# 1. Philosophy

## 1.1 The concept of consciousness

1 **The Folk Psychology of Consciousness** Adam Arico, Fiala, Brian; Nichols, Shaun <arico@u.arizona.edu> (Philosophy, Tucson, AZ, U.S.A.)

Part of the traditional problem of other minds focuses on the question: "What leads us to think that other individuals have minds?" This way of posing the problem emphasizes the psychological mechanisms by which attributions of mentality are produced, and brackets issues about the epistemic status of those attributions. There have been several proposed solutions to the problem of other minds, so posed: perhaps our attributions of mentality are grounded in analogical inference (Mill), inference to the best explanation (Pargetter 1984), or a dedicated mechanism or faculty that causes the attributions (Reid). Psychologists and philosophers of psychology have recently begun to investigate the more refined question, "What leads us to think that other individuals have conscious minds?" We might dub this question the problem of other conscious minds. Gray Gray & Wegner (2007), Knobe & Prinz (2007), Robbins & Jack (2006), have all recently contributed interesting and important work on the problem of other conscious minds. Here we develop a new model for understanding the problem of other conscious minds. Following Reid, we advance a version of the 'dedicated mechanism' approach that we dub "The Agency Model." According to The Agency Model, there are specific superficial cues that suffice to dispose a subject to attribute conscious mentality to a target. This draws on the work of Heider and Simmel (1944) and follows closely the model of agent-detection proposed by Susan Johnson (2003), who postulated dedicated mechanisms to explain our attributions of agency and mentality more generally. According to the Agency Model, once a person identifies an object as an AGENT (e.g. by superficial cues), that will suffice to produce a prepotent tendency to attribute conscious states to the object. In order to test the Agency Model, we ran a reaction-time study in which subjects were presented with a sequence of Object/Attribution pairs. Attributions specified properties such as Happy, Made of Metal, Pain, Living, and White. Objects were drawn from categories such as Artifacts, Birds, Insects, Mammals, and Plants. For each Objection/Attribution pair, subjects were asked to respond (Yes or No) as to whether the object in the pair could have the property in the pair. The Agency Model predicts (i) that subjects should be more willing to attribute mental states to entities that typically trigger our agent-detection mechanism than to entities that typically do not, and (ii) that subjects should take longer to respond negatively for phenomenal attributions to entities that typically trigger the agent-detection mechanism than for phenomenal attributions to non-agent entities. The results confirm our basic predictions. However, we found an interesting anomaly: RT's did not differ between phenomenal attributions to Insects and phenomenal attributions (e.g., PAIN) to Plants. This result suggests that, although Plants do not display the cues that typically dispose us to attribute Agency, subjects are nonetheless disposed to attribute (some) phenomenal consciousness to Plants. We argue that this result does not undermine The Agency Model, but does suggest that the model is explanatorily incomplete. We conclude by considering some options for elaborating the model. **C16**

2 **The Reach of Phenomenal Consciousness** Tim Bayne <tim.bayne@gmail.com> (Philosophy, University of Oxford – St. Catherine's College, Oxford, United Kingdom)

What kinds of mental states can be phenomenally conscious? Some theorists – 'phenomenal conservatives' – holds that phenomenal consciousness is restricted to sensory and low-level perceptual states. Others – 'phenomenal liberals' – argue that high-level perception, such as the identification of an object as a tomato or as a face, involves proprietary phenomenal character. Indeed, some liberals even argue that purely cognitive states – such as judgments, entertainings, intendings and desirings – possess distinctive phenomenal character. This paper both clarifies the contrast between phenomenal conservatism and liberalism and presents some arguments in favour of the latter view. **C2**

3 **What It Is Like to Think. On Cognitive Phenomenology, Functionalism, and Externalism** Marius Dumitru <marius.dumitru@chch.ox.ac.uk> (Faculty of Philosophy, University of Oxford, Oxford, United Kingdom)

The very idea of cognitive phenomenology is considered by many as a non-starter, because of a definitional restriction of phenomenology to non-cognitive states. But perhaps we should clarify the intension of the concept first and determine its extension on that basis, and not start with an exclusivist extension followed by the assignment of a concept to it. It seems to me that the concept of

phenomenology allows cognitive phenomenology in its extension. If we agree on the cogency of the very idea of cognitive phenomenology, there is a further question about its specification. One could hold that cognitive phenomenology just is a) the phenomenology of inner speech (Carruthers 2006, Jackendoff 2007) or b) the phenomenology of mental images, emotions, or feelings (of effort, conviction, understanding, etc.) conjured by thoughts. Fringe phenomenology (such as the tip-of-the-tongue phenomenon) may challenge the specification in terms of the phenomenology of inner speech. It seems to me that even if we bracket a) and b), which are typically present, we are still left with a phenomenological core: the phenomenology of cognitive meaning. Many authors (among others, G. Strawson, Ch. Siewert, D. Pitt) converge on a specification of cognitive phenomenology in terms of grasp of intentional contents and the experience of semantic comprehension, while others (Horgan & Tienson, B. Loar) emphasize the grounding of all content in a phenomenal basis (mental paint for Loar). I agree with a specification in terms of the experience of semantic comprehension, with the qualification that we should not consider it simpliciter, but as the end product of a complex process involving the mastery of conceptual structures. My claim is that if there is intrinsic cognitive phenomenology, it has to be functionally exhausted to a great extent. Arguments are presented against exclusively equating it with the phenomenology of inner speech, and the feelings of comprehension and conviction, on the ground that these phenomenal aspects engender certain anomalies if considered separately as accounting for the phenomenology of thoughts. Functional exhaustion for the case of cognitive phenomenology is shown to be immune to inverted spectra and absent qualia objections, because from the point of view of inferential involvement, colour concepts are constructs derived from experience, and zombie arguments are not free from prior assumptions of separability between functional and phenomenal aspects in the case of thoughts. This specification of cognitive phenomenology in (narrow) functionalist terms may entail an internalist view of mental content. **C2**

4 **From Phenomenal Overflow to Inaccessible Phenomenal States: Filling a Gap in Block's Argument.** Bernard Kobes <kobes@asu.edu> (Philosophy, Arizona State University, Tempe, AZ)

Ned Block claims, in "Consciousness, Accessibility, and the Mesh Between Psychology and Neuroscience", that we have evidence for consciousness within Fodorian modules and in deeply inaccessible states of Rees's visuo-spatial extinction patient GK. He cites in support of his claim a neural explanation of how phenomenology overflows access in the Sperling paradigm and in so-called change blindness. I show how the neural explanation can be accepted while remaining agnostic about Block's conclusion, so that a gap appears in the argument. I suggest a way in which the gap may be filled and Block's conclusion supported. The resulting picture is framed by an account on which our generic notion of phenomenal consciousness ramifies into three specific notions, determined by varying constraints on phenomenal access. **C16**

5 **The Phenomenal Concept Strategy Without Co-Reference** Dylan Murray <murray.dylan@gmail.com> (Northwestern University, Chicago, IL)

Even if the only we can think about phenomenal properties is with phenomenal concepts and we cannot refer to them with physicalistic concepts, it does not follow that phenomenal properties aren't ontologically physical. Current versions of the Phenomenal Concept Strategy (PCS) connect identity theory physicalism, which claims that phenomenal and physical properties are identical, to the claim that physicalistic and phenomenal concepts refer to the same property. They don't need to. PCS is meant to defuse the antiphysicalist arguments and open the possibility that phenomenal properties are ontologically physical; whether it does so doesn't hinge on whether physicalistic concepts can refer to phenomenal properties. A concept's being physicalistic isn't the same as its being physical, which Terence Horgan's (1984) distinction between the ontologically physical and the explicitly physical clarifies. On Horgan's distinction, something is explicitly physical or physicalistic if expressed in the terms of the current physical or natural sciences' lexicon. Something is ontologically physical if the entities and properties it refers to are physical. Concepts are thus distinguished by the type of explicit conception they afford; properties by what they ontologically are. The physicalist can claim that everything is ontologically physical, but doesn't have to claim that all concepts are physicalistic. It's not that phenomenal concepts wouldn't be included in an ideal, completed science, but that they're a sui generis kind of concept. Different versions of PCS point to different special features of phenomenal concepts that distinguish them from nonphenomenal, physicalistic concepts without the feature. Advocates of PCS claim the explanatory gap is only caused by this conceptual distinctness and cognitive independence, not also by a metaphysical gap as dualists claim. Physicalism maintains that phenomenal-physical property identities are a posteriori but nonetheless necessary, and PCS is invoked to open this possibility

past the antiphysicalist arguments. Since Brian Loar (1990/1997) proposed it, every version of PCS suggests that phenomenal and physicalistic concepts could refer to the same property without it being transparent that they co-refer. It's overlooked that PCS also opens the possibility of psychophysical identities without co-reference. Maybe only phenomenal concepts can conceive of phenomenal properties, not physicalistic concepts without the special features PCS posits. In that case, phenomenal and physicalistic concepts don't refer to the numerically same properties, but that's not to say that phenomenal properties aren't identical to physical properties, only that they're not identical to any physical properties there are physicalistic concepts of. Property monism is compatible with different kinds of concepts not co-referring to the same property. Physicalists are free to insist that properties be individuated ontologically, not on the basis of the type of concept they're picked out by. Physicalism claims that all properties are ontologically physical, not necessarily that there are physicalistic concepts of all phenomenal properties. If the Phenomenal Concept Strategy defuses the antiphysicalist arguments, the simpler, more consilient inference is that phenomenal concepts pick out physical, not nonphysical properties, regardless of whether or not those properties can also be referred to with explicitly physicalistic concepts. **P1**

6 **Two Conceptions of Subjective Experience** Justin Sytsma, Edouard Machery <jms124@pitt.edu> (Philosophy, University of Pittsburgh, Pittsburgh, PA)

Do philosophers and ordinary people conceive of subjective experience in the same way? The received view is that they do: the philosophical concept of phenomenal consciousness coincides with the folk conception. In this article, we argue that the received view is mistaken. We offer experimental support for the hypothesis that philosophers and ordinary people conceive of subjective experience in markedly different ways. We then explore experimentally the folk conception, proposing that for the folk, subjective experience is closely linked to affectivity. We conclude by considering the implications of our findings for a central issue in the philosophy of mind, the hard problem of consciousness. **P7**

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## *1.2 Ontology of consciousness*

7 **Embodied Cognition: Dualism Redux?** Andrew Bailey <abailey@uoguelph.ca> (Philosophy, University of Guelph, Guelph, ON, Canada)

This paper examines the consequences of recent movements in cognitive science – attention newly being paid to embodiment – for the theoretical status of phenomenal consciousness. I provide an analysis of the thesis of embodied cognition, developed by considering the sources of empirical evidence typically adduced for embodiment (as a distinctive thesis from classical cognitivism), and distinguish six different key claims that may form part of an embodiment hypothesis: • partialness of mental models; • action-orientation of mental models; • off-loading off cognitive work to the environment; • non-representational mental models; • embodiment constraints on cognitive capacities; • rejection of organism-environment dualism. I consider some of the ways in which these claims may be – and have been – combined, and some of the ways in which they are in

mutual tension. I identify a particularly central philosophical cluster of embodiment theses – common, I argue, between such important recent embodiment hypotheses as enactivism and neurophenomenology. I argue that this form of embodiment, though often touted as anti-Cartesian and opposed to various out-dated dualisms, in fact introduces a new form of dualism (or, alternatively, reintroduces an old dualism in a new form). This is a dualism between consciousness and mind. **C17**

8 **Action and Visual Consciousness** Michael Bruno <mbruno@u.arizona.edu> (Philosophy, University of Arizona, Tucson, AZ)

In this talk, I'll defend the enactive theory of perception's commitment to there being a constitutive relationship between action and conscious visual perception. After briefly motivating the enactive theory generally, I'll present an objection that this commitment is incompatible with a prominant theory in cognitve neuroscience. I'll defend the enactive theory by arguing that the relevant experimental data fails render its commitment to a constitutive relationship problematic. **C17**

9 **There is No Unconscious – Going Beyond Panpsychism: Consciousness As A Given of the Way the World is.** Ross F. Grumet <rfg@psychiatryatlanta.com> (Atlanta Psychiatric Specialists, PC, Atlanta, GA)

Hypothesis: Consciousness, experience, conscious experience – these are given features of how the world works, in the same way that matter-time-space are given features. Conscious experience indicates that something is now happening in the world. Our vivid scenarios of sensory qualities, of being Here, of being Now- these naturally occur whenever we encounter anything. The brain or mind is an evolved machine for elaborating consciousness, just as other machines may elaborate matter, energy, or time. Conscious experience does not require a particular structure such as a mind or a brain, it only requires that the world be as it is. There is always a "something it is like" subjectivity for any creature or object or thing which is in the process of interacting in any way with any other thing. We hypothesize that there is no additional faculty, but that consciousness is an indication that something is happening in the present in the world. Consciousness is the same sort of datum that matter or time is. The human brain elaborates the consciousness default starting point into a mind, perhaps using the circuity of strange loops and multiple drafts. We no longer have to keep reminding ourselves to keep asking the endlessly repeating question "But who is it, who does the perceiving of this hallucinated self" etc. The hallucination of a self is sensed and experienced by the rest of the universe, the reason being that when anything occurs it could not be otherwise than being experienced. Arguments for and against this hypothesis are presented. Other points elaborated in the paper: 1) The dual substance approach is probably unnecessary. 2) Zombies appear to be inconceivable. 3) Scientific study can explore consciousness without the big But of the hard problem. 4) The brain has evolved and modified phenomenal consciousness, not created it. 5) subjectivity is not related to a substance or ingredient; it is a fact of the matter and will always be with us. 6) What would an other universe be like without this fact of consciousness? **P1**

10 **Some difficulties of naturalistic approach** Alexander Matckevich <anaid1@yandex.ru> (Moscow, Russia)

All the efforts to find out whether there is a correlation between mental and physical powers are up to date and easily introduced into the system of naturalistic. Many scientists nowadays consider consciousness to be the product of brain. One can't say that such an approach is a new one. In the XVIII century we can easily find the whole bunch of such theories – La Metri and Holbach in France, Hiessman in Germany and etc. And still this does not mean that the modern philosophers are doomed to repeat the former ideas. Just a brief outlook shoes great difference in the opinions of the "old" and "new" psychological naturalists. The "old" ones tried to give some basis to the assertion that the mental processes depend on the physical state, and the "new" ones take this thesis as the basis for their research work. Saying all this we may speak of further development of the ideas of the ancestors by the modern consciousness philosophers. And one of the main things to do is to find out where this development can lead. We shall see that the development of the new processes and procedures leads not to the answers, but reveals much more questions. Sometimes much better thing seems to be the admission of Hume's confession which he made in his application to the third book of "Treatise of human nature". There he said that all the hopes for the harmony of the theory of the mental world, which he had had in the first book turned to dust. As a starting point we may speak of Searle who says that consciousness or mental states are the causal product of brain. It's obvious that the separate neuron does not induce consciousness, as Searle says. Consciousness is a system phenomenon compared with such an attribute of matter as its fluidity, instability. The sepa-

rate molecules can't be called fluid, but taken together they present fluidity. The same thing with neurons when their whole presents the high-leveled attribute – consciousness. The problem is that this position has got a big defect and it comes out while asking a simple question – what is there in brain cells that allows them to produce consciousness? And if we think over this question properly, the only answer that comes to our mind is that consciousness produced by our brain is not the result of the matter it is made of (for our brain is made of the same particles as the whole world), but of the way these particles are organized and what are their basic functions. The recognition of this fact brings us to the final decision that consciousness is not the result of the existence of the brain itself, but of its functional organization which can be also realized on some other basis. It also puts before us an ontological dilemma whether the mental states are the basic functions realized by the brain, or they represent some other kind of the reality correlated with the last. **P7**

