Skrbina, Strawson, Nagel, Goff, Tononi, Monk and others). It does not need to explain "the hard question " (Chalmers) how consciousness emerge from matter, it has been there all the time. But, that approach usually does not involve other phenomena where there is scientific support (phenomena far more controversial, but still with a scientific support), telepathy, healing and near-death experiences (Cardena, 2018, American Psychologist, van Lommel, Fenwick, Bengston, Kruth, Moga). A special variant is suggested by George Williams (JCS, 2021), combining Russels Monism with quantum holism, giving cosmo psychism. And Michael Jawer (2020) has a focus on sentience rather than consciousness, but opening up for panpsychism. Otherwise, some philosophers regard Idealism to be necessary (Kelly, Kastrup, Marshall and others), where consciousness is primary (also neurosurgeon and near-death experiencer Dr Eben Alexander, Dr Peter Fenwick, Dr Bernardo Kastrup, Dr Julia Mossbridge, Professor Marjorie Woollacott and Dr Harald Walach). With that view, Kelly e g claim also near-death experiences, mystical experiences and creativity on genious-level can be explained. Other models of interest that have been developed are Generalized Entanglement (Walach, Römer, Schmidt and others) and the idea that consciousness is a field (Forman, Schooler). Many of these models, especially idealism, do include entanglement (the Nobel Prize 2022 in physics), and for some also electromagnetism is suggested to be of interest for consciousness (McFadden, Al-Khalili, Keppler, Sheldrake). It is also clear that there are ideas among some leading physicists (Carr, Rauscher and others) that physics needs to and can be extended to involve consciousness and also paranormal phenomena. The research in telepathy, healing and also near-death experiences, clearly indicates these phenomena do exist and are real. It thus seems necessary that a model of consciousness should pay attention to them and has the possiblity to involve them.

Keywords
consciousness, telepathy, healing, near-death experiences, model, entanglement, physics, electromagnetism

PO-2 (Fri): Hallucinating Nociplastic Pain

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.12] Medicine and healing

Abstract
Despite the knowledge that neuroscience has created about chronic pain in the last forty years and the new chronic pain classification in 2019 (ICD-11), nociplastic pain is still an ordeal. Its difficulty lies in understanding its cause and the processes behind it. Central sensitisation of the nervous system is presumed to be the cause, but this is not easy to prove. Despite the efforts of the International Association for the Study of Pain and other institutions, chronic pain is still reduced to a biological process. This paper exposes the hypothesis of treating chronic pain as a perceptual phenomenon related to hallucination. This new approach can benefit the health system but especially accompany chronic pain bearers in understanding what is happening in their corporeality. By looking at nociplastic pain as an altered state of consciousness and not as a disability or a disease, the possibilities of treatments that have not been considered or have been considered marginally can open new perspectives. The paper is a creative exploration of the elements attached to chronic pain: 1. It presents the parts attached to the chronic pain experience from its bearer's standpoint, linking 4E cognition and the phenomenological lived body with the subject's existential crisis. 2. It introduces the treatments that are in use in the biomedical sector to present the dimensions tackled by this approach. 3. It explains the move from disease to an altered state of consciousness and its implications. In this section, the paper accumulates evidence on nociplastic pain that indicates the importance of consciousness studies. 4. Finally, the paper speculates the possible treatments that can help shift the understanding of nociplastic pain within society and the potential therapies it can derivate into. The methodology employed is diffractive analysis, combining critical posthumanism, consciousness studies, and pain studies and focusing on the processual, not the representational, as a transformative method of inquiry. The research reintegrates embodiment and materiality into the research process, escaping from the representational analysis. Process-oriented political ontology centred on life and Rosi Braidotti's ethics of joy and affirmative politics sustain the research. Chronic pains are a continuous process o becoming as chronic pain seems to bring awareness to one's life by taking possession of it. How can the bearer of chronic pain regain meaning? The multidimensionality of living in pain affects all the features of its bearer. How can current knowledge on nociplastic pain shape a speculation on contemporary subjectivation?

Keywords
Chronic pain, nociplastic pain, pain as a memory, altered state of consciousness, subjectivity

PO-2 (Fri): Alteration of Hypnotizability and Consciousness Phenomena following application of Non-Invasive Brain Stimulation (NIBS): State of the Art and Future Perspectives

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.16] Brain stimulation techniques

Abstract
Non-Invasive Brain Stimulation (NIBS) is a cutting-edge technology widely adopted by researchers and clinicians to alter cognitions, emotions, and behaviours. The most common NIBS techniques are transcranial Direct Current Stimulation (tDCS) and Transcranial Magnetic Stimulation (TMS): both are capable of exciting or depressing the neural activities of the targeted cortical areas. NIBS has also been recently adopted in hypnosis research with the aim of altering hypnotizability and consciousness phenomena. In particular, the few studies available so far have mainly targeted the dorsolateral prefrontal cortex (DLPFC) in an inhibitory way. Findings from these studies showed the intriguing possibility of enhancing hypnotizability and modifying the hypnotic experience through alteration of consciousness dimensions such as volitional control and self-awareness. Unlike psychological and pharmacological approaches, NIBS allows operator-independent and non-invasive alterations of hypnotic experience, giving researchers the opportunity to adopt a causal approach to explore the brain-behaviour relationship that underlies suggestibility and consciousness phenomena. The present contribution reviews the NIBS studies published so far in this field: the neurocognitive mechanisms of action are discussed, as well as their possible implications for consciousness research. Finally, recommendations for future research are outlined with the aim of promoting evidence-based approaches that may promote better outcomes for clinical practice.

Keywords
non-invasive brain stimulation (NIBS); hypnosis; hypnotizability; consciousness

PO-2 (Fri): Identification of neurotransmitters involved in nocifensive behaviour of Bombus terrestris: a step towards bee sentience and pain.

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Categories by Discipline
2.0 Neuroscience

Primary Topic Area-TSC Taxonomy
[02.22] Miscellaneous

Abstract
Sentience is the ability of an organism to consciously perceive internal experiences and interpret them in relation to external circumstances. This capacity allows for the experience of emotions, including pain. Pain is a mental state that sentient beings can experience and is often considered a crucial criterion in determining whether an organism is worthy of moral consideration. In insects, the distinction between pain and nociception (i.e. the mere detection of noxious stimuli) remains controversial. Although nociception has been observed, it is still unclear whether insects are capable of experiencing subjective pain. The presence of endogenous neurotransmitters in the invertebrate nervous system could be a strong indication that, like vertebrates, they possess pain-reducing mechanisms and can experience more than just nociception. It is therefore crucial to investigate whether the behavioural responses of insects to noxious stimuli are influenced by chemical compounds acting on their nervous system. To this end, we have adopted a multidisciplinary approach combining behavioural observations and pharmacological manipulation to study the modulation of nociceptive responses in Bombus terrestris. Our research involves analysing behavioural observations for evidence of painful experiences and using pharmacological manipulation to identify the neurotransmitters involved in nocifensive behavioural responses. This will determine whether bees can regulate their behaviour using neuroactive compounds. If so, we would provide strong evidence that bees are sentient organisms capable of experiencing pain.

Keywords
Bombus terrestris. nociception

PO-2 (Fri): The Only Listening Eyes: Musical Hallucinations provide a new perspective on Dysconnectivity and Precision in Psychosis

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.19] Cognitive theories of consciousness

Abstract
This paper aims at connecting two seemingly parallel lines of research concerning conscious perception in schizophrenia, both centered on the case of the positive symptoms of the condition. One approach, which I envision here as correlated with the Global Neuronal Workspace Theory of Consciousness (GNW), sees the channeling route between neural dysconnectivity and psychosis in the elevated consciousness threshold present in schizophrenia. The other, strongly related to predictive processing (PP), resorts to Bayesian inference to explain the source of psychosis, placing a strong emphasis on precision weighting. In this paper, I evaluate in which ways these results can be correlated. To do so, I focus on the specific case of Musical Hallucinations (MHs), a particular kind of Auditory Hallucination (AH). I shall proceed as follows: (1) I focus on mental imagery, auditory imagery, and musical imagery in both GNW (1.1) and PP (1.2); (2) I investigate MHs; (3) I apply this literature both to the concept of dysconnectivity and to that of precision; (4) Lastly, I elaborate on how a link between the two approaches can be established. Were such a correlation possible, we could theorize that impairments in precision hinder conscious perception by elevating the threshold for consciousness. Thus, this perspective: 1) provides a method to shed new light on PP and consciousness, perhaps paving the way for integration between PP and GNW, which has proved problematic in light of psychiatric research; 2) provides insight into how a deficit in precision actually operates in hindering conscious perception.