11 **Monism: A Phenomenological and Neuroscientific Perspective** Stephen Pearce <steve.pearce@utoronto.ca> (University of Toronto, Toronto, Canada)

This paper is an investigation into what David Chalmers has called Type-F monism (Chalmers 2003). Such views can be seen as a middle path between physicalism and dualism; accepting the aesthetics of a reality composed of only one type of 'stuff'(eg. object or property) from physicalism, while at the same time accepting the dualist intuitions that physical descriptions cannot account for consciousness. These 'middle path' views will be further delineated between what I call atomistic and non-atomistic. Bertrand Russell's view of protophenomenal properties being the intrinsic nature of elementary particles is a paradigmatic example of an atomistic view, while Alfred North Whitehead's metaphysics of process can be considered a case of non-atomistic Type-F monism. These two contrasting formulations will be subjected to analysis from a phenomenological and neurodynamical perspective. From the phenomenological perspective, I will argue that non-atomistic views cohere nicely with the holistic nature of conscious experience, while it is not obvious how to account for part-whole relationships under an atomistic framework . From a neurodynamical perspective, I will consider the modern neuroscientific hypothesis for how the integration of information is achieved in the brain: neural synchrony I will argue that atomistic views cannot provide a metaphysical account of such properties of brain processing, while non-atomistic views can. This will lead to the conclusion that a non-atomistic middle path between physicalism and dualism, the holistic nature of experience, and neural synchrony are all mutually supporting, suggesting that such Type-F monistic views deserve serious philosophical consideration. Chalmers, D. (2003). Consciousness and it's Place in Nature. In Stich, S., and Warfield, F., eds. Blackwell Guide to the Philosophy of Mind. Malden, MA: Blackwell Pub. **P1**

12 **Outline of A Metaphysics of Hedonic Tone** Mark Pestana <pestanam@gvsu.edu> (Philosophy, Grand Valley State University, Allendale, Michigan)

In this paper I develop a functionalist information-theoretic account of the qualitative character of pleasure and pain. This account draws upon the metaphysical insights of Aristotle (On The Soul), Spinoza (Ethics, Book III) and Kant (Anthropology From A Pragmatic Point Of View) concerning the ultimate nature of these two fundamental feeling states. My attempt in this paper is to weave their metaphysical characterizations of pleasure and pain together with current homeostatic conceptions of biological functioning, current representationlist theories of mind, and current information theoretic conceptions of mental functioning. Section one contains an explanation of physical systems that exhibit the complexity in structure and function necessary for being in states of activity that either enhance the continued existence and functioning of the system or diminish the ongoing functioning and (ultimately) existence of the system. This is further characterized in terms of deviations from and returns to homeostatic equilibrium and in terms of overall diminishment and enhancement of the ability of a system to maintain homeostatic equilibrium in a variety of environments. Section two contains an account of pleasure and pain in representational terms. As complex organic systems have evolved, part of the function of maintaining homeostatic equilibrium has become mediated by representations that organisms form of their own inner states and of entities in their environs (that cause deviation from/return to equilibrium). These representations of the inner condition of the organism (as a whole or in some part) constitute its being in pain/in pleasure and cause the organism to either maintain its condition or change its condition. Section three translates the biological and representational accounts of pleasure and pain into functional information theoretic terms. Aristotelian hylomorphism and efficient causality provides the basic metaphysical framework for the analysis – complex entities are metaphysically constituted out of form and matter and forces are deployed by such entities that bring about changes in their very configuration. I explain how configurations of materials can be representations and how complex systems can form within themselves information states that are representations of their own states. I then

characterize how states that are formal representations efficiently cause changes in the states of such systems (how forms canalize forces). Finally, I elucidate how an information structure that is a representation of the homeostatic state of the very system forming that information structure, brings about the deployment of forces that changes that structure. The final section of the paper attempts to match phenomenological insights concerning pleasure(s) and pain(s) with the metaphysical analysis. Here I refer to standard distinctions used by psychologists between the degrees of pain, acute/intermittent/chronic pains, etc. and to work by phenomenologists on tonal feeling flows. In summation, I demonstrate how pleasure/pain appearances in the phenomenal field can be explained in terms of the metaphysical account. **P1**

13 **Complexity Theory and Theories of Consciousness: the Supervenience Hypothesis: Preface to a Theory of Complex Neurofunctionalism** Matthew Piper <i@matthewpiper.com> (Graduate Interdisciplinary Program, SSU, Santa Rosa, CA)

I will here defend the view that a correct scientific theory of consciousness will supervene upon a correct theory of complexity. The argument will proceed as follows: According to cutting-edge science, brain activity is accurately describable in the language of complexity theory, which is readily explained by the uncontentious posit that the brain is a complex adaptive system. Given the physicalist premise that the mind supervenes upon, is realized in, or reduces to the brain, a stance I will call "complex physicalism" asserts that the mind supervenes upon, is realized in, or reduces to complex system activity. Accordingly, scientific theories of consciousness will supervene upon accurate theories of complexity. More specifically, from a naturalistic perspective, theories of consciousness will supervene on complexity theory insofar as they, minimally, assume, and are congruent with, its metaphors and some subset of its logicomathematical language. Neuroscientific theories understood in the light of complexity theory can be considered variants of Complex Neurofunctionalism. It is suggested that both philosophy and neuroscience are converging thereto. **P1**

14 **A Novel Argument for Panpsychism** William Seager <seager@utsc.utoronto.ca> (Philosophy, University of Toronto, Toronto, Ontario, Canada)

One traditional argument for pansychism begins from the observation that phenomenal states of consciousness are intrinsic properties. What, exactly, intrinsic properties are remains very unclear and there is a lively philosophical debate about the issue which has been going on for some time. Roughly speaking, intrinsic properties are the properties things have 'in themselves', properties that are had without the 'metaphysical help' of any other thing. Note, this characterization does not imply that intrinsic properties are uncaused. The question is about the status of a property once an object has it; I tried to indicate this with the somewhat peculiar phrase 'metaphysical help'. States of consciousness seem to be excellent candidates for being intrinsic properties. Descartes noticed, to his distress, that no matter what might be happening apart from or 'outside' one's conscious mind, one's experience could be exactly as it is. The 'what it is like' of conscious experience seems to something 'in itself' not logically or metaphysically (though of course in general causally) dependent on any other thing. A duplicate of me would have experiences despite, for example, not being an uncle. If I was the only thing that had ever existed I would still have conscious experiences (so long as I survived). The venerable argument for pansychism referred to above claims that science reveals only the relational properties of the physical. The most significant of these – maybe all of these – are of course the causal powers of the physical. This observation undercuts any pretense that properties such as charge, spin or mass are truly intrinsic – they are but the nominal shadow of the relation we call causation. Versions of this argument are very interesting, but to many they are not very convincing. The option of accepting some unknowable but presumably non-mental physical intrinsic ground is for many more attractive than attributing mentality to electrons and quarks. But another argument can be readily constructed from the assumption that states of consciousness are intrinsic properties, if we accept a recent amendment or extension of the idea of intrinsicality proposed by Ted Sider. This involves the idea of 'maximality' which is that feature of objects such that none of their parts are themselves objects (even if they have 'all it takes' to be an object of the relevant sort were they existing alone rather than as a part of an object). Sider argues that maximality entails that consciousness is not an intrinsic property. I take issue with Sider's claim here, and note that there is a way to retain the intrinsicness of consciousnesss in the face of the maximality challenge, which does not deny the maximality condition. What is especially intriguing about this approach is that it quite naturally leads to a view of consciousness which is essentially panpsychist in nature. In the end, it is interesting that such an intuitively bizarre theory as panpsychism provides a way to maintain two highly plausible or even commonplace views about the nature of consciousness. **C8**

15 **Reassessing the Incompatibility of Ontological Emergence and Microphysical Realization: A Way to Advance the Debate over Nonreductive Physicalism?** J.R. Shrader <wshrader@iusb.edu> (Philosophy, Indiana University at South Bend, South Bend, IN)

A theory of ontological emergence, as I understand it, entails at a minimum that there exists a class of properties E (the ontologically emergent properties) such that (1) instantiations of the members of E are ultimately determined by the instantiation of microphysical properties, and (2) instantiations of the members of E are still causally efficacious and causally autonomous (in that the causal powers of these emergent properties are not identical or reducible to microphysical causal powers). Several authors, e.g., Sydney Shoemaker and Brian McLaughlin, have argued that it is impossible for ontologically emergent properties to be realized by microphysical properties. The purpose of this paper is to reassess this conclusion. I identify two distinct characterizations of what it is for one property to realize another property. Both of these characterizations are consistent with the general desiderata for realization offered in the literature and both are strong enough, or so I will argue, to satisfy physicalists. I then show that it is only on one of these characterizations of realization that a property's being emergent is incompatible with its being realized by microphysical properties. The upshot is that there is a way to formulate realization, consistent with the general perception of how the relation should be characterized and consistent with physicalism (as most conceive it) according to which realization and emergence are compatible. I then introduce and explore two recent nonreductive accounts of mental properties and show that, in each of these accounts, mental properties are described in such way that they are both ontologically emergent and realized by the microphysical. These two accounts are those of Derk Pereboom in his "Robust Non-Reductive Physicalism", Journal of Philosophy (2002) and Carl Gillett in his "Strong Emergence as a Defense of Non-Reductive Physicalism: A Physicalist Metaphysics for 'Downward' Determination," Principia (2002). I then raise a significant problem for each account. I show that Gillett's account is plagued by an internal inconsistency, and thus cannot be true. I then raise a couple of questions about the justifications Pereboom gives in support of his account, justifications that I think are insufficient. The view, however, very well could be true and may be persuasive to some if stronger justifications were provided. Pereboom's insights are worth exploring, and do open the door to understanding ontological emergence in a different light – as a view that is compatible with realization and thus compatible with a robust nonreductive physicalism. I conclude by offering some final reflections on where the debate should go from here. **P1**

16 **State space dynamics and a hylonoetic theory of mind** David Skrbina <skrbina@umd.umich.edu> (Philosophy, University of Michigan – Dearborn, Northville, MI)

The human brain is a complex nonlinear feedback system, and as such is amenable to dynamical analysis, especially via state space techniques. Following the lead of Paul Churchland (1986), such analysis is shown to be effective in illuminating the dynamics of mind and consciousness. Here, a straightforward qualitative analysis of the brain leads to interesting correlations with experiential qualities, including unity of consciousness, quasi-stability of personality, and qualia. It furthermore casts new light on mind-brain causality and the 'hard problem'. Following this analysis, it is conjectured that qualities of mind are logically associated with all dynamical systems, and hence all physical systems – resulting in a new approach to panpsychism. Thus we may say that complexity of mind is correlated with dynamical system complexity. This notion was actually anticipated by C. S. Peirce in 1892, but the mathematical tools were not yet in place. Following Skrbina (2001), this general approach to mind is labeled 'hylonoism': mind as inherent to matter, or mass-energy more generally. It is a strong form of panpsychism. **C8**

17 **Being a Non-Reductionist about Consciousness when Modal Arguments Fail: An examination of Thomas Metzinger's Dynamicist-Connectionist attack on Qualia and a Reply in Favour of Neutral Monism** Sean M. Smith <sean.smith@utoronto.ca> (Philosophy, University of Toronto – St. George Campus, Toronto, Ontario, Canada)

Much of contemporary philosophy of mind is concerned with modal arguments for dualism. Whether your are a non-reductionist, a physicalist or an eliminativist about consciousness, everyone involved seems to be quite clever in arguing for their positions. The unfortunate fact about these debates (whatever side you are on), is that whether or not your claims are true seems to rest on two things: (1) a coherence principle by which the arguments provided are judged and (2) a modal intuition about just what it is you can or cannot conceive (e.g. Zombies). Nearly everyone involved satisfies (1) while having a different foundation for (1) in (2). Suffice it to say, it is a difficult situation. This paper will frame the debate of the nature of consciousness in terms of a reductionistic vs. non-reductionistic views. It is my desire to approach the problem from another direction. My reasons for this are as follows: (1) I do not wish to engage this debate in the usual fashion of arguing

against one side from another, for fear of the argumentation turning on pedantic details about inferential entitlement (e.g. from conceivability to genuine metaphysical possibility). (2) I believe that the debate arises out of an assumption which has no grounds. Namely, that the concept of matter is ontologically sufficient to serve as the epistemological grounds for a rigorous mind to body reduction. That is, that we have something to reduce the mind to. I propose to give the most systematic and sophisticated reduction of qualia that I can by examining the position of Thomas Metzinger as outlined in his monograph, Being No One. He does something profound in his reduction of qualia by shifting the debate to empirical grounds and by making a distinction between phenomenal possibility and logical possibility. Suffice it to say, the project of non-reductionism is a hard road to hoe. Having made these general opening remarks, I can now state my position with clarity. I propose that we do not have an epistemologically rigorous concept of matter that is sufficient for a mind-body reduction. In order to reduce X to Y, Y must be sufficiently defined. I believe that for matter this is not the case. To put it simply: there is no substance in matter. As such, I will conclude with the help of Bertrand Russell, that a neutral monism is what is needed. I will argue that the events or time slices which are the ontological primitives of contemporary physics, are in fact neutral. In continuing work in both the physical and cognitive sciences. I believe that temporal gestalts are the best candidate for explaining reality in a way that is respectful to both physical and psychological laws whilst satisfying non-reductive intuitions simultaneously with reductive ones. Metaphysical naturalism does not entail materialism (in the rigorously reductive sense). **P7**

18 **Consciousness Tuning** Stewart Erik, Christian Whittall <possum@n-space.org> (Anarchist Free University, Toronto, ON, Canada)

How consciousness is created often seems like an unsolvable puzzle. Many models of consciousness suggest the brain is an advanced network of logic-gate like cells. The nature and complexity of these interactions, somehow giving rise to consiousness. However, for many of us, it is difficult to see how consciousness can emerge from a bunch of logic gates regardless of their nature or complexity. This paper examines an alternate model of consciousness which is more in line with Alfred Whitehead, or Eastern spiritual traditions. It suggests that rather than being somehow created in the complexities of the brain, perhaps consciousness is a fundamental force that exists in the universe independently of brains or other conscious beings. This independent consciousness likely doesn't exist in an advanced self-aware form as it is found in humans, but perhaps in a raw, primal form. Rather than give rise to consciousness, the brain in particular – and perhaps life in general – harnesses that already existing primal consciousness. The paper explores some of the implications to philosophy, science, and technology if consciousness is indeed a force to be tapped, rather than a mechanism to be created. If taken seriously, this view of consciousness does not actually "solve" the consciousness hard-problem. However, it would move the question of the existence of consciousness to the same nature of question as the other metaphysical questions of existence such as: "Why is there matter?". In science, the seemingly impossible task of distinguishing between computer- or brain-like apparatuses that are conscious and ones that are merely intelligent zombies, is transformed to a study of what substances are able to harness the consciousness force. This new problem is a more familiar one in science with (for example) similarities to receiving radio broadcasts. The paper then looks for evidence of this point of view in various experiments in psychology, quantum physics, biology, and para-psychology. Finally, it proposes further experiments to help clarify the likelihood of this view-point. **P7**