Keywords
consciousness, schizophrenia, psychosis, hallucinations, precision, dysconnectivity

PO-2 (Fri): Verbal v. Nonverbal Ecstasy: Teachers, Actors, and Historic Park Rangers Have Verbal Ecstasies While Others Access Bliss Through Peripheral Spatial Attention and Other Sensory Architecture

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Colorado Mesa University, Grand Junction, CO, USA

Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[04.11] Consciousness and evolution

Abstract

Part One of this study, completed at Clark University's Frances Hyatt School of Psychology, replicates classic research on the peak experiences or natural highs identified by Abraham Maslow and Mihaliy Cziksentmihalyi, by producing laboratory conditions in which 44 participants could experience bliss and/or discuss previous experiences of bliss. These new studies refined some elements of the original researches, omitting ideologically laden questionnaire elements such as "spirituality " and "Supreme Being. " Data from 150 participants in a second study indicates that eighty-six percent of the population have experienced extremes of bliss as an altered state, usually in youth or during periods of transition, disruption or new learning phases in middle adulthood, such as during changes in marital status or career, while twelve percent experience blissful altered states into advanced age. Participants experienced Marghanita Laski's Flower Meditation in a visual attention exercise which included the six attentional modes proposed by David LaBerge. Participants who experienced heightened peripheral spatial perception reported ecstatic experiences, virtually all recounting memories of transcendent ecstasy and conditions for their occurring. The findings identify characteristics of transcendent bliss, some not previously noted: bliss is praeternatural, ineffable, typically nonverbal, an altered state, of heightened peripheral spatial attention, voluntary perception, immediate, of intense pleasure; a "half solitude " in proximity to someone held in high regard or one's beloved who is just beyond communicative reach; extraordinary, of full knowledge; oneness or unity, in physical circumstances or settings that disrupt the social field, and timeless. The conditions also required a locus of attention in which multiple points of entry are possible. The Five-Factor Scale and other assessments differentiated frequent "blissers " and those who primarily experience flow. Further, "life-changing " and extremely pleasurable transcendent bliss experiences occurred during the research experience but only to participants who, before the session began, had experienced mild to moderate emotional stress or displeasure up to within twenty minutes of being asked to complete Laski's flower meditation. These latter findings will be of interest to psychedelic therapists and researchers on altered states. Part Two of the research, undertaken at Duke University's Cross-Disciplinary Program in Philosophy and Neurobiology, demonstrates how the current research on altered states and their qualia, including psychedelic experiences, has expanded beyond a growing negativity-driven agenda of treatment for mental distress and addiction, to include evolutionary theory. Self-induced altered states may be an adaptive biological mechanism. Only fourteen percent of the population never experiences transcendent bliss, while seventy-one percent experience them often, thirty-one percent experience them frequently. Personality styles such as divergence, surgency, or neurotic style are not predictors for natural bliss as an extreme positive state. Part Three explores the psycholinguistics of verbally induced bliss states experienced by actors, mentors and teachers, though not induced by Pentacostal glossolalia, showing similarities between these verbal events and nonverbal bliss. For future inquiry, research on the transcendent bliss can be articulated within the theoretical framework of neuroscientist Antonio Damasio's work

on consciousness as cellular-level collective consciousness. Ecstasy as collective "flourishing " is presented in conclusion.

Keywords-Bliss, transcendence, altered states, ecstasy, consciousness, Maslow, peak experience, entheogen, psychedelic, ananda, Antonio Damasio, neurobiology, evolution, adaptation.

PO-2 (Fri): Autonomy and bonding as structural determinants of exceptional experiences (ExE)-evidence for dual-aspect monism?

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[05.12] Miscellaneous

Abstract
Self-organization and energy exchange with the environment are the indispensable prerequisites for the existence of living systems. Organisms interact as autopoietic systems in structural coupling with their environment, exploration and bonding are the driving forces of human development, and self-determination and interpersonal relationships are basic psychological needs. We refer to these complementary principles by the general terms autonomy and bonding. Humans generate a mental self-model as a meta-representation of the autonomy of their organism and a mental world-model reflecting its bonding and interaction with the environment. Exceptional experiences (ExE), commonly referred to as supernatural or paranormal, deviate from the usual mental representation of autonomy and bonding. Phenomenological analyses of more than 2300 cases in which people with ExE have contacted the IGPP counseling service reveal six typical ExE-patterns that can be traced to two continua of increasing irregularity. A continuum of internal phenomena begins with "extrasensory perceptions " in the self-model as exceptional bonding to the world-model. With " internal presence and influence, " bonding increases and threatens the autonomy of the self-model, and at the stage of "mediumship and automatisms, " internal bonding displaces autonomy, which is externalized through dissociation. The continuum of external phenomena begins with the perception of "meaningful coincidences " that appear autonomously arranged in the world-model. In the case of "poltergeists and apparitions, " external phenomena override the bonding or reliability of the physical environment, contrary to natural law. In the "nightmares and sleep paralysis " stage, autonomy appears entity-like and the natural bonding between the self-model and the physical body as part of the world-model is suspended by dissociation. Empirical studies with various samples including the general population, show that people with different ExE-patterns also differ significantly in their social bonding, i.e. partnership, marital status, housing situation etc. On the background of attachment theory, systematic correlations between ExE-patterns and bonding styles have been identified. While an secure-autonomous bonding style is associated with a balance of autonomy and bonding, the results suggest that ExE of the internal continuum are associated with an insecure-dismissing bonding style that emphasizes autonomy and avoids bonding, and that ExE of the external continuum are associated with an insecure-enmeshed bonding style that emphasizes bonding and avoids autonomy. If insecure bonding styles excessively restrict the fulfillment of autonomy or bonding as basic needs, it is plausible to assume that this has repercussions on the

basal level of autonomy and bonding as structural determinants of the overall system. Whereas in a reductionist approach the "whole system " is the physical organism, the findings on the mental representation of ExE suggest that autonomy and bonding are complementary structural determinants of a psychophysically neutral reality in terms of dual-aspect monism. Literature Atmanspacher, H. & Fach, W. (2019). Exceptional experiences of stable and unstable mental states, understood from a dual-aspect point of view. Philosophies, 4(1), 1–21. https://doi.org/10.3390/philosophies4010007 Fach, W. (2022). Exceptional experiences (ExE) and bonding styles: Autonomy and bonding as basic human needs and as structural determinants of ExE. British Psychological Society Psychotherapy Section Review, 67 (International Special Issue).

Keywords-exceptional experiences, mental representation, autonomy, bonding, bonding styles, structural determinants, dual-aspect monism

PO-2 (Fri): Adult attachment affects the absorption and the imagery during the first hypnotic experience, not the hypnotic susceptibility

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Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.09] Unconscious/conscious processes

Abstract
Background: Experimental hypnosis indicates that subjects are not equally hypnotizable, and three classes of hypnotizability are commonly identified: low, medium or high. In the context of clinical and experimental hypnosis, it is useful to understand the predictors of hypnotizability, and most of the studies in this field focused on the relationship between hypnotizability and personality or cognitive variables. Only a few study suggested the possible contribution of the attachment, defined as the result of the relationship with the caregiver during the first months of life, influencing the personological structure and also influencing adult relationships. The present study aims to investigate this hypothetical relationship. Methods: The research involved a large group of undergraduate students in their first experience of hypnosis. All subjects underwent hypnotic assessment through the Phenomenology of Consciousness Inventory: Hypnotic Assessment Procedure (PCI-HAP), while the adult attachment was assessed through the Experiences in Close Relationships-Revised (ECR-R) questionnaire. Results: Correlational analyses showed that adult attachment, as measured by the ECR-test, is not associated with the level of hypnotizability, while being associated with some subdimensions of consciousness – mainly the absorption and the visual imagery. The attachment style-based groups comparison revealed that insecure attachment subjects had greater level of absorption and imagery vividness when compared to secure ones. Conclusions: Present findings indicated a contribution of the Adult Attachment style on the phenomenological experience during the first hypnosis exposure. Possible implications for the clinical and the experimental hypnosis are discussed.

Keywords
hypnotizability, adult attachment, consciousness

PO-2 (Fri): Biological Events that Correspond to Conscious Experience: Improving Brain Scale Hypotheses by Applying the Surjective to the Subjective

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.11] Consciousness and evolution

Abstract
Multiscale hypotheses for evolution of consciousness propose related evolutionary changes at multiple biological scales: The smallest scales may involve germ-line changes in genes and changes in counterpart tubulin-related proteins; the largest scale is typically brain scale, at which evolutionary change affects a substantial part of a brain. Multiscale hypotheses for development and operation of consciousness could similarly culminate at brain scale. Indeed, the brain scale part of a multiscale hypothesis is, by itself, a "brain scale hypothesis " about the relationship between a brain and its conscious experience—it proposes a way to understand consciousness. Recent proposals hypothesize that change in a brain scale biological effect corresponds to change in conscious experience. (Beran, 2022) Because "corresponds to " is very broad, these brain scale hypotheses appear difficult to disprove or falsify—How can one show a complete lack of correspondence? Therefore, this work studies ways to improve such hypotheses by specifying in more detail how brain scale events correspond to conscious experience. Our first attempts add the more specific category "surjective correspondence " to recently proposed brain scale hypotheses. As used here, "surjective correspondence " refers to "onto " mapping between two sets: For every element in the second set, at least one element in the first set maps to it. (See, e.g., Kwong, H., LibreTexts Mathematics, Discrete Math, Section 5.4, 2019) We propose that every actual transition that occurs between conscious experiences has one or more (and perhaps many) brain scale events that map to it. In other words, the set of brain scale events corresponds surjectively with the set of transitions in conscious experience. For example, in one modified proposal, events in a brain's electrical/magnetic (E/M) pattern correspond surjectively with transitions in the brain's conscious experience; in another, events in a brain's "Durbridge C Field " (DCF) (a hypothetical field in which brain scale quantum effects occur) correspond surjectively with transitions in the brain's conscious experience. These two examples have pros and cons, e.g. involving ease or difficulty of measuring brain events and transitions in conscious experience. But can we combine the two into a better brain scale hypothesis, e.g. as follows?—A set of measured changes in a brain's E/M pattern, each adjusted for any accompanying DCF quantum effects, corresponds surjectively with the set of reported transitions in the brain's conscious experience. This hypothesis requires that every transition has at least one corresponding (E/M + quantum) brain event; it can be falsified if at least one reported transition lacks any corresponding brain event. In general, hypotheses with surjective correspondence are better because they can be falsified in this way. Could even more details about correspondences lead to further improvement in brain scale hypotheses? We suggest other ways to add details to hypotheses for evolution, development, and operation of consciousness. Brain scale hypotheses that specify correspondences in more detail provide a promising path to understanding consciousness.

Keywords-Multiscale hypotheses, evolution, brain scale, correspondence, surjective, electrical/magnetic, Durbridge C Field

PO-2 (Fri): Biophysical understandings of experiences of ecstatic consciousness commonly reported in the Gospel Church

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.09] Biophysics and coherence

Abstract
It is useful to employ the terminology and rules of biophysics to explore both the human body and human consciousness as excitable, synchronizable, and ultimately entrainable coherent resonant systems. The heart may have an important role as the chief organ of entrainment. The organization of water in the body may also be significant. Recognizing consciousness as subject to resonant processes, such phenomena as trance induction, rapport (in pairs and in groups), attachment bonding, habit, addiction, emotional contagion or infection, and mob mind may all be explored as resonant entrainment processes. Both shared consciousness as well as shared somatic states may be addressed as resonance phenomena. Emotion and intention may have significant roles as organizers, by increasing coherence. By recognizing the human as an excitable resonant system, it is possible to examine the effects of adding energy to that system. Such systems are subject to charge and discharge mechanisms. Theories of destabilization and restabilization of systems may additionally come into play. Concepts of phase transition or quantum jumps of consciousness may also be relevant. Research suggests that mental and somatic unity must be aroused, that is, incited. Many of the most effective tools of amplification are musical technologies of African danced religion used in gospel churches. Using biophysical understandings, it may be possible to explain certain ecstatic experiences commonly reported in Gospel Church—including the induced group worship field of "one accord " (one heart); the supersensory (or synesthetic) perceptions of "grace " (the felt sense of God's love) and "glory " (the visceral sensation of the presence of the divine); particular motor automatisms; as well as such extraordinary phenomena as "glossolalia " (speaking in tongues), being "slain in the Spirit " (suddenly falling to the floor), "baptism in the Holy Spirit " (surrender to a higher power and spiritual conversion), possession by the Holy Spirit, instances of faith healing, and even prophecy.

Keywords
Ecstatic Experience, Gospel Church, Worship, Gospel Music, African danced religion, Biophysical Terminology, Resonance, Excitation, Oscillation, Synchronization, Entrainment, Amplification, Coherence, Heart Field, Organized Water, Attunement, Trance, Consciousness Systems, Somatic or Consciousness Induction, Rapport, Bonding, Emotional Contagion, Addiction, Habit, Mob Mind, Destabilization/Restabilization, Phase Transition, Quantum Jump, African Danced Religion, One Accord, Grace, Glory, Supersensory Perception, Synesthesia, Motor Automatisms, Miraculous Healing, Glossolalia, Slain in the Spirit, Baptism in the Holy Spirit, Spiritual Conversion, Surrender to the Holy Spirit, Possession by the Holy Spirit, Faith Healing, Prophecy.

PO-2 (Fri): The Quantum Mechanics of Fertilization

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.14] Quantum theories of consciousness

Abstract
The past decade has been one of fantastic scientific achievements. In 2016, researchers at Northwestern University identified the zinc spark that marks the successful merger of a sperm and egg, signifying the initiation of embryonic development. In addition, we have seen the discovery of the Higgs boson in 2012, the first recording of the "chirp " of two black holes merging in 2015, and the first visualization of a black hole in 2019. We propose that these discoveries are connected and will explain how human consciousness or first qubits of information attach the independent Higgs field of the zygote at the moment of fertilization. We will demonstrate how the human body is an antenna for light, explain quantum cognition, and reverse engineer that back to the moment of fertilization. We will show that the zinc spark is the notification that human consciousness has entered the biological vessel. The human body has evolved within a very narrow portion of the electromagnetic field to receive information via electron excitation. Quantum mechanics is beginning to be acknowledged as the foundation of human biology. DHA allows us to convert photons into electricity that gives us both vision and instruction for our mitochondria via the suprachiasmatic nucleus. Current literature acknowledges that the mitochondria serve as sensors to the environment, storing quantum information that drives physiological function. We have evolved sentience because of the mitochondria's production of ATP. This allows us to have memory and therefore perceive time. Given human dependency on the electromagnetic field, which is a part of the unified field, we propose that this intertwining of consciousness and physiology with the unified field can be traced back to conception. We will discuss the current scientific landscape of quantum consciousness, including the Orch OR model by Stuart Hameroff and Sir Roger Penrose and the quantum cognition research by Mark Fisher and his team at UCSB. The golden ratio is a fundamental geometric pattern that appears ubiquitously throughout nature. It can be seen from the planck scale all the way up to the macroscale, appearing in DNA, embryos and even black holes. When the first image of the black hole Messier 87 was released, it struck us how similar it appeared to the zinc spark that is formed at fertilization. The discovery of the Higgs boson proves that the Higgs field exists and that this is the particle that ties energy to mass. The first law of thermodynamics states that energy and information can never be created nor destroyed. We propose that at the merger of the sperm and egg their unique Higgs fields collide creating the new Higgs field of the zygote, and that the zinc is the nanoantenna or quantum thermodynamic phenomenon that anchors the qubits or consciousness to mass. We propose that this is the quantum physics of fertilization.