19 **Panpsychism or Neutral Monism** Leopold Stubenberg <stubenberg.1@nd.edu> (Philosophy, University of Notre Dame, Notre Dame, IN)

We are currently witnessing a surge of serious discussions of panpsychism in the mainline analytic literature. In making the case for panpsychism, a number of authors rely on a view that Bertrand Russell made prominent. It is the thesis of the inscrutability of matter, the thesis that, contrary to common opinion, we know next to nothing about the nature of matter. All the information provided by physics concerns structural or relational features of matter. Physics tells us nothing about the intrinsic nature of matter. This, the panpsychist argues, opens up the possibility that matter is, in some sense, intrinsically mental. Given a number of other assumptions about reduction, emergence, and simplicity the panpsychist argument arrives at the conclusion that all things – even the ultimate particulars that compose everything else – have a mind. This is usually taken to mean that all things are sentient or have experiences of some sort. This view strikes many as absurd. And many seem to think that Russell himself embraced this conclusion. While a superficial reading Russell's texts may seem to confirm the panpsychist suspicion, I shall argue that Russell's way of "filling matter with experience" does not yield panpsychism. According to his view, we may conjecture that there is experience "in" every ultimate. But these ultimates sense or experience noth-

ing, they are not experiencers, they have no mind. The experience that is "in" the ultimates is, instead, the raw material from which they are constructed. This suggests an idealist rather than a panpsychist picture: experience is seen as the ultimate or basic reality. This view also strikes many as absurd. So I shall end by arguing that Russell is neither a panpsychist, nor an idealist, but a neutral monist. Experience, according to Russell, is best understood as neither mental nor physical but as neutral between the two. Both mental and physical entities are then seen as constructions from these neutral elements. Those who judge panpsychism and idealism to be absurd will, I fear, be only too happy to extend the same courtesy to neutral monism. But even so there is some progress here: if one is going to think that Russell's metaphysics is absurd, it is best to think so based on a correct understanding of what his actual views were. **C8**

*See also:*

262 **How to Feel and Act Like an Amoeba: Neo-psychism, Self-Organization, and Collective Orchestration**
66 **Multiple Drafts or Anatman? Neuroscientific and Buddhist Conceptions of the Self and Language**
27 **Deduction, Necessitation, and Consciousness**
198 **Temporal Experience and the Counting Problem**
210 **On a Fundamental, Nondeterministic Problem Solving Mechanism Explaining the Wholeness of Perception**
83 **Strong Representationalism and Selective Attention**
88 **Extended Consciousness?**
263 **Road Rage: An Indicator of Evolutionary Augmentation**
61 **Consciousness and Laws in the Physical World**
4 **From Phenomenal Overflow to Inaccessible Phenomenal States: Filling a Gap in Block's Argument.**
87 **Perception, Language and Culture in a Semantic Turn: Consciousness as Meaning**
5 **The Phenomenal Concept Strategy Without Co-Reference**
347 **Evolution, Neuroplasticity, and the Beatific Vision**
342 **We show that the contradiction in consciousness definition by different schools of philosophies is a necessary condition for the unified concept of consciousness! We then present a unified definition.**
264 **Consciousness Ontogenesis: the Radical-Emergence-versus-Panpsychism Dilemma and its Solution by Means of an Irreducible Field Principle**
238 **Embryology and Vascular Correlates of Consciousness. From Quanta to Qualia, From Semiotics to Semantics.**
240 **Primitive element transformed and reflected method in consciousness**
364 **Theory of Consciousness Theory of Knowledge**
231 **Naturolism: Seeing organizing principles of life and consciousness at the depth core of nature – rather than what's robotic/mechanical/mathematical.**

## 1.3 Materialism and dualism

20 **Boundary Conditions for Theories of Consciousness: Satisfaction by a Dualistic Interactionist Theory** J. Kenneth Arnette <jkarnette@hotmail.com> (Spokane Falls Community College, Social Science, Spokane, WA)

Dualistic theories of consciousness and the mind-body relationship have suffered intense criticism from materialists, ever since Descartes made his famous proposals, on a variety of grounds such as: dualism is unscientific; it is inconsistent with evolution, neuroscience, and common sense; and it is vague, lacks detail, and proposes no mechanism of mind-body interaction. The present work reframes these criticisms. Rather than being reasons why dualism is incorrect, the materialists' objections constitute constraints on an interactionist theory that any such theory must satisfy: boundary conditions. If an interactionist theory can meet these conditions, then it should warrant serious consideration as a viable theory of consciousness. Materialists would no longer be able to complain that dualists had avoided the hard questions and wrapped their ideas in mystery. The following set of eight principles, derived from materialists' objections to dualism, represents reasonable boundary conditions for any dualistic interactionist theory. The theory must: (1) employ appropriate, specific, scientific terminology, and define its terms as clearly as possible; (2) be based, insofar as possible, on empirical data; (3) specify the nature of the non-material "mental substance" in terms of positive attributes; (4) give a coherent mechanism of mind-body interaction; (5) be consistent with evolutionary theory; (6) be consistent with the fields of neuroanatomy and

neurophysiology; (7) be composed of logically related rules or propositions having the same ontological status as the laws of physics and chemistry; and (8) generate hypotheses that are in principle empirically testable. In a series of publications, the present author (1992, 1995, 1999) has constructed a dualistic interactionist theory, the theory of essence. The present paper demonstrates that the theory meets the boundary conditions stated above. The theory, based on empirical data from the near-death experience (NDE), holds that mind is composed of two substances, one matter (the brain) and the other a different substance (the essence) that interacts with matter electromagnetically. The essence is composed of a substance resembling closed-loop strings (string theory). The essence originates in a different (parallel) universe and travels to and from this one via relativistic wormholes. The complete theory meets the boundary conditions by: (1) using specific and appropriate scientific terminology; (2) employing the empirical NDE data to form the basis of the theory; (3) using relativity, string theory, and cosmology to formulate a physical basis for the existence and properties of the non-material substance; (4) proposing an interaction mechanism in terms of standard, well-known principles from physics, chemistry, and neuroscience; (5) embracing evolution as the process by which the organic interface (brain) between body and essence is created and improved over time; (6) identifying anatomical and physiological aspects of the brain that serve as locations and mechanisms for essence-brain interaction; (7) synthesizing a model from principles of all major areas of physical and biological science, connecting them to each other in a logical and consistent way; and (8) generating empirically testable predictions. The singular success of the theory of essence in accounting for human anomalous experiences is discussed. **P7**

21 **Zombies and the Phenomenal Concept Strategy** Dave Beisecker <beiseckd@unlv.nevada.edu> (Philosophy, University of Nevada – Las Vegas, Las Vegas, NV)

In this paper, I challenge the considerations Chalmers has recently raised against Type-B materialism, or the "phenomenal concept" strategy ("Phenomenal Concepts and the Explanatory Gap," in Phenomenal Concepts and Phenomenal Knowledge, Alter and Walter (eds.), OUP, 2007). Chalmers characterizes the Type-B materialist as one who generally endorses or accepts zombie and Mary intuitions, yet nevertheless argues that due to peculiarities in the way we talk or think about phenomenality, the epistemic gaps revealed by these intuitions need not ramify into an ontological one. In order to set up a dilemma for the Type-B materialist, Chalmers invokes another layer of conceivability considerations to determine whether the peculiarities inhering in phenomenal concepts are themselves materially explicable or not. If these peculiarities in our phenomenal concepts are materially explicable, then they cannot explain the alleged epistemic difference between us and zombies. If, on the other hand, they are not, then the phenomenal concept strategy clearly hasn't bridged the explanatory gap, so much as presuppose it. It seems clear enough to me that type-B materialists should maintain that the possession of phenomenal concepts is not materially mysterious. So in my estimation, they should grasp the first horn of Chalmers' dilemma and challenge the alleged distinction between the epistemic situations of us and zombies. Indeed, I've gone so far as to claim that the type-B materialist really ought to claim that we are the zombies Chalmers has taken such great pain to conceive. If so, then consciousness (at least for us) is a wholly material affair. What is conceivable but non-actual are not zombies, but rather "angelic" beings, who possess an acquaintance with non-material phenomenal states. I find it odd (to say the least) that Chalmers insists so strongly on the conceivability of the zombie hypothesis, and then turns around and just as stridently insists on its non-actuality. If we are being appropriately open-minded about the nature of consciousness, it should take more than arm-chair reflection to rule out the admittedly-conceivable hypothesis that ours is a zombie world. To support his contention that our epistemic distinction is so markedly different from that of zombies, Chalmers bids us to consider a zombie in the same position as Jackson's Mary. Upon release, Chalmers contends, while "Zombie Mary" might acquire some new knowledge concerning her inner states, she just couldn't come to have the full-fledged first-person knowledge that we have of genuinely phenomenal states. To suppose that she could acquire such knowledge is, in Chalmers' eyes, not to have an accurate conception of a zombie. In short, the peculiarities Chalmers finds to inhere in our genuinely phenomenal thoughts turn out to be epistemic. So just like Descartes, it would appear that Chalmers' dualism is ultimately motivated by an inability to see how we can have such privileged epistemic access to states that wind up being material (or how our concept of a state whose primary and secondary intensions collapse could turn out to be the concept of a material state). However, if type-B materialists can tell a materialistically acceptable story about how (and also why) our phenomenal concepts exhibit these epistemic peculiarities – and I'll present some reasons to think they can – then the phenomenal concept strategy will prove every bit as hard to kill as Chalmers' zombies. **C16**

22 **Two-Dimensionalism and the Knowledge Argument: No Fit Sherlock** Sam Coleman <samueljcoleman@hotmail.com> (Philosophy, University of Hertfordshire, Hatfield, Herts, United Kingdom)

Jackson and Chalmers, among others, have employed Two-Dimensionalism to defend the Knowledge Argument against attacks by physicalist conceptual dualists, who hold that Mary knows the experience of redness via two incommensurable conceptual routes. Using the leading example of Sherlock Holmes, I demonstrate a problem for Jackson and Chalmers' strategy. In brief, two-dimensional defence of Mary would require her to possess both the phenomenal concept of an experience of red and a scientific concept of it, while imprisoned in her black and white room. But it is widely held that she can only have the latter in this situation. Thus it seems that Two-Dimensionalism cannot rescue Mary from the conceptual dualist. Having explained the difficulty, I survey possible solutions: for example, dropping the knowledge argument from the anti-physicalist cause, or arguing that folk concepts can be derived from scientific concepts where these co-refer. **C1**

23 **The Modal Argument and the Complexity of Phenomenal Experiences** Craig DeLancey, Craig DeLancey <delancey@oswego.edu> (Philosophy, SUNY Oswego, Oswego, NY, 13126)

I argue that many of our anti-physicalist intuitions about phenomenal experience can be explained with the assumption that phenomenal experiences are very complex physical states. I use Kripke's Modal Argument to illustrate my point. Kripke claims our "Cartesian intuitions" put a special explanatory burden upon any attempt to identify a phenomenal experience with some body state, because we have special access to the phenomenal experience. Heat is molecular motion, and this identity is contingent because other things could cause the sensation of heat. But any other sensation than pain would not be pain, and so any identity of pain with some physical state must be necessary. Using the notion of Kolmogorov Complexity to provide a rigorous measure of descriptive complexity, I show that Kripke's argument misses an important distinction. The claim that a heat sensation could have "qualitative analogs" is equivalent to the claim that the sensation of heat does not contain enough information to distinguish between various possible causes. We can grant Kripke's claim that one's self-conscious reflection upon the sensation of pain provides all the relevant information there is about that self-conscious sensation of pain – but the thing we aim to explain is not our reflective understanding of the phenomenal experience, but rather the experience. We have no reason to believe that all of the information of every phenomenal experience can be discerned by and articulated by our abilities for theoretically reason. Instead, if some phenomenal experiences were very complex, we would expect our reflective understanding of those experiences to be incomplete. To deny this is to assert that our self-conscious understanding of our phenomenal experiences tells us everything there is to know about each phenomenal state, and thus that the relevant sensations can be wholly grasped by and subsumed to our faculties of reflective reason. Given this, we can understand one's self-conscious understanding of the sensation of pain as not containing enough information to tell whether the phenomenal experience is caused by or identical with some particular brain event or not. The Cartesian intuition is thus explained: we see possibilities where there is too little information to allow us to rule out these possibilities, and we assume we have special access to our phenomenal states when we assume (improbably, and without justification) that our phenomenal experiences contain no more information than the self-conscious understanding of our reflection upon those states. I conclude with the observation that the hypothesis that phenomenal experiences are very complex physical states is more conservative that its rivals, and is testable. **C1**

24 **Can Cartesian Duality and Monism Co-Exist?** Stephen Anthony Farah <stephen@andromeda.ws> (Red Sun Foundation, Johannesburg, Gauteng, South Africa)

1. Consciousness has five fundamental, and ubiquitous, qualities: 1. awareness of an object, 2. a sensory component, 3. differentiation, 4. subjectivity: a. Consciousness always has an internal, subjective reference point b. Awareness of subjectivity emerges at a certain point in the evolution of consciousness, individual and collective. c. Along with subjective awareness comes: i. Subjective experience, it is always 'like something' to be a subject. ii. An awareness of self; to quote, "I think therefore I am." 5. it is contextualized: a. Consciousness is always a consciousness of context, which is to say it is an emergent property of certain contexts. b. Consciousness is not a state or quality than can exist independently of its context. c. A changing context produces an equally changed consciousness. 2. Consciousness is never singular in nature, but always dualistic. Giving rise to Cartesian duality, and its propensity to appear in the study of the phenomenology of consciousness. Even if in a fundamental objective sense reality has a Monistic nature, in phenomenology it will al-

ways appear dualistic. 3. Even in the Nirvanic state of 'pure awareness' as spoken about in the Vedantic metaphysical tradition both subject and objects exist. For it stands to reason that there is awareness of the state of awareness, without which in what sense could the subject be said to be aware, or state afterwards I have experienced a state of pure awareness. 4. The term consciousness is best understood as describing as a vast number of states of awareness that have the capacity to differentiate. The following list whilst not meant to be complete, illustrates the aforementioned concept: a. Differentiation without accompanying experience: i. Organic: single cell organisms or plant life reacting to external stimulus. ii. Machine consciousness performing pure computational function. b. Experiential consciousness: i. Consciousness which is has the quality of feeling tones; it feels like something in this state of consciousness c. Consciousness in which a sense of self emerges. d. Consciousness from which culture emerges, the memetic tradition. 5. Consciousness is dynamic. 6. Reality is an emergent property of consciousness. a. Consciousness holds a unique position in the study of phenomenon. For unlike anything else in the field of phenomenon, of whatever nature, consciousness is a prerequisite for study to commence. b. Reality, in as much as realty is phenomenal in character, emerges from consciousness and is dependent on consciousness for its phenomenological existence. c. So in this, consciousness has an irreducible nature; much like space and time it is a fundamental property of existence and our universe. d. So we may equally say that the inverse of Dave Chalmers' 'hard problem' of consciousness is true; how is it that objective reality emerges from subjective experience? e. To put it in terms of Quantum physics: • Objective reality exists as a wave function until the point that it intersects with consciousness. • It is the differentiating consciousness that collapses the wave function or state of superposition: phenomenological reality is = the point at which time + space + differentiating measurement, interact. **P1**