Keywords
zygote, fertilization, quantum biology, higgs field, quantum consciousness, entanglement

PO-2 (Fri): Many Worlds-One Mind: Quantum Neural Networks Hypercomputation as an Explanation of Consciousness Driven Wavefunction Collapse.

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Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.01] Quantum physics, collapse and the measurement problem

Abstract
The many-minds interpretation is a variant of the many-worlds interpretation of quantum mechanics that addresses the apparent paradox of a conscious observer which could become superpositioned with itself when measuring a superpositioned system disabling it to experience a deterministic state, a paradox which is solved by proposing that any conscious agent possesses an infinite number of physical minds in a prevalence proportional to the amplitude of the wavefunction observed, any of which are in a definite state and never in superposition, albeit only one becomes experienced and others remain inaccessible but real. This work proposes another variant of this interpretation where conversely, there is only one conscious mind that accesses and hyper-computes each of the physical brain states resulting from the observation of superpositioned stimuli into the most optimal definite state which is, in general, the only one that is experienced as real; hence, the other brain states are not unaccessible nor computationally lost, remaining essential for the construction of the sense of deterministic reality. Therefore, the wavefunction collapse exists only at the level of the ultimate observer as the many minds interpretation claimed, nonetheless, the other minds which exist on different multiverses are not disconnected from each other but conform to a single entangled mind. Formalizing this in a computational basis, a conscious measuring agent is a structure in the form of a quantum neural network that performs the hypercomputation of all the individual deterministic neural network states acting each as Turing machines that are produced after the observation of a superpositioned state. This hyper-computation of the individual brain states is performed by selecting the optimal configuration in means of achieving the maximal thermal efficiency of the network or the ability to match the most probable future. Therefore, the conscious agent will only perceive this constructed deterministic optimal state among all others. In brief, in the same fashion that the perceptron function computes all inputs into a single output, a "conscious perceptron function " computes all the superpositioned perceptron functions into one, which could also be equivalent to a perceptron function with an n-dimensional tensor input leading to a less dimensional matrix or even a single scalar output. This new interpretation offers an evolutionary basis of consciousness as the hypercomputation of the superpositioned states provides an advantage for an organism to adapt or react to the environment even in front of nondeterministic challenges or superposed sensorial stimuli. It could also provide an explanation of the ability of intelligent beings to solve problems that are theoretically uncomputable or the ability of the human mind to outperform in some tasks even the most powerful classical computers and show computation power beyond its thermodynamical theoretical limits.

Keywords
quantum mechanics, quantum computing, many-minds, many worlds interpretation, wavefunction collapse, multiverse, hyper-computation

PO-2 (Fri): A Hypothesis and a System Model on the Origin of Consciousness in Living Beings

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[04.10] Origin and nature of life

Abstract
As all life is based on cells, the origins of consciousness and sentience in living organisms, must be explainable with the mechanisms of simple unicellular forms. The field of bio-magnetism has documented the existence of subtle electro-magnetic energy fields in living beings. This work proposes a hypothesis that the bio-magnetic currents of a unicellular organism, interact with the surrounding space-time to form a focal zone. Such a bio-magnetic focal zone, with a characteristic of receiving and radiating the information present in the field, learns the events that occur to the cell and in turn can replicate in time. Learning herein refers to the wave interactions that occur in the field and in the focal zone, that generate new information potential. Further the work puts forth a system model that describes how certain basic functions such as motion, sensory perception and reproduction are outcomes of this learning process of the focal zone. As a next step, the work aims at investigating genetic material formation as a result of such bio-magnetic focal zones.

Keywords
bio-magnetism, consciousness, genetics, space-time

PO-2 (Fri): Intellective Saturation of The Evolutive Cosmovision (ISEC): Hypothetical Conditions for the Experience of Cosmoconsciousness

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract
Cosmoconsciousness (or cosmic consciousness, as coinned by Richard Bucke) is one the most transcendental phenomenon in the field of Phenomenology (or more specifically, Paraphenomenology) and has one of the greatest potentials to carry out transformations for the better of those interested in experiencing it. However, paradoxically, very little has been spoken, written, and published on the subject by those who declare to have experienced the phenomenon. In any case, the fact is that the subject really lacks greater conceptual structuring and detail about what happens in practice with those who recognize having reached such a state. This is one of the main objectives that this article aims to meet. In this sense, the article proposes, at first, to give a quick overview of what cosmoconsciousness is and how it can be defined in general terms. For this, it has definitions brought by the main authors who have already dedicated themselves to the topic. From these contributions, which constitute an essential starting point, it is possible to enter more properly into the proposition of a certain feasible path. This opening intends not only to explain a possible path to cosmoconsciousness, but also to offer a hypothesis in which the interested one can take advantage of it to come to have the desired experience. Without any intention of closing this path as the only path, or of claiming that this is the true or authentic route, it is wanted to provide bases for understanding the phenomenon with a view to facilitating self-experimentation. In this sense, the concepts of worldview (weltanschauung), cosmovision and consciousness evolution (or consciousness excellence, or even consciousness progress) are central to the proposition. It is conjectured that it is from the intellectual saturation of this specific point of view, i.e., a deep and wide cosmovision regarding the evolution of the consciousness, that a state of greater homeostasis begins to insinuate in what can be called as an expansion of consciousness, and when it reaches a maximum peak of saturation it overflows into what is called cosmoconsciousness. Both insinuation and maximum overflow stem from a specific way of consciousness functionality related to the way of apprehending and perceiving reality. Capturing the reality that surrounds us depends not only on the conventional conception of worldview, but strongly on the cosmovision adopted. In addition to this a priori intellective conditioning, the second stage is putting into practice these concepts, trying to implement them in the contexts in which we are contingently inserted. This attempt can occur in two ways: (i) through intellection, when one still utilizes comparison mechanisms, analysis, memory, critical judgments, among other intellectual resources; and, (ii) by intuition, when one already understands with relative ease such contexts and starts to work in a more automated way, without the intermediary of intellectual procedures. According to the hypothesis defended here, when the evolutionary consciousness cosmovision starts to function in an intuitive way, it is when the expansions of consciousness occur, and at the highest point, the cosmoconsciousness.

Keywords
cosmoconsciousness, cosmovision, standpoint, overview, theory, practice, evolutive values, intuition, intellection, perception, Conscientiology, Paraphenomenology, saturation, overflow

PO-2 (Fri): Consciousness Education applied to Mental Health and Psychological Safety

Milena Braticevic

California Institute for Human Science, Encinitas, California, USA

Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract
Common mental disorders such as anxiety, depression, and burnout are on the rise. Mental health and psychological safety are becoming important topics in organizations and communities. A new paradigm based on prevention and early intervention is needed to help create a more sustainable approach to mental health and improve a sense of belonging and common purpose. By addressing the key question 'Who am I?' and providing a wider definition of the mind as embodied, emerging, and relational in nature, consciousness education can provide useful tools for mental health and psychological safety. While all mental disorders represent a degree of fragmentation of the psyche, increasing awareness of nondual consciousness and the natural state can promote integration. Adopting an integral view can contribute to the development of a growth mindset and process orientation, leading to a reduction of symptoms of anxiety and depression. Through consciousness education, individuals can learn to not identify with thoughts and emotions, thereby reducing the activity of the Default Mode Network that causes rumination. By practicing the natural state, individuals can learn to activate the parasympathetic nervous system, which helps relieve symptoms of anxiety and depression. Knowing how to replenish energy levels at the physical, emotional, mental, and spiritual aspects of being can contribute to prevention of burnout. This session will show how consciousness education has been used in group settings to promote mental health and psychological safety in organizations and communities.