25 **From Dualism to Materialism and Back Again?** Nataliya Garntseva <garntseva@gmail.com> (Philosophy, Moscow, Russia)

Daniel Dennett (1969) wrote that history of philosophy of mind to most of its critics seems to be a meaningless swing of pendulum from dualism to materialism and back. This pendulum continues to move till today and even faster than ever. In my opinion, this motion isn't meaningless and fruitless because the evolution of both materialism and dualism is hard to describe as contingent and the progress in understanding of the nature of consciousness and the mind-body problem isn't something that is so easy to deny. However, for a long time materialism and dualism weren't equal in rights. Physicalistic materialism used to be the official doctrine in understanding of mind which caused false reduction of consciousness to physical phenomena, leaving out the essential subjective character of conscious experience. It's natural that dualistic doctrines were energetically repressed by materialists those days. The criticism was focused on such defects of dualism as postulation of additional mental substance along with physical substance, inability to explain the mechanism of causal interaction between body and mind without breaking the principle of causal closure of the universe, violation of basic physical laws, in particular the law of conservation of energy. And nevertheless dualism has survived and fortified its positions by launching a retaliatory attack on materialism, constructing a series of weighty arguments which can be roughly classified as the Explanatory Argument, the Conceivability Argument and the Knowledge Argument. These arguments appeared to many convincing, and physicalistic materialism nowadays has lost its status of "orthodox" stance in the analysis of consciousness while dualism is treated as a respectable theory. Of course, modern dualistic conceptions notably differ from Cartesian dualism and lack most of its drawbacks. Moreover it's not an exaggeration to say that interaction between materialism and dualism is becoming more close. Some of those who were convinced materialists are obliged to transform partly their views and do not avoid dualistic implications in their theories. For example, Jaegwon Kim (2005) asserts that phenomenal mental states (or qualia) are irreducible and epiphenomenal. Dualists in their turn are paying tribute to materialism. David Chalmers (2003), for instance, says that his doctrine shares the spirit of dualism and "fits the letter of materialism" at the same time. I suppose, in the light of the processes which take place in philosophy of mind at present, that the border between materialism and dualism is gradually diminishing and both of them are renewing. In my opinion, further intercommunication between materialism and dualism in search of their mutual benefit will lead to the detectable progress in our understanding of the most topical issues concerning mind and consciousness. References: Dennett, D.C. 1969. Content and Consciousness: An Analysis of Mental Phenomena. London: Routledge & Kegan Paul. Kim, J. 2005. Physicalism, or Something Near Enough. Princeton: Princeton University Press. Chalmers, D.J. 2003. Consciousness and its Place in Nature, in: Stich, S.P. and Warfield, T.A. (eds.). The Blackwell Guide to Philosophy of Mind. Oxford: Blackwell, pp. 102-142. **P1**

26 **Bridging a Gap Within The Gap: Strengthening the Link Between Primary and Secondary Possibility** Angie Harris, Melissa Ebbers <arharrisuofu@aol.com> (Philosophy, Rutgers University, Jersey City , NJ)

David Chalmers argues that conceivability is a guide to metaphysical possibility. In his "The Two Dimensional Argument Against Materialism", he employs the two dimensional semantics framework to motivate his claim that phenomenal zombies are conceivable. In this paper, we discuss conceptual entailment as it relates to Chalmers' conceivability argument. We focus on the requirements of competence with a concept and raise an epistemic worry for the link between primary and secondary conceivability: given Chalmers' account of the a priori, we claim that even if ideal primary negative conceivability is a guide to primary possibility, for any given world that satisfies the primary intensions of 'P' (a microphysical description on our world), we are not justified in concluding that this world satisfies the same secondary intensions of 'P' (in other words, that the values of the secondary intensions are the same in both our world and z-world). We argue this epistemic link plays a crucial role in justifying one's conclusion that one has conceived of a metaphysically possible world. In our concluding remarks, we discuss two ways in which the epistemic link between the values of the primary and secondary intensions could be strengthened along with what follows for the conceivability argument on each alternative. **C1**

27 **Deduction, Necessitation, and Consciousness** Robert Howell <rhowell@mail.smu.edu> (Philosophy, Southern Methodist University, Dallas, TX)

The two most influential arguments for property dualism, the knowledge argument and the conceivability argument, implicitly rely on the following principle: if an ideally informed ideal reasoner cannot deduce q from p, then p does not necessitate q. On the face of it, this is a surprising claim: deduction is a process of reasoning between propositions, while necessitation is a metaphysical relation between facts. In this paper, I argue that the close tie between propositions and facts on the one hand, and deduction and necessitation on the other, involves substantive metaphysical and epistemological commitments. I claim, however, that these commitments are not usually problematic, but that we should expect them to be problematic precisely when it comes to reasoning about consciousness. I argue that is a large part of the source of the "hard problem" of consciousness. **C1**

28 **A Postmodern Physicalism That Can Accommodate Experience** Anand Rangarajan <anand@cise.ufl.edu> (Department of CISE, University of Florida, Gainesville, FL)

While most previous physicalist approaches to the problem of experience run afoul of Chalmers' logical supervenience argument, there is no a priori reason – as Stoljar has shown – for all varieties of physicalism to be ruled out tout court. However, since the bar has been raised rather high, any new physicalism must show why it is accompanied by experience. Otherwise, the explanatory gap remains. We address this problem using two moves. Drawing upon recent work in quantum gravity, we begin with the notion of the physical world as a quantum computer – or more simply as a multiverse. We point out that the quantum computer conception of the multiverse is incomplete since it merely specifies a measure on a set of possibilities – or possible worlds – with no actual events. In our second move, we note that the postmodern critique of experience faults phenomenology for not seeing the importance of perspective. The postmodernist argues that raw experiences are never to be found. Instead, experience is always situated within a particular perspective. Based on this, we allow a set of physical perspectives to operate on the multiverse, thereby generating – among other events – experience. Our new physicalism comprises a set of perspectives and the multiverse – with both being entirely physical. While physical perspectives may be counter-intuitive at first, we argue that they are natural candidates to complete the physicalist picture and simultaneously accommodate experience. An obvious question to ask at this juncture is: Why should physical perspectives and their interaction with the multiverse generate experience? First, we can and will argue that the definition of a physical perspective includes the generation of experience; an experience occurs when a perspective interacts with the multiverse. Next, the incompleteness of the multiverse allows us to specify a new entity – perspectives – to complete the physicalist picture. To see why physicalism can accommodate perspectives, it is important to realize that the multiverse merely specifies a measure on possibilities. Actual events occur only when perspectives – in their interaction with the multiverse – convert possibilities into actualities. In this way, perspectives and possibilities form an interacting base that is necessary for actual events. Furthermore, we can expect a perspective to divide the multiverse into an interior and exterior. Experience then is an interior event which is accessible only from a particular perspective and exterior events are those which are accessible from different perspectives. This notion of access – when an event is accessible and from which perspective – plays an important role in our scheme [and we note that it plays an

important role in the philosophy of relativism (Hales, Kolbel, Bennigson) as well]. However, this is entirely to be expected given the asymmetry of experience. The crucial difference is that rather than posit a self or a first person point of view to explain this epistemic asymmetry, we instead offer perspectives and accessibility. The result is a postmodern physicalism with experience and processes being supervenient on perspectives and the multiverse. **P1**

29 **It's About Time** Arthur Smith <drsmith@noetichealth.com> (Noetic Health Institute, Foothill Ranch, CA)

Human experience is both dualistic and monistic. It is monistic in that everything is experience, but dualistic in that it involves both knower and known. Since Socrates, an axiom of Western philosophy has been that rational discussion begins with defining what that subject matter is. We could say that consciousness (or at least ordinary human consciousness) is experience as a knower-self (noesis) that experiences known-others (noema). Both are essential aspects of experience. Without the noesis, consciousness would be unconscious. Without the noema it would be conscious of nothing, i.e., also unconscious. Thus human experience is noetically dualistic in its distinction of knower and known, but ontologically monistic in being all experience. In that sense, empirical science itself, even when it studies distant galaxies, is part of the "science of consciousness," because it can study only phenomena in consciousness. However, not everyone would call this a "science of consciousness." Some want a science of the knower without reference to the known, and this is where it gets tricky. As soon as we make consciousness an object of study, it becomes the known, and the people studying it, the knowers, and an infinite regress of self-reference ensues. One way to circumvent this paradox is to deny the dualistic nature of consciousness in some form of monism, usually by explaining away one side of the dualism in terms of the other. With idealism, matter, the noema, is explained away as a figment of the mind. With materialism or epiphenomenalism, the noesis is explained as an effect or property of matter. A few have embraced the monism of panpsychism or panexperientialism to avoid having to deny one side of the dualism or the other, but most find the claim that all knowns are also knowers implausible. Meanwhile, others can accept none of the above and stubbornly defend dualism, typically in its Cartesian form of mental and physical substances existing independently. In this essay, I argue that there is a better way. First, we accept that ordinary experience is noetically dualistic but ontologically monistic. We drop the Cartesian dualism of two substances with no common attributes and replace it with a dualism of grammatical time, in which the knower is first person, singular, and present tense, and the known is third person, plural, and past tense. Under this model, brain activity is not the knower, but that which is known most immediately. We also stop attempting to reduce the knower to the known, as in reducing the knower to brain activity, or vice versa. But there is still much to be learned about conscious from studying it. Both neuroimaging and controlled studies of introspection can tell us much about the ways consciousness works. **P1**

30 **Property Dualism Entails Substance Dualism** Khaldoun Sweis, Khaldoun A. Sweis <sweis2003@sbbcgloba.net> (Humanities, Kaplan University, Chicago, IL)

This paper is divided into three parts, part one is about the problem of the coherence of mental and physical properties and part two is concerning what a substance is. In part three, I argue that the properties that make up consciousness (or our unity of consciousness) fit the criteria of a substance in their own right. It is not my goal here to prove that substance dualism is true; rather I aim to show that substance dualism is still a reasonable and viable option. **P1**

*See also:*

58 **Contrasting Approaches to the Study of Consciousness**
23 **The Modal Argument and the Complexity of Phenomenal Experiences**
33 **Representational Content and the Knowledge Argument**
46 **What if it's "Gaps All the Way Down"?**
208 **Quantum Mechanics Rigorously Implies Consciousness is Nonphysical**
21 **Zombies and the Phenomenal Concept Strategy**
19 **Panpsychism or Neutral Monism**
44 **The Phenomenology of Explanation and the Explanation of Phenomenology**
267 **The Psychophysical Conversion of "Consciousness" Into Physical Reality. The Philosophical Difference Between the Metaphysics of Consciousness and the Physics of Physical Reality.**
26 **Bridging a Gap Within The Gap: Strengthening the Link Between Primary and Secondary Possibility**

## *1.4 Qualia*

31 **The Brand New Physical World of Swamp-Mary** Chien-Hui Chiu <st.lynn@gmail.com> (Life Sciences, National Yang Ming University, Taipei, Taiwan, Taiwan (Republic of China))

Whether Frank Jackson's all-knowing scientist-Mary, upon experiencing color for the same time, learns new knowledge and thus defeats physicalism, depends on whether Mary is really all-knowing in regard to physical facts. Arguments tackling this point question whether her being in such confined condition in the black-and-white room, depleted from all know-how, sensori-motor, or non-propositional knowledge is still capable of all-knowing. Reports such as the difficulties of understanding visual stimuli after congenital blind patients gain vision, the loss of discrimination abilities in animals that have been deprived of experiencing certain visual stimuli during development stages, etc. have shown that many concepts that are required for understanding input information can only be constructed through experience and interaction with the world. Therefore, there are facts that a non-experiencing Mary wouldn't know even though those facts are physical. The new phenomenal facts might be such facts. If we can let Mary gain these types of physical knowledge without experience, then Mary will have complete knowledge and learn nothing new when experiencing red for the first time. However, I argue that once this thought experiment is done, then physicalism will introduce subjective components into their objective physicalism framework. Let Swamp-Mary be a swampman-duplicate of a real Mary, who has experienced everything, and has all the knowledge given in the room. Swamp-Mary, born in a black-white room, has no red color experiences at all, but has all the required neural-circuits corresponding to the concepts, know-hows, non-propositional, or sensori-motor knowledge that can only be formed through experience, thanks to her duplicate. The crucial question would be-does Swamp-Mary gain new knowledge when she opens her eyes to the color for the first time? Will she learn something that the real Mary has but Swamp-Mary doesn't? Since there is no difference in brain states between Swamp-Mary seeing red for the first time, and the real Mary seeing red for the nth time after duplication, Swamp-Mary will not have learned anything new. Therefore, the knowledge argument fails for Swamp-Mary and physicalism holds. For traditional physicalists, physical knowledge can only be gained objectively. However, for Swamp-Mary to gain complete physical knowledge, the only way is to be the duplicate of an experienced Mary and possess and exercise whatever she has upon seeing red. There is no way any other person in the same room could gain such complete physical knowledge without becoming Swamp-Mary herself. Therefore, the knowledge of Swamp-Mary, though not gained through experience, is still subjective in the sense that only she can obtain such knowledge – that there exists red phenomenon – by being a subject that has these experiences before. Therefore, traditional physicists would have to either admit that physicalism should include subjective components, or refute their own claims that these types of knowledge are physical, and thus admit that the original knowledge argument holds. **P7**

32 **Emergence in the Global Neuronal Workspace Model:A Neurocognitive Hypothesis of Qualia** Carlos de Sousa <carlosphi@yahoo.de> (Philosophy, Universität Konstanz, Konstanz, Baden-Württenberg, Germany)

Understanding consciousness has become the final achievement in science. For centuries philosophers were busy with this problem. The typical philosophical question was "how consciousness can fit into the natural world." But it is misleading, because regards the existence of a gap between physical and non-physical entities in the world. This conception supposes that consciousness is not a biological phenomenon occurring in the natural world. On the other hand, scientists and some philosophers are currently discussing about the possibility of a science of consciousness; in this regard, there are no doubts that consciousness is based on neural activities in the brain. However neuroscientific findings are not able to explain yet how the qualitative hallmark of conscious experience emerges from mere neural activities. Particularly, it seems that neural events are necessary conditions for the emergence of qualia, but they are not sufficient for their occurrence. Following this reasoning, some philosophers like to conclude that qualia are special properties irreducible to neural activities in the brain. Though no-one is trying to reduce qualia to neural events, but is trying to find the neural correlates of such experiences. Presently there are some tentative models of consciousness. One is the Global Neuronal Workspace Model (GNW) proposed initially by Bernard

Baars and extended by Stanislas Dehaene and others. Nevertheless the GNW does not say anything about emergence. The authors just make some en passant commentaries on qualia. Regardless of this fact, the GNW could be used to explain the emergence of qualitative properties. In order to accomplish such a task, necessary would be further developments of the model by providing sufficient conditions. Then it would be possible the visualization of how qualia do emerge from the informational processing in the neuronal networks. The hypothesis says that qualia emerge from the so-called 'qualitative-loop' occurring after the availability of information in the GNW. Specifically, when information is globally accessible for the whole system, it is immediately related to the register in the memory. The register modulates so to speak, the processed information according to family resemblances, by assigning some qualities. At this very moment occurs the qualitative-loop, i.e., when objective information is converted into qualitative one. In sequence the emergent qualitative character becomes available for the whole system. **P1**

33 **Representational Content and the Knowledge Argument** Hyo-eun Kim <qualia9@gmail.com> (Seoul National University, Seoul, Korea)

The purpose of this presentation is to offer a response to Jackson's Knowledge Argument in terms of conceptual and non-conceptual contents. I argue that Mary's perceptual experience outside of the cell in Jackson's thought experiment is partly conceptual and partly non-conceptual. The overall argument is that my reformulation of Mary's 'Aha!' moment preserves both physicalist and dualist intuitions on the perceptual experience of Mary while explaining what it is like to have such an experience. The Knowledge Argument has ceaselessly been discussed as the main challenge to physicalism despite its unsound reasoning from the epistemological premise to the ontological conclusion. This is because the argument inspires reflection on the nature of consciousness. Likewise, several responses to the Knowledge Argument are still viable despite having their own problems. This is because each proposal makes some convincing claims about the nature of 'what it is like to have that kind of experience'. I argue that both physicalist and non-physicalist responses to the Knowledge Argument provide interesting interpretations on the representational states of Mary. The Ability Hypothesis is implausible in that the ability to imagine an experience is neither necessary nor sufficient, but the hypothesis at least offers a base condition on which a subject can performs actions. The New Knowledge/Old Fact view assumes a mode of presentation which requires distinct reference-fixing, but simply having a mode of presentation is not equivalent to having the experience itself. The Acquaintance Hypothesis provides the pre-linguistic aspect of qualitative state of consciousness but it does not give substantive information of what the content of that experience is. Based on these lessons, I reformulate Mary's 'aha!' moment as multi-level representational states involving conceptual and non-conceptual content. Stages of epistemic progress that Mary goes through outside of the black-and-white room are presented. I argue that my response to the Knowledge Argument overcomes the shortcomings of many current responses. **P7**

34 **Objection to Quining Qualia** Ying-Tung Lin <joejoe0227@hotmail.com> (Taipei, Taiwan)

Daniel Dennett claimed that qualia should be "quined" since they do not exist. Qualia are the ways things seem to us while to quine qualia is to deny resolutely the existence of qualia. Dennett rejects the feature of qualia – infallibility, by an intuition pump – Chase and Sanborn. Chase and Sanborn were coffee tasters of Maxwell House who were happily responsible for ensuring constant taste of coffee, but one day they found out that they did not like the coffee as they used to; Chase believed that his taste had changed while Sanborn held that his tasters had changed. With this intuition pump, Dennett argued that no one would disagree that Chase and Sanborn might be in the cases that their tastes had changed, their tasters had changed or the taste of coffee had change; since it is impossible to differentiate the different possibilities from the first-person perspective of Chase and Sanborn, that means they might be mistaken about whether they have the same qualia or not. This presents a challenge to the "infallibility" of qualia. I would like to argue that Dennett made a confusion. In the case of Chase and Sanborn, they could be wrong about the contents of their judgments; nevertheless, Chase and Sanborn could not deny that there was qualia while tasting the coffee, for what they were not sure was the content, not the existence of qualia. We could be mistaken about the content of our own from the first-person perspective, but at the moment, we are still definitely sure that we did experience the qualia, this we could not be wrong. Dennett mixed up the concept of "content" with "the existence"; thus he could not deny the feature of qualia – infallibility and therefore deny qualia. **P7**

35 **Three Kinds of Transparency** William Robinson <wsrob@iastate.edu> (Iowa State University, Ames, IA)

I contrast the experiences we have (1) when listening to music on one's stereo in the ordinary way, and (2) when listening to the same music while trying to evaluate the contribution of a new stereo component. I contrast both with (3) the "experiences" that Moore claimed to be "diaphanous". All of these cases have a kind of transparency, but these transparencies are of different kinds. If we carefully attend to these differences, we can do justice to transparency without having to draw strongly representationalist conclusions. Several ways of avoiding or objecting to this view are considered (including two based on points in Tye, 2002). They are shown to be ineffective against the view being advanced. It is concluded that we can, after all, attend to the qualities of our experiences. Reference: Tye, M. (2002) "Representationalism and the transparency of experience", Nous 36:137-151. **C9**

36 **Transparency Explained** Chen Yu-Jen <r95124002@ntu.edu.tw> (Taiwan, Kaohsiung, Taiwan)

Transparency is the thesis that the introspection of experiences reveals awareness of mind-independent objects of experience but does not reveal awareness of intrinsic features of experiences themselves. If there are mental properties such as qualia, how is it that we cannot be aware of qualia qua qualia, but are only aware of them belonging to mind-independent objects? Thus transparency poses a challenge to the notion of qualia. I will argue that Daniel Dennett's argument against qualia, especially against qualia being immediately apprehensible in consciousness, can shed light on the problem of transparency. The thought experiments given by Dennett, like coffee tasters Chase and Sanborn, strongly suggest that there are no qualia separate from our reactions to them. The nature of our experience is such that no introspective resources can help us to identify which qualia we are experiencing, and it follows there are no qualia that can by itself be introspected by us. Transparency is thus well explained. However, the thesis of transparency is not wholly uncontroversial. Philosophers disagree with each other about whether they can give examples of introspectible phenomenal difference without represented difference in the objects of experience. For example, Ned Block maintains that blurriness is such an example. I argue that Dennett's argument can be used to settle this controversy. Different thought experiments sharing spirit with Dennett's suffice to defeat these examples and to prove the soundness of the thesis of transparency. In sum, Dennett's argument doesn't merely help explain transparency of experience, but also help to settle issues about it. The transparency is a natural consequence of his argument. I argue no such satisfying account of transparency can be afforded by any theory containing the notion of qualia. Therefore Dennett's theory is a more satisfying theory of experience on this respect. **P7**

*See also:*

12 **Outline of A Metaphysics of Hedonic Tone**
1 **The Folk Psychology of Consciousness**
53 **HOT Implies PAM: Why Higher-Order Theories of Consciousness are Committed to a Phenomenal Aspect For All Mental States, Even Beliefs**

## 1.5 Machine consciousness

37 **A Proposal for a Turing Test of Emotion.** Michael Cerullo <cerullom@hotmail.com> (Psychiatry, University of Cincinnati, Cincinnati , OH)

This paper will discuss a new proposal for a Turing Test of emotion. A specific and operationalizable set of criteria will be developed to determine if a machine is experiencing emotion. Key to any such proposal is a clear definition of what is meant by "experiencing" and "emotion". Unlike Turing's original test, "experiencing" will be defined to include subjective elements, specifically qualia. Emotion will be defined to include both the cognitive and dispositional elements of affect. Before discussing the proposed test, it is worth examining a straightforward modification of Turing's original test for intelligence as a test for emotion. Place a computer and a human in hidden rooms and have an interrogator/judge communicate with them via a computer screen. The judge questions both about current and past emotions they have experienced. If the judge can't distinguish between the contestants, then the computer is said to experience emotion. There are two major problems with this test. First, it assumes that emotions are purely cognitive and transparent; both controversial positions in affective science. Second, it shares the same problem with Turing's original test; it assumes rather than proves a functionalist theory of mind. In the paper I will also demonstrate the limitations of a modified version of the Lovelace Test, itself a modification of the Turing Test. In contrast to the certainty offered by the Turing Test, the best we should hope for is the high probability of machine emotion. This should be not surprising given the limitations in epistemology (there is no sure way even to refute solipsism). Yet even such a limited Tu-

ring Test of emotion could be of vital importance in the near future. We have developed three rules a machine (or any system) should satisfy before we have confidence that it experiences emotion. The rules are not absolute; rather the closer the system satisfies the rules, the more likely emotion is granted to that system. The rules are the following: 1. The system should behave as if it is experiencing an emotion. If the system claims it is experiencing emotion X, then it should behave consistently with what we know about other systems that experience emotion X (those other systems are limited to human beings and certain animals at the present time). 2. No deception is allowed. The inner workings of the machine must be examined, and the behaviors exhibited in rule 1 must be in response to a larger environment than simply passing the test (i.e. canned responses would be ruled out). 3. The informational processing of the system must be isomorphic to the computational and structural elements of other systems that experience emotion (again currently limited to human and animal brains). Work in the neural correlates of consciousness will give us appropriate computational (e.g. symbolic vs. connectionist processing) and structural models (e.g. are quantum level description needed?). Current computers would have a very low probability (approaching 0) of experiencing emotion based on this test. Whether future machines can pass the test is an empirical question. **P1**

38 **Artificial Agents and Moral Status: The role of Consciousness Present and Absent.** Steve Torrance <s.torrance@mdx.ac.uk> (Informatics, University of Sussex, Brighton, UK)

Machine Ethics addresses how AI agents are increasingly implicated in situations which raise deep moral issues – e.g. in medicine, warfare, social care, etc. Machine ethicists try to find ways to make the deployment of such agents more morally responsible, and, as far as is possible, to directly embed moral responsibility in the agents themselves. But there are obvious obstacles to such a project. How far could an AI-based agent be attributed 'genuine' rather than 'simulated' moral status? Speaking of an agent as having 'moral status' is to refer to at least two different kinds of moral role: either being the *source* of morally evaluable action – that is, acting in ways that merit attributions of rightness, wrongness, responsibility, etc.; or being the *target* of such action – that is, being a legitimate object of moral concern. A moral expert system might be the first; a sentient robot – were one to be buildable – might be the second. The question of consciousness seems fundamental to moral status. Arguably, consciousness is more central to the 'target' role than the 'source' role – so maybe non-conscious artificial agents could come to have genuine moral responsibilities even if they don't have claims on our moral concern. However an opposing, 'organic', view would argue that moral status is bound up with consciousness because both presuppose the status of being an organic, biological creature, and this is why AI-based agents would be disqualified from ethical status (Torrance, 2007, 2008). Shaun Gallagher (2007) has offered a neo-Aristotelian conception of moral agency, centred on conceptions of 'endogenous intersubjectivity' and embedded self-consciousness. Gallagher's view reinforces the organic claim that being a genuine moral agent (in the sense of either source or target) is impossible for artificial agents designed according to known technologies. Gallagher argues that an agent needs to have the capacity for a kind of wisdom (*phronesis*) to be counted as moral. Yet a defender of machine ethics might argue that some form of 'moral intelligence' could be possible within AI agents, even if *phronesis* is beyond their capability. This may depend on whether one could develop in an artificial agent a kind of empathic rationality over and above purely cognitive forms of rationality. In any case there are, I will suggest, certain important practical challenges facing both AI technologists and those who use their products. Increasingly we design autonomous agents to act on our behalf in many morally significant contexts – so there is a pragmatic imperative to design agents whose reasoning, choice and action track those of genuinely responsible agents in like situations, even if the lack of consciousness (and related features) in AI agents would disqualify them from having genuine moral status in their own right. I will outline some ways in which such (non-conscious) 'para-agents' might achieve a closer approximation to humanlike moral agency, and what some of the features of a mixed ethical society, containing a large-number of such para-agents alongside humans, might be. **C21**

*See also:*

64 **Beyond Self-Reference: Taking Consciousness Seriously**

## 1.6 Mental causation and the function of consciousness

39 **A Possible Functional Role for Qualia** Jerome Elbert <Demythologizer@cs.com> (Physics Department, University of Utah, Tacoma, Washington, U.S.A.)

Advanced animals use arrays of sensors to learn what is happening near their bodies. This is

highly adaptive, since it allows animals to select appropriate actions. Much of the brain operates as a well-integrated network that forms representations of the animal's current situation. This awareness system takes sensory information and gives it meaning by retrieving related memories. Processes in the awareness system include perception, the evaluation of the animal's current situation, the formation and selection of action plans, and the initiation and sensing of many emotional, motivational, and motor processes. Conscious experiences probably result from complex patterns of neural activity in the awareness system. Consider the example of observing hues in color vision. Initially, the sensory signals are coded efficiently and carried to the brain. A neuron may represent red or green in a certain direction by a firing rate that is greater or less than the neuron's average background firing rate. Using the same code, another neuron may represent yellow or blue. However, the signal is too simple to represent the hue explicitly. This must be true, since the encoded signal is the same for red or yellow. The signal is only useful because it is connected to inputs for processes that handle the red/green or the yellow/blue variable. Presumably, what distinguishes a red signal from a yellow signal is where they are connected. If they were connected improperly, they would give the wrong message. This kind of representation, which I call a compact representation, encodes the hue implicitly by where it is connected. The connections may last as long as the organism survives. I propose that the compact representations initiate what I call broad representations. A broad representation is a more complex pattern of the brain's neural activity that can form the contents of such processes as remembering a previous event or seeing a certain primary hue. These representations need to serve as inputs to various processes that result from learning by the organism. An animal's DNA cannot specify the connections of the representations with the processes in advance, since the details of the processes depend on previous experiences that vary from individual to individual. So, unlike the case for compact representations, it seems likely that the broad representation itself represents the hue's identity. Each primary hue may be represented by a characteristic, genetically specified pattern of neural activity. I propose that this pattern also produces the characteristic experience associated with observing that hue. We might have clues about the kinds of activity that represent the different hues. For example, Nicholas Humphrey (2006, p. 20) notes that red is usually regarded as a warm, exciting, and disturbing hue, and that it has been found to produce signs of actual physiological arousal. These properties may affect the appearance of red. If so, one's experience of red may be "colored," at least partially, by the seemingly arbitrary code that has the functional role of identifying the hue. **P1**

40 **Mental Causation** Peter Ells <peterells@hotmail.co.uk> (Oxford, UK)

One of the problems of consciousness is that of mental causation. How do my feeling of hunger and my train of thought and imagination that result from perusing the restaurant menu lead to physical behaviour of matter: My jaw wags and my vocal chords vibrate so as to utter the words "I'll have the steak please"? The problem is acute because according to materialist philosophers the physical world is causally closed in the sense that its physical state at any one moment is sufficient to determine its state at the next moment (apart from some irreducible randomness). In my presentation I will use causal diagrams to show how mental causation (mind -> body, mind -> mind & body -> mind) can be given a natural place in the overall causal structure of the world. The proposal has the attractive features that it respects a reductionist account of the world, and it avoids causal over-determination. Any explanation of the fact that a mental state such as a taste of steak can cause a physical movement must involve radical and counterintuitive features. The features proposed here are: that ultimate reality lies at a level below that of even completed physics, and is mentalistic (idealistic) in character; and that panpsychism holds. More reassuringly, the theory can be regarded as a form of identity theory in which a particular taste of steak corresponds identically to a particular brain state. I will give a clear explanation as to why these identical objects have different properties: in this theory there is no mysterious 'explanatory gap.' **P7**

41 **Consciousness as the Interface between Cognition and Emotion ('ICE Theory')** Bryony Pierce <bryonypierce@btinternet.com> (Philosophy, University of Bristol, Telford, Shropshire, United Kingdom)