Keywords
consciousness education, mental health, psychological safety, anxiety, depression, burnout, prevention

PO-2 (Fri): How Buddhist Mahamudra supports Strawson's thin subject and Zahavi's minimal self

Anand Rangarajan
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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract
We begin with the premise that Strawson's thin subject and Zahavi's minimal self are indispensable concepts in consciousness studies. While these concepts eschew naive Cartesianism, they affirm something basic in our phenomenology, that experience is always accompanied by a subject or perspective and this needs to be acknowledged in some form. We also note that there is a widespread belief that Buddhist studies affirm the concept of no-self which at first glance seems to be at odds with the thin subject and/or minimal self. The goal of this paper is to show that there is a Tibetan Buddhist tradition which affirms the thin subject (and/or minimal self) and recommend that this be more widely disseminated in consciousness studies. A brief description of Tibetan Mahamudra follows: there are four yogas/stages in the Mahamudra tradition. In the first emptiness of self yoga, the practitioner is encouraged to discover that their prior (Cartesian) assumption of a fixed self is mistaken and that their phenomenology is filled with dynamic content. In the second emptiness of world stage, the practitioner is encouraged to see that the manifold of phenomenal content is itself empty and that underneath it lies a vast awareness. In the third One Taste stage, the practitioner sees that awareness and phenomenal content are always co-present and simultaneous and appreciates the danger of reifying awareness. In the fourth stage, the practitioner sees meditation itself as a construct and starts noticing that (an awakened) awareness comes and goes accompanied by phenomenal content. It is this vital post-meditation stage that interests us. Here, the return of awareness is marked as significant and is seen as responsible for the very creation of a limited perspective connecting awareness and bounded phenomenal content. This significant return of awareness is taken up further by the Dzogchen traditions with the Mahamudra yogas acting as a base of operations. We mention all this to point out the crucial role played by the post-meditation stage in Mahamudra: the self or a perspective, awareness and phenomenal content all appear together and then disappear. This mimics the descriptions of Strawson and Zahavi to such a remarkable degree that it is surprising that we don't see discussions in consciousness studies focused on this concordance. In contrast, we see recent attempts by philosophers such as Garfield proceed in the opposite direction and discard the thin subject while claiming support from the Buddhist traditions. To summarize, the appearance of simultaneous awareness/phenomenal content in a spatio-temporally bounded form cannot be denied. Buddhist Mahamudra explicitly acknowledges this via the metaphor of taking the perspective of the flashlight (and not focusing either on the illuminated content or on the holder of the flashlight). This thin subject has qualia (sensations, perceptions, emotions etc.) and is capable of intentional acts. Situating the thin subject in the physical world instead of eliminating it should therefore be a paramount concern of consciousness studies.

Keywords Tibetan Mahamudra, Dzogchen, Strawson, Zahavi, thin subject, minimal self, awakened awareness, experience, phenomenal content, perspective, emptiness, reification

PO-2 (Fri): Verifying Contemplative Experiences with First-Person Experiments: Investigating Pure Awareness Experiences in Phenomenological Interviews

Brentyn J. Ramm[1], Anna-Lena Lumma[1], Terje Sparby[2], Ulrich Weger[1]

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Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.01] Phenomenology

Abstract
In contemplative traditions one's 'true nature' is commonly reported to be void-like and silent – a pure awareness without qualities. However, such experiences are usually limited to highly experienced meditators in advanced meditative states. These religious experiences have so far resisted rigorous scientific investigation. These reports are also vulnerable to objections such as that they are merely cultural artefacts. I introduce the approach of using first-person experiments as a means of reliably eliciting such experiences (in both meditators and non-meditators) outside of a religious or spiritual context. As part of a phenomenological interview about their first-person perspective, I asked 20 participants to engage in visual and bodily awareness exercises developed by the philosopher Douglas Harding. My aim was to empirically verify the effectiveness of this approach in eliciting experiences of emptiness and pure awareness experiences. In support of the hypothesis, 12 out of 20 participants reported an experience of 'emptiness' or 'void' when they attended to where they are looking from. Additionally, 18 participants reported the sense of lacking personal characteristics (particularly with their eyes closed) and 6 participants explicitly described themselves as a pure awareness or observer when carrying out Harding's first-person exercises. Given that meditators only rarely report experiences of 'the void' and 'pure awareness' this is a significant finding. In particular, it suggests that such contemplative experiences can be reliably elicited outside of formal meditation practices and hence are not merely products of those practices. I conclude that these first-person methods have the potential to bring some contemplative experiences into the realm of scientific study, while avoiding the criticism that such experiences are merely cultural constructions. This potentially has significant implications for our understanding of the general structure of consciousness and the nature of the self, as well as suggesting new therapeutic methods for everyday life.

Keywords
Contemplative Experience, Douglas Harding, First-Person Methods, Phenomenological Interview, Pure Awareness, the Void.

PO-2 (Fri): How can we use breath, sound, and bi-handed drawing to investigate cyclical spiral energy?

Margot Wilson

Royal College of Art, London, United Kingdom

Categories by Discipline
5.0 Experiential Approaches

Primary Topic Area-TSC Taxonomy
[05.04] Psychedelic and other altered states of consciousness

Abstract
This 'altered state consciousness' research uses directed intuition-platforms such as immersive drawing and breath-induced vivid dreaming practices to investigate the gap between binary linear philosophies and entangled emergence theories, such as Lyotard's Discourse Figure (1974) and Golding's Radical Matter (2017). The research formalises my independent research into intuitive agency and intersects art practice with neuroscience investigations into altered states of perception such as Buddhist and Vedic tantric breathwork and meditation, also, my own bi-handed drawing practice, my 2-directional simultaneous writing practice, breath-induced vivid dreaming method and 'sonic breath toning'. A recent development of this bi-handed practice is 2-directional writing, simultaneous writing forwards and backwards with both hands. The significance of deep research into these techniques offers findings relating to evidencing the role of intuition in visual and performance 'soma-neuro-immersive happenings'. Moving between upright and horizontal bodily (soma-neuro-immersive) states, the research moves between waking cognisant drawing activities, hypnogogic/hypnopompic visualisation activities, and sleeping breath induced vivid dreaming activities. Early theories of elevated uprightness in humans include Plato's 'featherless biped' (Plato: XX). Horizontal processes include those of rigor mortis and petrification as yogic phases (Burley: 2014, Hopkins: 2008), elevated upright processes include tantric quantum expansion practices such as heat directed vortex energy [kundalini] (White, 2000). Tantric somatic technologies use breath generated heat to destabilise and restabilise the holding patterns registered in the body/ brain (and 'mind'). Seated meditation then enables a bridge state between horizontal sleep and upright (including seated) waking, utilising the 'natural' elevation in the 'floating' 'S' shape of the spine during which 'straightness', 'stretching' and 'extended elevation' may spontaneously occur. (Bruce: 1993, Jung: 1932, Mullin: 1986, 2006, White: 2000, Ray: 2001). Due to the unique architecture of the human skeleton, in particular, the 'S' shape of the spine, specifically the angle that the cervical vertebra of the spine joins the skull and the symmetry of the tilted pelvis (Dart: 1925, Lovejoy: 2010), these elevation meditations (towards levitation) techniques are uniquely possible in humans. It is this 'S' architecture (as 'freeing the arms') that will be explored in my figurative and abstract sculpture, and bi-handed drawing practice. The 'S' also appears as the looping Infinity Symbol, and Lyotard's Libidinal Band (Lyotard, 1974) and is proposed here as the geometry of the circulating flow in tantra (S-Tantra). The 'S' and Moebius strip shapes also arise spontaneously in my bi-handed drawing practice. This proposal includes bi-handed drawing performance and optional workshops and soma-neuro-immersive headphone experience of 'sonic-breath-toning', both research methodologies my practice presently investigates at The Royal College of Art. Please see links for examples of my work.