This paper presents the hypothesis that the function of consciousness is to act as an interface between cognition and emotion. This theory has arisen from my philosophical research into conscious rationality and is also defended in the field of experimental psychology by Balleine and Dickinson. I will refer to their experimental work on incentive learning to provide empirical support for this view. My claim will be that consciousness has evolved as a means of monitoring the current state of the biological system to allow physiological needs to determine values and goals. Physiological states are represented in the form of conscious feelings or emotions that are used to attribute appropriate incentive values to commodities or to the predicted outcomes of apparently

available courses of action. Information about emotional responses representing bodily states is processed alongside information about the external world, enabling interaction between self and world that can be responsive to variable needs and therefore has greater adaptive value than reflex responses. Causal relationships between actions, outcomes and the predicted value (which is dependent on the reduction of needs) of the outcomes of various courses of action are represented in abstract form, i.e. there are multiple concurrently represented possibilities. A process of selection according to perceived utility can then take place, resulting in goal-directed action. **P1**

42 **Interactionism is compatible with causal closure** Vadim Vasilyev <edm@rol.ru> (Philosophy, Moscow State University, Moscow, Russia)

Some authors reject interactionism as they believe it denies the causal closure of the physical world, and this violates the basic laws of physics. In this paper I'll try to demonstrate that we have reasons to say that one kind of interactionism is compatible with the causal closure principle (CCP). Let us begin with an assumption that mental states like beliefs and desires, in their qualitative aspects, are correlated with behavior (CA): if I want to drink a glass of cola, I, as a rule, drink cola, not something else. No one, I guess, is prepared to argue against this assumption. From CA and CCP, which I understand as follows: every physical event has an immediate physical cause (as in Lowe 2000), we can conclude to the truth of the global supervenience principle (GSP). Indeed, if GSP does not hold, it is possible that some worlds, identical in their physical structure, differ in mental states, accompanying physical systems which exist in these worlds. Then, according to CA, they would evolve in time differently, due to the difference in their mental accompaniment – the CCP would be wrong. But GSP does not imply the local supervenience principle (Kim 1993, Chalmers 1996). It does not follow from GSP that any local physical system have to have just one set of mental states: it follows only that if two or more identical local physical systems have different mental states there are some physical differences in the worlds where they exist. If the existence of such physical systems with different mental states is compatible with GSP and CCP, then, if we consider those physical systems locally, we see that, according to CA, it seems as if their changes depend on mental states. But if we look at the whole physical worlds we see that they depend on some non-local physical causes. This position I would like to call the local interactionism. So far I talked about possibilities. Now I am going to show that we have all the reasons to accept this local interactionism. Firstly, the local supervenience principle, as regards mental states, is probably wrong. Indeed, it is a common opinion that the same physical event might have different causes (and that it is not just logical possibility). So, for example, my brain could have come to its present condition as a result of another causal history than it actually had. But my causal history is reflected in my memory, which is the basis of my beliefs and desires. So my very same brain could have been accompanied by different mental states and, according to (1), in such a case it would produce a different behavior due to them. Then my current mental states must play a real causal role as well, and interactionism is true. But, secondly, CCP is probably right. It follows from our natural disposition to infer from the past to the future connections of events. Indeed, these inferences presuppose that any physical event should have a necessary correlate in the past, existing in a public, physical space: otherwise other people would consider some or other event as an event lacking such a correlate, i. e. its cause, in their experiences. So, while we have reasons to accept interactionism, it is local interactionism only, the interactionism which is compatible with the causal closure and which may possibly illustrate what E. J. Lowe called a "causation by a mental event of a physical causal fact". References. Chalmers, D. 1996. The Conscious Mind. New York: Oxford University Press; Kim J. 1993. In: Kim J. (ed.) Supervenience and Mind: Selected Philosophical Essays. Cambridge: Cambridge University Press; Lowe, E. J. 2000. Causal Closure Principles and Emergentism. In: Philosophy 75(4): 571 – 585. **P1**

*See also:*

69 **We Infer Rather Than Perceive the Moment of Decision to Act in Libet's Measurement of the Time of Conscious Decision**
239 **A Theory of Consciousness Based on the Concepts of Force Carrier Particles and Superposition, and Electromagnetic Fields Generated by Neural Networks**
51 **The Problem of Explanation: A Call to Reject the Hidden Reduction in Non-Reductive Materialist Arguments for the Explanatory Gap**
282 **Mind, Movement and Health as Emergent Properties of Patterns in the Neural Net**
257 **Natural Selection and the Design of Consciousness**
117 **The New Empirical Muscles of the Theory of Ideo-Motor Action**

## 1.7 The 'hard problem' and the explanatory gap

43 **Explaining the Explanatory Gap: Beyond Monism and Dualism** Fairlamb Horace <horus472@gmail.com> (Briarcliff, TX)

(1) Today's notorious "explanatory gap" between consciousness and mechanistic explanation motivates much debate between property dualists and materialistic monists. I argue that explaining that gap requires Peirce's threefold phenomenology. (2) Peirce's phenomenology divides experience into three kinds of elements according to their relations to other elements. Firstness includes qualia (e.g., feelings) whose qualities have no intrinsic relation to other elements. Secondness includes elements (such as forces) structured as relations between two elements. Thirdness includes intentional and representational structures involving relations between three elements (X is a sign of something Y for an interpreter Z). (3) Human knowledge is an intentional system, a behavioral adaptation mediated by caused perceptions and correlated linguistic signs. Perceptions are physiologically hardwired; natural feelings are instinctively programmed. These biologically grounded meanings naturally correlate linguistic conventions between same-species users. But while some aspects of meaning are physiologically shared (e.g., colors), many qualia (e.g., exotic tastes) are not. Qualia that cannot be interpersonally standardized cannot be reliably communicated, if at all. Primitive forms of consciousness, for instance, would have been pre-representational, barely more than the reactive effect of some cause. Given very different physiologies and contexts, human language could not represent such experiences. (4) These evolutionary facts place natural limits on what can be represented for thought. Human representational schemes are naturally suited to experiences of beings complex enough to have them. Our knowledge can model the exterior working of matter, utilize similarly advanced intentional structures (such as logic, mathematics, etc.), and express instinctively or culturally correlated qualia. But what escapes representability are intrinsic qualities of consciousness that are not correlated to standardized human experience, i.e., qualia that are either too primitive (the feelings of snails) or too foreign (outrageous tastes). Not already being familiar to us, and lacking essential relations to other elements, such qualia cannot be assimilated to what we already know. (5) This split between representable and unrepresentable elements of consciousness gives rise to several well known problems in the philosophy of mind, e.g., the ineffability of qualia and the gap between first person and third person perspectives. These problems yield two sorts of limits: to what can be represented and to what can be recognized through representation. They also explain why the explanatory gap increases when we try to project what it's like to be something down to the origins of consciousness. (6) This gap is predicted/required by Peirce's categories. Humans understand the world evolutionarily backwards through complex representations of force, perception, and shared qualia. But some qualia exist under the radar of sensory perception and shared physiologies, and are therefore unable to correlate to what we know. Given the privacy and contextuality of qualia, the range of qualia necessarily outruns the representational capabilities of science, the more so as we inquire farther from the familiar. **P7**

44 **The Phenomenology of Explanation and the Explanation of Phenomenology** Brian Fiala <fiala@email.arizona.edu> (Philosophy, University of Arizona, Redwood Falls, MN)

Suppose we knew that some materialist theory of consciousness were true (a smart little bird told us). It would still be difficult to understand how such a theory could possibly be true. Such a theory would yield lawful correlations between neural states (for example) and phenomenally conscious states, but we might still wonder, "Why is neural state N correlated with that phenomenal state P1, as opposed to phenomenal state P2 – or any phenomenal state at all, for that matter?" In other words, an "explanatory gap" would divide the physical and the phenomenal. The explanatory gap poses a prima facie problem for materialist theories of consciousness, insofar as the existence of an explanatory gap prima facie suggests the existence of an ontological gap. Consequently, the materialist must either deny that there is any explanatory gap, or else find a way of rendering the gap consistent with materialism. Here I sketch a new strategy for rendering the explanatory gap consistent with materialism. The project is to explain the appearance of a gap in a way that is materialistically kosher, while sapping the gap of its dialectical force. One way of going about this task is to first examine some feature of human psychology, and then argue that the feature generates the (mere) appearance of a gap. This strategy is favored by many "Type-B" materialists. It is also known as the "phenomenal concept strategy" (Chalmers 2006). My proposed strategy will conform to this general pattern. Whereas extant strategies emphasize the unique characteristics of our concepts of phenomenal consciousness, my strategy will focus on the unique profile of explanatory cognition more generally. That is, I will focus on the psychological mechanisms by which we generate explanations, grasp explanations, and evaluate explanations. The hope is that we can account

for the explanatory gap as a by-product of the relatively less mysterious psychological features of explanation, thus de-mystifying the gap. I argue that we might deflate the hard problem by giving a psychological explanation of why the hard problem arises. Taking a cue from Gopnik (1998), I appeal to the phenomenology of explanation itself, especially the feeling of understanding (AHA!!!) that overcomes the subject as she grasps an explanation. The AHA!!! feeling normally accompanies the grasping of a good theory. But there is a patent absence of any AHA!!! feeling when grasping a materialist theory of consciousness – this is the hallmark of the explanatory gap. I argue that the explanatory gap may be an "explanatory illusion" – that is, a good explanation that fails to produce the appropriate phenomenology of understanding. By closely examining the psychological mechanisms that produce the AHA!!! feeling, we might shed light on the apparent gap between the physical world and phenomenal consciousness. **P1**

45 **The Inverse Mind-Body Problem** Eric Furcsik, Eric Furcsik <Eric-Furcsik@utc.edu> (Philosophy, Mathematics, University of Tennessee at Chattanooga, Ooltewah, TN)

Many think of the mind-body problem (MBP) as the problem of reconciling experiential states with physical states. In general, a problem is solved when its statement is transformed to obvious identity with the phenomena of interest. Taking the MBP as such, an operation (thoughts, philosophy) that transforms the MBP into a solution of the MBP we may call an inverse-MBP. A set of thoughts that will solve the MBP is just such an 'inverse', 'reciprocal' recasting of the MBP, ending in an identity with experiential states, 'explaining consciousness' per se. An example inverse-MBP is built-up as this exposition and applied to the MBP. Parallel comparison of this method with historical solution attempts (dualism, materialism) illustrates the necessity of a philosophy it defines, called consciousness-ism. The perspective that allows for the hard MBP and solipsism is considered as a consequence of a systematic epistemological inversion. **P1**

46 **What if it's "Gaps All the Way Down"?** Steven Horst <shorst@wesleyan.edu> (Philosophy, Wesleyan University, Middletown, CT)

Philosophers who have discussed the explanatory gap between mind and brain – whether dualists, reductionists, eliminativists or non-reductive materialists – have generally assumed that, if there is such a gap, it is something unique in the case of the mind. The objects of other special sciences – chemistry, geology, biology – are, by contrast, reducible to physics. But within philosophy of science, the assumption that inter-theoretical reductions are the norm in the sciences has given way to the view that such reductions are in fact rather rare, and that in this sense the sciences are "disunified". How should this anti-reductionist turn affect philosophical debates about the mind? This paper presents the main claims of my recent book, Beyond Reduction (Oxford University Press, 2007). The anti-reductionist turn clearly deals a blow to reductive physicalism and at least some forms of eliminativism. It does serve to "vindicate" the claim that there is an explanatory gap between mind and brain. But it undercuts principal arguments for both dualism and physicalism. Dualists argue that irreducibility implies a failure of supervenience; but if it is "gaps all the way down", then this would entail that chemical and biological phenomena fail to supervene upon physical phenomena as well. And whereas reductions of mental phenomena would provide strong evidence for physicalism, non-reductive physicalism is left with the case for non-reductivism strengthened but the case for physicalism left as a standpoint of faith. **C1**

47 **Can't We Solve the Mind-Body Problem?** Shun-Pin Hsu <g39303016@ym.edu.tw> (Institute of Neuroscience, Yang-Ming University, Taipei, Taiwan, ROC)

Colin McGinn famously argued for a mysticism position of the mind-body problem, stating that even if there exists a solution to the problem, the limited human mind is cognitively closed to the correct explanation. McGinn's main argument is based on a model of science that differentiates between the data-gathering phase and theory-constructing phase. Theories are inferred from the data collected, which in turn are gathered via perception. By his principle of homogeneity, since perception cannot satisfactorily provide the explanatory link between the mind and body, all theories inferred from these data cannot provide the solution, too. I will argue that McGinn's argument is based on the misleading assumption that datum gathered by scientists is not-theory laden, furthermore, I will also argue that scientific explanations are established from confirmed correlation between the mind and the body instead of mere inference. Thomas Kuhn's model of scientific discoveries shows that scientists don't construct theories from pure data and inference, the kind of data you gather is based on what kind of theory you have. In addition, scientific theories are constructed from well-confirmed correlations, not from pure data and inferences of data. Although we cannot perceive the relation between high-level entities and low-level entities, for example, the unit of heredity and DNA, we can still identify the relation between them. We do this identification by

presupposing a theory as Kuhn suggests, so scientists can avoid McGinn mysticism by assuming a phenomenology theory as their observation framework, and constructing the relevant correlations when gathering data. In conclusion, I argue that McGinn's argument is on a misleading ground that scientists can avoid. **P7**

48 **Consciousness without Subjectivity** Pete Mandik <mandikp@wpunj.edu> (Philosophy, William Paterson University, Wayne, NJ)

The so-called subjectivity of conscious experience is central to much recent work in the philosophy of mind. Subjectivity is the alleged property of consciousness whereby one can know what it is like to have certain conscious states only if one has undergone such states oneself. I review neurophilosophical work on consciousness and concepts pertinent to this claim and argue that subjectivity eliminativism is at least as well supported if not more supported, than subjectivity reductionism. My plan is as follows. First, I conduct a quick review of the notion of subjectivity as it figures in some classic discussions in the philosophy of mind, especially those surrounding the work of Nagel and Jackson. I develop the idea that, in these contexts, subjectivity is one-way knowability. Next, I turn to discuss neurophilosophical perspectives on the topics of consciousness, phenomenal character, concepts, and "knowing what it is like". Next, I examine the proposal that due to the neural structure of the relevant concepts, one can only have the concept of what it is like to have certain experiences if one has had those experiences. Finally, I bring the insights developed in the previous sections to bear on the twin questions of whether (1) in perception, we perceive properties that may be known in no other way and (2) in introspection we introspect properties that may be known in no other way. My conclusions will be that both questions merit negative answers. **C16**

49 **Resolving The "Hard Problem" Within The Circuitry of an Individual's Brain: Binding The Phenomenal Qualities of Interiority and Exteriority** Ken Marton, Tanya Marton, Yale University; Marie Ary, California Institute of Technology <marton@mcatmaster.com> (JetStream Education, Encino, CA)

The "Hard Problem of Consciousness" arises from the sense that the nature of neural activity is in some way categorically different from the experiential qualities of the contents of consciousness, EVEN IF ultimately shown to be 100% correlated. Finding the correlations is considered ultimately not as difficult as resolving this apparent qualitative divide, which is why it is called the "Hard Problem". Argument and experiential demonstration will show that the hard problem is ONLY experiential, and illusory, and that it won't be resolved by neural experiment or philosophical analysis. However, the apparent disparity between the two may be resolvable in the experiencing of any individual (who happens to "experience" the hard problem) by using a proposed psychocognitive process. Anyone who undergoes the process (which is not yet technically feasible) would then find the hard problem in no way problematic, because for them, neural activity and correlated contents of consciousness would be experienced directly as two aspects of the same reality. Consider that all phenomenal experience are likely isodynamic and isostructural with correlated neural activity; their spatial, temporal, and relational qualities correlate with that activity. Nevertheless, uncovering all correlations won't resolve the sense of a categorical difference because a brain requires multi-modal experiential phenomena to temporarily co-occur to bind them, and thus to experience them as different aspects of the same reality. The co-occurring visual imagery and sounds of a ringing bell, for example, are inherently qualitatively disparate, yet they are associatively bound into one occurring reality – a ringing bell. No "sight-sound dualism" is typically proposed! On the other hand, "Interiority" phenomenal qualities (the experience of experiencing) never co-occur with the "Exteriority" of neural firing. The absence of a direct perception of associated neural activity (e.g., seeing/hearing neurons firing) co-occurring with the experiencing of the correlated contents of consciousness allows for the illusion of the hard problem. This leaves these two categories of experiencing occurring, for anyone who well contemplates the problem, as disparate realities, irreconcilably disparate in their nature. However, each category of phenomenal quality always occurs as categorically different from every other, until they temporally co-occur, so this is not unexpected. Consider an individual perceiving neural activity (by any technical means) while experiencing correlated "qualia". It is suggested that the brain can and will bind them into one occurring reality, with the apparent hard problem then experientially resolved for that individual. It is proposed, for example, that if an individual can observe all aspects of the neural firing correlated to the experiencing of a time-varying blue stimuli (via a "cerebroscope"), while also simultaneously experiencing the correlated time-varying blueness, their brain will bind the two qualitative experiences into one occurring reality, and there will be no disparity experienced. The experiencing of blueness, and of the neural firing correlated to that experiencing of blueness, will

simply occur as two aspects of one thing, like the sight and sound of a ringing bell. The hard problem would disappear for that individual (if they ever had the problem in the first place!). **P7**

50 **Psychophysical bridging and Orch OR** Jonathan S. Powell <j.s.powell@reading.ac.uk> (Philosophy, University of Reading, Folkstone, Kent, UK)

I present a tentative framework of five criteria by which to judge potential answers to the hard problem of consciousness. The hard problem is the question of how (and perhaps why) the brain produces subjective conscious experience or qualia. The five criteria of the framework are: 1) Non-elimination criterion That there are Experiential Goings-on is the most fundamental datum of existence. Consciousness is therefore ineliminable. 2) Foundational criterion There are decisive arguments against strong or radical ontological emergence. Consciousness must therefore be a foundational property of the universal entity, some form of panpsychism (broadly conceived) must pertain. 3) Isomorphism criterion Any proposed NCC must be structurally and functionally isomorphic with the conscious state for which it is the proposed correlate. 4) Explanatory criterion There is some fact of the matter as to the ontological status and causal role of consciousness irrespective of the route of enquiry into such a fact, a plausible theory of consciousness must therefore have explanatory power across both disciplines and scales. 5) Psychophysical bridging criterion A genuine answer to the hard problem must show how and where conscious experience or qualia fit into the natural order. Taking the basic empiricist observation that the only definitive correlate of consciousness is the reportable goings-on of the activity in human brains, one must show how brain processes and structures connect or interact with qualia/conscious experience. A psychophysical bridging principle must account for both ends of the bridge. The psychophysical bridging criterion is here applied to the Penrose-Hameroff Orch OR (orchestrated objective reduction) model which proposes that quantum computations in microtubules within brain neuronal dendrites underlie consciousness. Hameroff and Penrose further proposed that proto-conscious qualia and Platonic information exist in Planck scale geometry along with other irreducible features like spin or charge. Thus Orch OR places qualia/conscious in the natural order, specifically in Planck scale geometry. To satisfy the bridging criterion at the other end, i.e. in the brain, Orch OR connects Planck scale geometry to what Hameroff has described as Schrodinger's proteins. Functional states of brain proteins necessary for consciousness (e.g. dendritic membrane receptors, microtubules) are governed by quantum forces which induce superposition of multiple co-existing functional states in said critical proteins. These quantum states interact performing quantum computation which terminate to a solution of definite states by Penrose OR (objective reduction). Particular discrete protein states selected by OR, determine behaviour by the standard model of neural causation. The bridge to the Planck scale is given by the indeterminacy principle E=h/t. E is the amount of spacetime-separated superpositioned matter, h is Planck's constant, and t is the time at which OR occurs (assuming environmental decoherence is prevented in the interim). Thus Orch OR places consciousness as a process in, or connected to, Planck scale geometry in which proto-conscious qualia are proposed to be embedded. Orch OR is the first theory to actually describe psychophysical bridging in a closed universe. **C8**

51 **The Problem of Explanation: A Call to Reject the Hidden Reduction in Non-Reductive Materialist Arguments for the Explanatory Gap** Kimberly Van Orman <van.orman@gmail.com> (Philosophy, University at Albany, Watervliet, NY)

Non-reductive materialism once held out hope to the scientifically-minded philosopher of mind interested in preserving mental causation. A major challenge to this view has been the explanatory gap. The concern behind the explanatory gap issue is that there is something about (materialist) science that makes it unsuitable for explaining consciousness, or that it cannot account for genuine mental causation. As with any conclusion – if we don't like it, our options are either to challenge the inferences or go back and review our premises. Several non-reductive materialists have tried to accommodate these challenges. Of those who have taken issue with it, most have accepted the same premises, but challenged the inferences. I want to argue that we should go back and look at the assumptions at play in these discussions. Discussions of consciousness and mind have gotten to a point where the conventional wisdom needs to be revisited. The deductive-nomological (DN)-type views of explanation accepted (explicitly or implicitly) by those making explanatory gap arguments are seen as common sense within the philosophy of mind, but they are not uncontroversial within the philosophy of science. We should look more closely at the discussions in the philosophy of science. In our pursuit of an explanation of mental states (conscious or not) we should reject the premise that a good scientific explanation involves a deductive argument using some sort of reduction in its premises. Neither materialism nor merely a commitment to naturalizing the mind requires us to accept this notion of explanation or the ideas of causation related to it. In particular,

those of us who claim to be non-reductive materialist should be extremely reluctant to accept such views. I suggest considering James Woodward's counterfactual/interventionist account of causal explanation from Making Things Happen as an acceptable view. This is a view which in no way contradicts materialist metaphysics, is scientifically sound, and can potentially provide a way to avoid the explanatory gap. Stephen Mumford's view of dispositions and natural necessity in his book, Laws in Nature suggests a view with a stronger metaphysical grounding than Woodward's, and is another option for the non-reductive materialist to consider. His view allows for a materialistically sound explanation of how higher-level properties such as mental states and conscious mental states could play a role in causal mechanisms without a deduction from a lower level). The non-reductive materialist has generally been committed to the idea that mental states matter, not just because we think that's a nice story but because we believe the world shows us that that is the case. If we have to give up on this view, it should be because a better understanding of the world forces us to do so, not because we have deductivist assumptions about explanation or reductionist assumptions about causation influencing us. We should reject DN-type notions of explanation in favor of others that do not violate materialist metaphysics but also do not require us to give up explaining consciousness or the causal efficacy of the mental. **P1**

52 **Mind the Phenomenal Concept** Benjamin Young <byoung@gc.cuny.edu> (Philosophy, City University of New York, Kew Gardens Hills, NY)

A recent development in the debate regarding the relationship between the mind and the body has been the rise of Phenomenal-concept theories. Phenomenal-concept theories claim that physical brain states are captured by descriptive concepts, while qualitative mental states can only be captured by non-descriptive, phenomenal concepts, which are acquired and possessed only through experiencing the qualitative mental state. Where these theories differ is whether the acquisition and possession conditions are determined by a recognitional ability (Loar, 1997; Tye, 2003), a demonstrative thought (Chalmers 2003, 2006), a quotational-indexical structured thought (Papineau, 2002), or by having an exemplar experience of a certain qualitative kind (Papineau, 2006; Block, 2002, 2006). What is common throughout these theories is the experience thesis that to gain the concept one must have the relevant qualitative experience (Stoljar, 2005), as well as a motivation to bridge the explanatory gap. Some have alleged that mind-body physicalism cannot explain the relation between physical brain states and phenomenal mental states because of a certain explanatory gap. That gap is said by some to appear as a demonstration of the metaphysical falsity of physicalism (Kripke, 1980; Chalmers, 1996; Jackson 1982, 1986, 1993; Chalmers & Jackson, 2001) and by others as an epistemic hindrance to reducing the qualitative character of experience to physical mechanisms (Levine, 1983, 1993). I will argue that the phenomenal concept approach becomes untenable as a theory of concepts, when combined with the experience thesis, which brings into doubt its validity as a solution to the explanatory gap. Phenomenal-concept theories are untenable, because they cannot meet certain widely accepted constraints on theories of concepts. To demonstrate these points, I focus on the exemplar theory, because it is clearer what goes wrong with these types of theories. However, the ramifications of my argument equally extend to recognitional, demonstrative, and quotational indexical theories. The dependence of the phenomenal concept upon experience, is most apparent in exemplar theories, which claim that the acquisition of the phenomenal concept is determined by having an exemplar experience of a certain qualitative kind. However, by making experience the primary condition for determining the acquisition, possession, and individuation of phenomenal concepts, exemplar theories face difficulties respecting the publicity constraint (Fodor, 1998; Peacocke, 1992; Prinz, 2002; Rey, 1983; Smith, et. al, 1984), conceptual stability, communicability, and the generality constraint (Evans, 1982). The talk explores four possible solutions on behalf of the exemplar theory, arguing that none are plausible. Based on the inadequacies of the exemplar theory meeting the aforementioned constraints, the paper concludes with a theory that meets these constraints by arguing that the phenomenal concept's possession conditions and content are determined by the sensory state, its context, and a theory of object persistence through changes of features (Feldman 2003, 2007; Feldman & Tremoulet, 2006; Tremoulet & Feldman, 2006). By denying interpersonal publicity, while maintaining intrapersonal stability, a new theory of demonstrative concepts is proposed that provides an explanation in terms of purely physical processes of why there is an explanatory gap. **P1**

*See also:*

218 **Quantum Theory, Reality, the Dream Metaphor and the Subjective Reduction of the Wave Function**
219 **A quantum theory of consciousness**

## *1.8 Higher-order thought*

53 **HOT Implies PAM: Why Higher-Order Theories of Consciousness are Committed to a Phenomenal Aspect For All Mental States, Even Beliefs** Richard Brown <onemorebrown@yahoo.com> (The Graduate Center, City University of New York, Brooklyn, New York)

The higher-order strategy consists in first giving a non-problematic account of our 'consciousness of' things (transitive consciousness) and then giving an explanation of the recalcitrant phenomenon of qualitative consciousness in its terms; thus promising an enormous payoff in the form of a satisfying, scientific explanation of one of the most elusive aspects of mental life. I argue that in order to implement this strategy consistently all conscious mental states must be qualitative, even beliefs. Given that the transitivity principle says that a conscious mental state is a mental state that I am conscious of myself as being in, the argument can be summarized as follows. •The transitivity principle commits one to the claim that any mental state can occur unconsciously and so to the claim that pains can occur unconsciously •An unconscious pain is a pain that is in no way painful for the creature that has it (the transitivity principle commits one to this as well, on pain of failing to be able to give an account, as promised, of the nature of conscious qualitative states) •It is the higher-order state, and solely the higher-order state, that is responsible for there being something that it is like to have a conscious pain. •So, when a higher-order state of the appropriate kind is directed at a belief it should make it the case that there is something that it is like for the creature that has the belief, otherwise there is more to conscious mental states than just higher-order representation. As it turns out, this must be true of anyone who accepts the higher-order strategy because that strategy commits them to the claim that it is the higher-order state (whatever it is and whether or not it is a distinct state) that results in there being something that it is like for the organism to have whatever first-order state they happen to be in. If this is denied then the theorist has failed to give the promised explanation of qualitative consciousness, and so the theory looses its main appeal. I conclude by considering Rosenthal's response to this argument. He argues that the higher-order thought must represent the first-order state in respect of its (the first-order state's) qualitative properties in order for there to be something that it is like for the creature to have the state in question. He thinks the onus is on my side to independently show that thoughts are qualitative and that this dispute doesn't threaten the viability of the higher-order strategy. But this is to miss the force of the objection. A conscious belief and a conscious pain (ex hypothesi) both consist in having a suitable higher-order thought represent the creature as being in those first-order states. Why is there something that it is like for the creature to have one and not the other? If we give Rosenthal's answer we have admitted that there is something special about qualitative properties, and that there is more to qualitative consciousness than higher-order thoughts. **C2**

54 **How "Global" is HOT Theory?** Rocco Gennaro <rocco@indstate.edu> (Philosophy, Indiana State University, Terre Haute, IN)

The higher-order thought (HOT) theory of consciousness says that what makes a mental state conscious is that there is a suitable HOT directed at it. Thus, it rightly seems that any neural realization of the theory would be "global" (i.e. widely distributed in the brain). However, it is unclear just how global it needs to be. I will argue that it is a mistake, both philosophically and neurophysiologically, to claim that the HOT theory should treat first-order conscious states as "widely" or "very" global, for example, as requiring prefrontal cortical activity. It is a mistake neurophysiologically because there is little or no evidence to suggest that typical first-order (i.e. world directed) conscious states involve prefrontal cortical activity, as opposed to other more limited global cortical activity (e.g. feedback loops in other brain areas). In addition, there seems to be positive evidence for the view that other cortical brain areas are sufficient for having first-order conscious states, which, it must be remembered, only require unconscious HOTs on the HOT theory. It is only when a HOT is itself conscious that we have "introspection," "executive control,"

and other more sophisticated mental abilities, which are rightly associated with the prefrontal cortex. It is a mistake philosophically because if HOT theory required significant prefrontal cortical activity for all conscious states, then it is needlessly left open to the often mentioned criticism that most animals and even infants do not have conscious states if HOT theory is true. I thus opt for a more "moderate" global view of first-order conscious states for HOT theory. When one is in a first-order conscious state, prefrontal cortical activity is not necessary, but this fact is perfectly consistent with HOT theory and with animal and infant consciousness. I therefore challenge some claims and arguments made by Ned Block (in a BBS target article) and Uriah Kriegel (in a Consciousness and Cognition piece). In doing so, I show why the HOT theory is in a better position than Kriegel's "self-representational" theory of consciousness with respect to these issues. **C15**

55 **Peripheral Self-Awareness and Higher-order Content** Alex Kiefer <akiefer@gmail.com> (Philosophy, CUNY Graduate Center, New York, NY)