Keywords
hypnogogic, intuition, agency, meditation, sonic, breath, breathwork, vedic, trance, tantra, buddhist, vajrayana, hynopompic, vivid dreaming, dreaming, circadian, experimental, art practice, art, methodologies, bi-handed, expanded art

PO-2 (Fri): A new paradigm on death

Steven A Ferrara

Institute of Noetic Sciences, Petaluma, CA, USA

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[01.11] Personal identity and the self

Abstract
Death has consumed, confused, and seems to make living life more fearful. When death is approached with an attitude of compassion and looked at from the side of the deceased, we allow for a new understanding. The New Paradigm Birth and death are on the same polarity but Life has no opposite and therefor must be looked at from a non dualistic vision. Non dualistic understanding is the new paradigm that takes us beyond thought and emotion to a higher dimension of mind power. As we explore the death of our human based form, thought, and emotion, we will come to a place of "What can be " as opposed to "What could have been "..... As we move further into this more open minded willingness and away from our more seeming normal mentality of resistance, we will come upon consciousness that is not dependent on form. In actuality, humanness is dependent, and only has its being, because of consciousness. We are the awareness of this consciousness in our essence. We will take a deep dive into Awareness of Consciousness and how this can completely change the how we experience life and view death. This has the effect of the beginning of living life from the "inside out " as opposed to the "outside in ". This is the critical point that humanity is moving through. And death has the potential to accelerate this journey.

Keywords
A new paradigm on death, Birth/Death/Life, Consciousness and death, Beyond thought/emotion.

PO-2 (Fri): The Lambda /\ Symphony:: a love story of the Earth and his Moon

Scott F Ready

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.05] Mythology

Abstract
The Lambda in the title stands for Einstein's Cosmological Constant, the curious discovery and confirmation in 1998 with telescopes that our expanding universe appears to be on course for an exponentially rapid expansion that makes everything acausal, detached and super-relativistic. I have a memorable poster that captures the letting go at the end of one of Penrose's aeons; I build from a famous painting called a "Girl with a Red Balloon. " For the midway and beginnings of one of Penrose's epochs in CCC (Conformal Cyclic Cosmology), we have drawings, equations, even a song that makes hyperbolic geometry natural, obvious and feminine. A full presentation can involve all of the arts and a hopeful story of mankind; a myth in the making that goes like this. "In time, before our Sun becomes a Red Giant, our moon will pull our Earth out to Saturn. " We can start imagining this possibility and enjoy being human.

Keywords
Roger Penrose, CCC, Aeons, Conformal Cyclic Cosmology, hyperbolic geometry, The Lambda /\ Symphony

PO-2 (Fri): Entanglement and the Psychoanalytic Subject

Nida I Paracha

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.07] Anthropology

Abstract
In his Seminar on Ethics ([1986] 1997), Jacques Lacan notes the Thing (das Ding) at the core of the psychoanalytic subject is "an original division of the experience of reality, " "the first outside " and first object, originally lost and impossible to retrieve, an extimacy. Such a Thing, says Lacan, cannot be mastered or dialecticized; it can only be encircled. In my work as a psychedelic-assisted psychotherapist and a Reiki practitioner, it is this very Thing that

overwhelms entanglement – the unbearability at the core of intimacy. What Lacan describes as emptiness; the people I work with describe as entanglement within others. Thinking with Martin Heidegger in the Zollikon Seminars ([1987] 2001) as he attempts to reconstitute his philosophy into a healing praxis and discusses dis-ease as a question of intimacy, I revisit the extimacy and singularity ([1975] 1999) that persists in Lacanian psychoanalysis in an attempt to articulate an embodied subject, one that more closely aligns with the phenomenology of entanglement that is experienced in biofield therapies and psychedelic-assisted psychotherapy.

Keywords
anthropology, psychoanalysis, Heidegger, Lacan, subject, singularity, entanglement, psychedelics, energy healing, psychedelic assisted psychotherapy.

PO-2 (Fri): Spiritual Emergence and the Intersection of Ethics, Policy, and Law

Mariam J. Saleh, Esq.[1,2], **Brian Spittles, Ph.D.**[1,2,3]

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Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.09] Ethics and legal studies

Abstract
This presentation will explore the intersection of Spiritual Emergence with ethics, policy, and law from an ontologically neutral perspective. The wide range of phenomena commonly referred to as Emergence, Spiritual Emergence (or Emergency), Nirvana, Awakening, etc. have existed throughout human history but are increasing in frequency due to the rising popularity and social encouragement of what are known as Emergent Practices, including: meditation; mindfulness; yoga; recreational psychedelic use, psychedelic-enhanced therapies, or other entheogenic substance exploration; breathwork; and intensive devotional practices and prayer. Emergent states may also occur spontaneously or with exposure to virtual reality (VR) experiences or other perception-altering and -enhancing devices. Interestingly, various forms of psychospiritual emergence have traditionally been sought by many societies, as exemplified by the fact that over 3,500 societies have been documented to use specific procedures to induce alternate states of consciousness leading to Emergent Phenomena. With the growing interest in the therapeutic potential of psychedelics and mindfulness, coupled with major advancements in the VR/neurotech industry, Emergence is a field rapidly growing in significance. While many of these practices are routinely advertised as having no adverse effects, abundant sources–both ancient and modern–describe a wide range of possible effects that may result from these practices, many of which range from undesirable and unexpected to extremely destabilizing and life-threatening. Emergent Phenomenology may often mimic psychoses or other psychiatric disorders and mistakenly result in the corresponding treatment. Many individuals who experience this in contemporary society have no idea what is happening; they often fear they are going mad, and the modern healthcare systems cannot provide them with adequate reassurance and treatment. Due to insufficient understanding and incorporation of Emergent effects into modernist cultures, legal systems, and the current medical paradigm, individuals experiencing difficult Emergent effects that lead to impaired functioning are at

considerable risk of involuntary commitment, forced medication, and social rejection, amongst other negative outcomes. Mainstream science, clinical medicine, mental health disciplines, religion/spiritual teachings, and general public understanding have largely failed to keep pace with the Emergence-related trends and developments, which are scaling rapidly in many societies. Therefore, there is an apparent need to examine the domain of Emergence and its intersection with the fields of ethics, policy, and law. This presentation will discuss: (1) the history of Emergent Phenomena, psychiatric diagnostics and care, and medical ethics; (2) the deficiencies in the current medical framework and psychiatric paradigm; (3) the potential for a new era of human rights litigation as a result of unlawful violation of rights of individuals undergoing Emergent Phenomena, including constitutional limits on involuntary commitment, forced or coerced drugging, and lack of informed consent in treatment; (4) the potential for a new era of tort and medical malpractice litigation as a result of uninformed use of neurotech devices or tech-enhanced experiences; uninformed regulation of psychedelic substances; and improper medical diagnoses; and (5) the essential and plausible resolutions addressing this multidisciplinary problem.

Keywords
Emergence, law, policy, medical ethics, psychedelics, contemplative, meditation, mindfulness, VR, neurotech, spiritual emergence, spiritual emergency, transpersonal psychology, litigation, medical, clinical, psychiatry, psychology, technology, human rights, alternate states of consciousness, consciousness, altered states

PO-2 (Fri): Calibrating consciousness through pattern thinking and understanding: An educational approach to enabling human/world coherence.

Shae Linda Brown

Southern Cross University, Lismore, NSW, Australia

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.10] Education

Abstract
Education is the main site for the shaping the expression of human consciousness. Formal learning influences the expression of the capacities of consciousness in a similar way as sport influences expression of the capacities of the body, and can therefore enable or limit conscious perception, cognition, and metacognition. As part of the new paradigm in education, pattern thinking and understanding is found to be useful to enable the relational expression of consciousness through awareness of co-generativity, complexity, and agency, thereby increasing person/world coherence. Such capacity is then useful for any field of interest or endeavour. A patterns-based design, called Complexity Patterning, provides an educational introduction to pattern thinking and understanding, beginning with across scale pattern similarity, from the subatomic to the cosmic, to the at once individualised, and embedded and entangled, nature of existence. Visually patterning complex phenomena using the same ecological patterns then supports relational learning and knowledge making. At this time in history education needs to be updated to support human

evolution towards conscious stewardship of life. The teaching and learning of pattern thinking through Complexity Patterning can calibrate consciousness to the generative and emergent patterning of life, supporting adaptive and pre-adaptive cognition and action, thereby contributing to transformational education for positive futures.

Keywords
Complexity Patterning, pattern thinking, complexity, transformational education.

PO-2 (Fri): Comic Strip Anxiety Dreams in Windsor McCay's Dream of the Rarebit Fiend and Little Nemo Series.

Olga Colbert

Southern Methodist University, Dallas, TX, USA

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.12] Visual Art Forms

Abstract
This work explores the fictional representation of dreams and dreaming in American cartoonist Windor McCay's Dream of the Rarebit Fiend series (published from 1904-1911 and in 1913), and Little Nemo in Slumberland (1905-1914) series. My work situates the comic strips within the context of turn-of-the-century dream theory, such as Freud's Interpretation of Dreams as well as social scientists and philosophers' concept of Modernity. In McCay's comic strip Rarebit series, we find a great deal of dreams that touch into profound economic and social anxieties. Disquiet over the widening reach of a rapidly growing capitalist system (portrayed as an octopus) in the early years of the 20th century is shown through a series of adult protagonists' dreams as each cartoon is narratively independent from the others. The stress of urban living, the encroaching of technology, the fast pace of life and transportation (out of control automobiles, ships and trains abound), as well as anxiety over gender roles and other social issues are well represented. I also analyze the dreams depicted according to current dream and sleep science. McCay's cartoons often incorporated dream accounts sent by readers to which he gave form using highly innovative graphic techniques. I pay closer attention to those strips that are a result of reader collaboration, since on some level this series functions as a kind of collective dream journal of early 20th-century urban American life.

Keywords
Dreams, sleep, cartoons, comic strip, Windsor McCay, visual art

PO-2 (Fri): Consciousness from the Biomolecular to the Artificial: An Undergraduate Course in Consciousness and Ethics.

Thomas E Klepach

Colby College, Waterville, ME, USA

Categories by Discipline
6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.10] Education

Abstract
One hurdle that broader acceptance of the scientific study of consciousness in general and various biological accounts of consciousness such as the Orch OR model in particular face is the inherent interdisciplinary nature and a lack of understanding by non-specialists. Incorporating consciousness studies into a liberal arts curriculum enables the topic to be approached from a wider intellectual base and plants the seeds for future researchers in the field. This talk is a description of a new course entitled "Consciousness: from the Biomolecular to the Artificial " being offered in the Science Technology and Science Department at Colby College in Waterville, Maine through the support of the Davis Institute of Artificial Intelligence. This course introduces students to the field of consciousness studies grounded in a scientific approach. The course begins with an introduction of the "hard problem " of consciousness, namely the question of how phenomenal experience can arise from biological systems. This begs the more general question of how consciousness is able to arise from matter at all, leading to a qualitative survey of efforts to reconcile complex network, emergent property, and first principle theories in physics with this fundamental question. This consideration of the various approaches to the problem eventually settles in to the Penrose-Hameroff model of orchestrated objective reduction (Orch OR). It examines the relevant empirical evidence and consider the major critiques of the theory and their rebuttal. The latter portion of the class involves exploring the possibilities for consciousness in artificial systems. With the emerging significant advances in artificial intelligence, an important distinction between artificial intelligence and artificial sentience is drawn. In relation to the latter, consideration is given to the potential implications of the Orch OR model to artificial systems involving quantum computation, as well as other attempts to describe what constitutes an artificial consciousness This open debate around what constitutes artificial sentience and the attendant ethical implications is explored in a variety of ways, including through readings selected from contemporary science fiction literature. The culminating project of the course is a unique multimedia project in which the students create an avatar powered by various artificial intelligence text engines such as Open AI's GPT-3 / ChatGPT, Scalenut, or Jasper AI, etcetera. The students use this avatar to coherently frame the relevant model of biological consciousness and explore the ethical questions inherent in artificial consciousness by creating a digital artifact of these explorations. This manifests in any number of ways limited only by the creativity of the student. For example, it may take the form of video or podcast discussion or debate between themselves and the avatar, or the avatar could be a productive DALL-E 2 type visual "artist ", or a "musician ", or "poet " in their own right discussing the issues of concern to the student. Examples of this work will be provided.

Keywords
Education, Consciousness Studies, Liberal Arts, Undergraduate Education, Science Technology and Society, Consciousness Science Curriculum, Orch OR, Artificial Intelligence, Artificial Sentience, Ethics

PO-2 (Fri): Perception Reframing -> Expanding Consciousness

Vaughn R Cook

ZYTO, Lindon, UT, USA

Categories by Discipline
3.0 Cognitive Science and Psychology

Primary Topic Area-TSC Taxonomy
[03.09] Unconscious/conscious processes

Abstract
For more than forty years has exploited new science, turning heretical concepts into sellable products. He has a solid working knowledge of quantum physics, biology, anatomy, eastern medicine, western medicine, homeopathy, serial titration, acupuncture, injection therapy, nutrition, psychology, and religion. His inventions bring together concepts from these and other disparate sources to create cool stuff that serves humanity. His passion in life is to improve the quality of life of 13% of the world's people. Over the last 40 years his inventions have been used by more than twenty million individuals, tens of thousands of them being healthcare providers on every continent except Antarctica. The problem with heresy and new science is that it precedes mainstream thought by one or two generations. Dr. Cook's inventions have routinely fallen into that pattern, but now are becoming mainstream. Perception Reframing is an example. This technology was released into commercial distribution in 2007. It was offered only to healthcare providers and was embraced primarily by those who either had a prior relationship with Dr. Cook, or who had some familiarity with energy medicine. Perception Reframing relies on human voice, biofeedback, information theory, computer science, and quantum physics to catalog perception and to reframe it. Reframing results in an expanded perception which leads to more options, more appropriate choices, and more functional lives. The clinical reach of Perception Reframing includes the release of emotional attachments associated with disease (especially important with chronic illness), overcoming psychological barriers, improving physical performance, mending broken relationships, improving productivity, achieving success with less effort, reducing social friction, and more. Education: BS (Honors Graduate) 1974 – Utah State University Acupuncture Degree 1991 – Oriental Medical Institute of Hawaii Oriental Medical Doctor 1996 – North American Academy of Advanced Asian Medicine Proposal: Exploring perception, its contribution to consciousness, how it can be measured and expanded (reframed), and what the impact of reframing has on consciousness, evidenced by research and real-life experience. Also, looking for interested researchers to help with ongoing research.

Keywords
Perception Reframing, Subconscious Beliefs, Free Will, Zero Point Field, Energetic Posture, Opposition, Constraints

In memory: How our Quantum 'Reduction Boundaries' can be connected to one Consciousness Essence

Gerard J Blommestijn

Quantum Reduction Connects, Amstelveen, North Holland, Netherlands

Categories by Discipline
4.0 Physical and Biological Sciences

Primary Topic Area-TSC Taxonomy
[04.01] Quantum physics, collapse and the measurement problem

Abstract
In his seminal work "Mathematical Foundations of Quantum Mechanics " (1932) John Von Neumann united the different formulations of Quantum Mechanics (QM) into one system. He distinguishes two fundamentally different process types: Process type 1) The abrupt, discontinuous, indeterministic state changes that are brought about by measurement; also called: collapses or reductions of the wave function. They are related to conscious observation and entanglement. They contain all of QM's mysterious strangeness. Process type 2) The automatic, continuous, deterministic state changes of an isolated system that occur over time. Just like in classical mechanics. Once a measurement is made, the theory requires application of Process type 1. Von Neumann shows that the boundary between the 'observed portions of the world' and the 'observing portion of the world' can be displaced arbitrarily without affecting the outcome of the measurement. He eventually shifts that boundary to its ultimate place: between the retina, optic nerve and brain on the one hand and the observer's abstract "ego " on the other. Hereby he introduces and defines the 'abstract "ego "' as being the ultimate observer behind the brain or beyond the brain. Incidentally, process 1 not only reduces wave functions of the observing, sensory results of brain processing, but also of results in the motor areas. This means that motor action choices are also QM reduction processes. Namely, of motor wave functions that are superpositions of several possible choice outcomes for motion in both the physical world and the mental world. The Orchestrated Objective Reductions of the Penrose-Hameroff paradigm are in fact type 1 processes in microtubules in neurons and as such are connected to the abstract "ego ". In any living being, we could call the substrate where this happens (e.g. the microtubules involved) its 'reduction boundary'. This 'reduction boundary' lies between the orchestrating processing in the neurons on the one hand and the abstract "ego " or consciousness on the other. It's quite magical what happens there: information from physical wave functions is transferred to sensory experiences and feelings in the mental realm, and choices from that realm are transferred to physical and mental movements. It is where the sensory, physical world meets the world of conscious experience and choice. It may be revolutionary, but what if the whole abstract "ego " of all living beings, the entire observing portion of the world, is one thing, one consciousness? This ontology would imply that all reduction boundaries of all living beings are connected to that one consciousness. One wonders if the perceptions and choices in these reduction boundaries of the different living beings would not be confused in that one consciousness? Therefore this one consciousness should only be a 'Tabula Rasa' (a clean slate) for the experiences and a 'clean source' for the choices. Memory and other traces of activity must be in the physical side of the living being. In my presentation I want to discuss the implications of this ontology.

Exhibitor-Demo

Perception and Thinking in Visual Art and Painting

Jeane Cohen

Sharpe-Walentas Studio Program, New York City, NY, USA. School of the Art Institute of Chicago, Chicago, IL, USA. Maine College of Art and Design, Portland, ME, USA

6.0 Culture and Humanities

Primary Topic Area-TSC Taxonomy
[06.12] Visual Art Forms

Abstract
Observing and making visual art, particularly painting, unearths a unique point of view from which to approach visual thinking, perceptual experience and conscious processes more broadly. As primary sources for the visual synthesis of perceptual information, my artwork organizes and shares knowledge that is uniquely presented in the visual realm. For example, in my painting Fates, (1) owl eyes evoke a sense of being watched as well as an awareness of other conscious beings. The field of visual thinking and what it can offer for the understanding of consciousness is under-examined, despite the predominance of visual culture in daily lived experience. As a visual artist, I use painting, drawing, and visual narrative methods of making. For over ten years my practice has been deeply engaged with ideas of visual thinking, teaching about seeing, (2) and translating perceptual experiences. (3) One way my artwork examines thought is by shifting frameworks of logic within and amongst bodies of work. (4) This diversifies modalities and organizing principles in the work, and jolts a sense of shifting awareness in viewers, such as in the work, Three Moons, Two Suns. (5) Awareness is also evoked through composition of color, intensity, narrative, and emotion, as it is in Ludic Midnight. (6) Additionally, my practice images direct experiences of visual perception, which can be seen in excerpts from my artist books, The Listening Cone (7) and Monarch. (8) In these examples, sequential looking unfolds over time. In other works such as Draining House (9) and Acclimating to a Hostile Environment, (10) direct observational translations, which vary in their degree of recognizability and loyalty to illusion, convey the slipperiness of comprehensible meaning. Visual depiction is a valuable resource for communicating about conscious experiences. Looking closely at the particular ways consciousness is understood through visual art and visual thinking is a priority for my artistic practice. I am beginning to expand this work through new interdisciplinary partnerships, finding avenues for more visual models in consciousness discourse, and working towards the publication of a visually-based book that examines the nature of consciousness. Sources Link:

Keywords
Visual Art, Painting, Perception, Observation, Creativity, Visual Thinking, Experiential Consciousness, Imaging Consciousness, Drawing, Representation, Knowledge

THE UNIVERSITY OF ARIZONA
Center for
Consciousness Studies

Taxonomy of Categories
The Science of Consciousness 2023

[Philosophy]
[01.01] The concept of consciousness
[01.02] Materialism and dualism
[01.03] Panpsychism and cosmopsychism
[01.04] Ontology of consciousness
[01.05] Qualia
[01.06] Machine consciousness
[01.07] Mental causation and the function of consciousness
[01.08] The "hard problem " and the explanatory gap
[01.09] Philosophical theories of consciousness
[01.10] Epistemology and philosophy of science
[01.11] Personal identity and the self
[01.12] Free will and agency
[01.13] Intentionality and representation
[01.14] Philosophy of perception
[01.15] Neutral monism and idealism
[01.16] Miscellaneous

[Neuroscience]
[02.01] Neural correlates of consciousness (general)
[02.02] Methodologies (fMRI, EEG etc.)
[02.03] Neuroscience of vision
[02.04] Other sensory modalities
[02.05 .Motor control
[02.06] Memory and learning
[02.07] Blindsight
[02.08] Neurology, neuropsychology and neuropathology
[02.09] Coma and vegetative states
[02.10] Anesthesia
[02.11] Cellular and sub-neural processes
[02.12] Quantum brain biology
[02.13] Brain networks, synchrony and scale
[02.14] Emotion
[02.15] Sleep and waking
[02.16] Brain stimulation techniques

[02.17] Specific brain areas
[02.18] Neurolinguistics
[02.19] Psychedelics and psychopharmacology
[02.20] Neurobiological theories of consciousness
[02.21] Pharmacology and psychopharmacology
[02.22] Miscellaneous

[Cognitive Science and Psychology]
[03.01] Attention
[03.02] Vision
[03.03] Other sensory modalities
[03.04] Memory, learning and synaptic plasticity
[03.05] Emotion
[03.06] Language
[03.07] Mental imagery
[03.08] Implicit and explicit processes
[03.09] Unconscious/conscious processes
[03.10] Sleep and dreaming
[03.11] Cognitive development
[03.12] Artificial intelligence and robotics
[03.13] Neural networks and connectionism
[03.14] Cognitive architectures
[03.15] Ethology
[03.16] Self-consciousness and metacognition
[03.17] Temporal consciousness
[03.18] Intelligence and creativity
[03.19] Cognitive theories of consciousness
[03.20] Miscellaneous

[Physical and Biological Sciences]
[04.01] Quantum physics, collapse and the measurement problem
[04.02] Quantum field approaches
[04.03] Space, time and the nature of reality
[04.04] Cosmology and integrative models
[04.05] Emergence, nonlinear dynamics and complexity
[04.06] Hierarchies, scale-invariance and 1/f systems
[04.07] Logic and computational theory
[04.08] Quantum brain biology
[04.09] Biophysics and coherence
[04.10] Origin and nature of life
[04.11] Consciousness and evolution
[04.12] Medicine and healing
[04.13] Brain stimulation techniques
[04.14] Quantum theories of consciousness
[04.15] Photons and entanglement in the brain

[04.16] Miscellaneous

[Experiential Approaches]
[05.01] Phenomenology
[05.02] Meditation and mindfulness
[05.03] Hypnosis
[05.04] Psychedelic and other altered states of consciousness
[05.05] Transpersonal and humanistic psychology
[05.06] Psychoanalysis and psychotherapy
[05.07] Lucid dreaming
[05.08] Near-death and anomalous experiences
[05.09] Parapsychology
[05.10] Contemplation and mysticism
[05.11] Virtual reality
[05.12] Miscellaneous

[Culture and Humanities]
[06.01] Literature and hermeneutics
[06.02] Aesthetics
[06.03] Music
[06.04] Religion and spirituality
[06.05] Mythology
[06.06] Sociology
[06.07] Anthropology
[06.08] Information technology
[06.09] Ethics and legal studies
[06.10] Education
[06.11] Entertainment
[06.12] Visual Art Forms
[06.13] Poetry
[06.14] Dance
[06.15] Miscellaneous

EDITORIAL INITIATIVES

The conference will also serve as the center of a network of editorial initiatives, calls for papers, monographic issues, and potential dedicated volumes. At present, it is not possible to list them all, as the details are still being finalized. However, we invite you to check the dedicated page on our website (coming soon) where the various opportunities will be outlined shortly.

Have a great time and enjoy the conference!

Plenary Sessions will be uploaded on the TSC YouTube Page

The Science of Consciousness

https://www.youtube.com/channel/UCoNDcpkKXg2UioJKxTZI-ZA/videos

Thank you to all our participants TSC 2023!

https://www.tsc2023.it

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Center for Consciousness Studies

30th Anniversary TSC

THE SCIENCE OF CONSCIOUSNESS 2024
TUCSON | ARIZONA USA
April 22-26, 2024
Loews Ventana Canyon Resort

See website for details and links
www.consciousness.arizona.edu
info: center@arizona.edu

Call for Abstracts & Registration – Opens in September 2023
Hotel room block code – Available in July 2023