According to the self-representationalist theory of consciousness, conscious mental states are those that represent themselves in an appropriate way. It is claimed that this reflexive representational structure allows self-representationalism to accommodate some important facts about consciousness and its phenomenology that higher-order-state theories cannot. In particular, self-representationalists like Kriegel and Van Gulick claim that every conscious experience involves a simultaneous background or peripheral awareness of oneself as having that very experience. Higher-order-state theories cannot account for this form of self-awareness without positing an infinite series of higher-order states, but self-representationalism seems to avoid this problem by explaining peripheral self-awareness in terms of the representational properties of first-order states. In this paper, I argue that self-representationalism in fact has as much trouble explaining peripheral self-awareness as does a higher-order state theory, on any plausible way of construing the higher-order contents of self-representing states and the way in which such contents determine what we are conscious of in experience. Further, I argue that the description of state consciousness as involving peripheral self-awareness is not justifiable on phenomenological grounds. I conclude that we ought to reject this conception of consciousness, and indeed that we must do so if we wish to adopt any variety of higher-order theory. **P1**

56 **Simulation, self-knowledge and metacognitive judgement.** Finn Spicer <finn.spicer@bristol.ac.uk> (Philosophy, University of Bristol, Bristol, UK)

Simulation theories of mentalising do well at explaining how we predict behaviour and coordinate behaviour on the basis of mentalising. But it is also part of our mentalising ability that we are able to make explicit metacognitive judgements – judgements abut what others believe, want or think. Traditionally, Theory Theory has been thought to be on stronger ground in accounting for such explicit judgements – they are the explicit output of pieces of implicit theoretical reasoning. With the exception of Goldman, few simulation theorists have tried to close the gap on Theory Theory in this domain. This paper goes some way to closing that gap. First I argue that when one focuses on how well each can account for our ability to produce metacognitive judgements about our own minds, pure Theory Theory no longer appears to offer a strong account. Attempts such as Gopnik's to account for self-ascription using Theory Theory have not been accepted as convincing. Accordingly, the Theory Theory needs to be supplemented with a separate account of mental state self-ascription, I argue. I go on to further argue that once such a theory of self-ascription is in place, it suffices to serve as a foundation on which one can build a theory of metacognitive judgement, whether or not one proceeds along Theory Theory or Simulation Theory lines. I outline an account of self-ascription, (following Stich and Nichols) on which judgements about one's own cognitive states reliably cause self-ascriptions. Once such a view is in place, I show that Theory Theory and Simulation Theory are equally well placed to explain our ability to make metacognitive judgements about others. Many now agree that neither Theory Theory or Simulation Theory on its own can be the full story about metacognition; they think that the right story will combine elements from both. To such conciliators, this paper will still hold some interest, as it can be taken as an argument that shows that no blend of Simulation and Theory can be adequate without supplementation with an (independent) account of self-knowledge. **C10**

*See also:*

65 **Higher Order Thoughts, Self-Ascription and Conscious Unity**
164 **Consciousness is just a word: Julian Jaynes and contemporary psychology**
192 **Metacognition Without Metarepresentation: Implications for Consciousness Studies**
57 **Kinds of Introspection: A Pluralistic Model of First-Person Knowledge of Consciousness**

77 **What language does for consciousness: Socially fixed Signs and Consciousness 'that...'**

## 1.9 Epistemology and philosophy of science

57 **Kinds of Introspection: A Pluralistic Model of First-Person Knowledge of Consciousness** Jesse Butler <jbutler@uca.edu> (Philosophy and Religion, University of Central Arkansas, Conway, AR, U.S.A.)

Introspection is typically regarded as a unitary process through which we become conscious of the contents of our own minds. Some take the concept of introspection quite literally as a kind of inner perception, while others reject the inner perception model and replace it with some other singular type of cognitive process, such as inner speech, conceptual metarepresentation, or a cognitive mental monitoring mechanism. However, what most accounts of introspection typically hold in common is the misguided assumption that our introspective knowledge of our own conscious states can be adequately understood as being derived from a single type of process with a single epistemic characterization. I reject this assumption and propose a pluralistic model of introspection that can more accurately accommodate the multiple ways in which we come to know, and fail to know, our own minds. I argue that the concept of introspection does not map onto a unitary mental process, but rather is a blanket projection of a perceptual metaphor onto a heterogeneous collection of mental events and processes, including but not limited to phenomenally conscious experiences, conceptual metarepresentations, folk psychological self-attributions, and self-reflective thoughts in inner speech. Acknowledging this diverse collection of introspective processes can help us make significant headway in understanding the nature of introspection itself, as well as the epistemic status of our first-person access to mental phenomena. In regard to the latter topic, I explain how introspection cannot be one-dimensionally characterized as either epistemically privileged or problematic, but rather as having a number of different epistemic dimensions with unique pros and cons in regard to their capacities to facilitate understanding of the mind in general and consciousness in particular. First, and perhaps most important for the study of consciousness, are the epistemic properties of phenomenally conscious states themselves, which I argue have unique characteristics that cannot be adequately understood through existing epistemic criteria. The other varieties of introspection can be more plausibly accommodated within standard epistemic frameworks, but still have some unique epistemic properties that need to be recognized and accounted for, especially within the context of utilizing them to investigate the mind and consciousness from a first-person standpoint. Taken together, acknowledgement of the multi-faceted nature of introspection and its varied epistemic properties can lead to a significantly more nuanced understanding of our own first-person perspective on our own minds and the roles this perspective might play in the scientific investigation of mind and consciousness. **P7**

58 **Contrasting Approaches to the Study of Consciousness** Morey Kitzman <kitzmanm@mscd.edu> (Psychology, Metropolitan State College of Denver, Littleton, Colorado)

There are some remarkable differences in how we go about studying consciousness in the west and traditions that have developed over thousands of years in the east. Western science is curious about the nature of consciousness and the idea of developing consciousness, expanding awareness, opening the mind and heart, are of little interest in the west. This can be seen in the paucity of discussions at conferences such as this one that revolve around the actual development of consciousness. Although, we do entertain ideas about mind expansion through drugs. There is another rather striking contrast. In Eastern approaches to study of consciousness as well as in Western religious traditions, those wishing to understand something deeper about their being are required to undergo a fairly rigorous training that involves shedding layers of egoism, conceit and self importance. In the West we have managed to make the study of consciousness entirely independent of the character of the one studying it. In other words, it is really just about the application of technology and scientific methodology. The scientist seldom questions the possibility of their own psychological shortcomings, somehow the scientific method is immune to perturbations of self and ego. The Romantic movement in philosophy attempted to shed light on irrationality that infuses itself with all our actions and beliefs. However, western scientists are seldom concerned with issues like self delusion, it is the general public that have problems with delusional thinking, case in point is the "God Delusion" by Dawkins. Not only are we oblivious as scientist to our own shortcomings, but we have are so keenly aware of what everyone else lacks. How we achieved this high degree rational thinking without the slightest personal effort is truly a remarkable development. The paper will argue that the beginning of the study of consciousness must begin with an intense process of self ex-

amination. To ignore the complex psychological dimensions and motivations that make up the scientist is indefensible. A good starting point is a review of Bacon's Idols. **P1**

59 **Two key questions about consciousness** Max Payne <maxgpayne@googlemail.com> (Scientific & Medical Network, Sheffield, South Yorkshire, U.K.)

Two key questions about consciousness are (1) does science demand that mind must ultimately be reducible to matter; and (2) are the normal human mind, and the rational intellect, the highest operational level of consciousness in all Reality ? If the answer to both questions is "No !" then present day consciousness studies becomes a lighted fragment in an ocean of agnostic ignorance. Reductionist Materialism is not the inevitable consequence of modern science. 19th cent science suggested that a 1-to-1 correspondence between mind and matter is possible. 20th cent. science shows it to be impossible in practice, and prohibited in theory. Brain scans are incomparable magnitudes coarser than thought. Heisenberg Indeterminacy, quantum entanglement and virtual particles forbid knowledge of any precise quantum description, and hence any exact correspondence between brain and mind. 21st cent., "dark matter" and "dark energy" reveal that what we know is only 5% of what is. Reductionism ceases to be deduction from science, and becomes an article of faith. We do not know, in ultimate reality, what matter is. This means that serious research into paranormal phenomena can no longer be dismissed as unscientific. But in turn the paranormal, the admitted existence of the dimensions of animal consciousness, all show that we not know what mind is either. It is therefore legitimate to question whether the rational intellect is the highest level of consciousness. Methods of intensifying or elevating consciousness, such as various yogas, can no longer be discounted. Mind may be a far wider area of reality than the skull encased rational intellect may imagine. Consciousness research must discount arrogantly confident answers, and must become an area of humble agnostic questioning. **P1**

60 **Naturalizing Phenomenology and Intertheoretic Lessons from Physics** Anthony Peressini <anthony.peressini@marquette.edu> (Philosophy, Marquette University, Milwaukee, WI)

For many of us used to an analytic approach to the mind and consciousness, the possibility of recruiting as partner some of the machinery of the phenomenological tradition is a tantalizing one because it seems an apt (if still unproven) aid in characterizing phenomenological consciousness in a rigorous way that would really facilitate the naturalized project of understanding the physical basis of consciousness. An immediate stumbling block to doing this is a pervasive anti-naturalistic tendency in phenomenology. Husserl's own anti-naturalistic sentiments are well known (Petitot et al in Naturalizing Phenomenology, Stanford U. Press, 1999). As Petitot et al point out in the lead piece in the collection, it was Husserl's (understandable) belief that there were gaps in the science of his day that only phenomenology could fill that saw him so dead set against the idea of a naturalized phenomenology. One of these gaps was what Husserl took to be the impossibility of a physics of phenomenology. As Petitot et al point out, however, this has changed with the advent (mathematized) physical theories that can now explain macro-qualitative effects in terms of micro (and intermediate) levels and dynamics, which is just what is needed for a "pheno-physics." (p. 55) I propose to consider one (particularly interesting) example from another part of physical theory in the context of such a pheno-physics. The example has been brought to the attention of philosophers of science by Robert Batterman (PSA 04, University of Chicago Press, 2006) and involves explaining the breaking behavior of droplets in terms of molecular dynamics at the micro level and classical continuum hydrodynamics at the macro level. While precisely what a pheno-physics might look like is still a matter of speculation, if the hydrodynamic-molecular dynamic example is apt, then some rather interesting results would seem to follow regarding the intertheoretic relationship between phenomenology and the underlying neuroscience. In the hydrodynamic case, we seem to have a macro theory that is not literally true of the physical systems, nor fundamental, and yet indispensable for our understanding. I will argue that many of these properties would seem to carry over to a pheno-physics and explore ramifications, including whether and how these results may or may not hold for the intertheoretic relationship between psychological and neurophysiological explanatory frameworks. **P1**

61 **Consciousness and Laws in the Physical World** Kristin Schaupp <schaupkp@uwec.edu> (Philosophy, University of Wisconsin – Eau Claire, Eau Claire, WI)

Thought experiments play a central role in most recent attempts to challenge material accounts of consciousness. At the heart of these conceivability arguments lies the notion of metaphysical possibility. But while philosophers often appeal to metaphysical possibility instead of natural possibility, do we really understand what it is? In this paper I analyze the notion of metaphysical possi-

bility, and show how reliant we are on it. Although we have a clear understanding of natural possibility, our understanding of metaphysical possibility pales in comparison. Natural possibility involves both physical things and physical laws. Metaphysical possibility differs from natural possibility in that it looks at the same physical things, but imagines that the physical laws are different. This line of inquiry is supposed to result in a better understanding of the thing in question. But does this approach actually make any sense? Given the impact that metaphysical possibility has on our debates, it certainly warrants further attention. Appealing to metaphysical possibility involves an assumption about the way the world is, namely that the laws of nature could be changed without changing the physical make-up of the world. When analyzed more closely, it becomes clear that this is a very weird view of the world. It seems to imply that there is a world which consists of both physical things and physical laws. And this view seems to have become so widespread among philosophers that we have failed to question it. Why is this? One obvious reason for the widespread acceptance of metaphysical possibility is that we often talk about physical things and laws as if they were completely separate from one another, and we often learn about each at different times and in different ways. Thus it is easy to imagine that physical things could stay the same while the laws change. However, as Kripke points out, a posteriori discovery should not lead us to think that things are contingent. If laws are not contingent, but necessary, then there is no room for metaphysical possibility. Laws can only be contingent if they are something that is superadded on top of the physical. Nancy Cartwright makes it clear that there is no reason to think that laws of nature are superadded to the physical in any ontological sense. If they are not superadded, then they are not contingent but necessary. If laws are necessary, then appeals to metaphysical possibility do not show what we think they show. Rather than telling us something about what consciousness really can/cannot be, appeals to conceivability arguments merely show us something about our current concept of consciousness. And while determining what our current concept of consciousness is, is certainly useful, it should not be assumed that this shows us what consciousness actually is, nor which theories are inadequate. If laws are necessary, then thought experiments shed light on the gap between our concepts and our theories, and between our concepts and the things our theories are purported to explain, but they do not shed light on the things themselves. And they certainly fall short of disproving materialism once and for all. **P1**

62 **Introspective Ascent and the Thinness of First-Person Authority** Josh Weisberg <jwsleep@aol.com> (Philosophy, University of Houston, Houston, TX)

We can be wrong about the world. We can misperceive it in any number of ways. But we can retreat from error and say, "But that's how things seem to me." And here, it appears we are safe from error. I may be wrong about how things actually are in the world, but how could I be wrong about how things seem to me? This looks like the epistemological bedrock, the very fabric of our epistemic existence. We can call this retreat to the safety of how things seem "introspective ascent." When we ascend into introspection, we seem to have a firm grip on what we access. The vagaries of the world are left behind, and we at least have authority over this domain. Or so it seems. In this paper, I will contend that introspective ascent does not provide such a safe epistemic haven. I will argue that there are a number of reasonable ways to interpret claims about how things seem where the introspecting subject can be in error after all. In doing so, I will take in the burden of defending the idea that there is an appearance/reality distinction in consciousness itself. If we can be wrong about how things seem to us, there must be a right answer in the offing. That is, it may seem to seem a certain way to us, even though it does not seem that way. Many find this incoherent at best. Theorists as diverse as Rene Descartes, in his Second Meditation, and Daniel Dennett, in Consciousness Explained, reject this sort of move. But I will contend that, despite the awkward embedding of "seems," cases reasonably answering to that description can be defended. It may not seem that way, prima facie, but seemings are not to be trusted. In defending this strong thesis, I will in passing establish the weaker thesis that even if a safe haven of seemings can be established, nothing of use to the study of consciousness results. The thinness of the any seeming residing in this epistemic haven renders them unfit for substantial metaphysical duty in consciousness studies. Introspective ascent buys you nothing, in spite of how things seem. **C15**

63 **Toward a Consciousness of Science: Historical Models for a New Imaginative Scientific Method** Christian Whittall, Eric Stewart <okiejoe2000@hotmail.com> (Anarchist Free University, Toronto, Ontario, Canada)

The subtlety of nature is greater many times over than the subtlety of the senses and understanding; so that all those specious meditations, speculations, and glosses in which men indulge are quite from the purpose, only there is no one by to observe it. – Francis Bacon Novum Organum The greatest minds, as they are capable of the highest excellences, are open likewise to the greatest ab-

errations. – Rene Descartes Discourse on the Method – – - There is one strong and distinct theme that underpins the foundational texts of Western science, and upon which our modern scientific practices are built. This is the struggle to overcome the tendency of the human mind towards fancy and imagination, and to align it as closely as possible with what is called Nature. For both Francis Bacon and Rene Descartes, this involved a severe distrust of the mind and inaugurated an inner struggle against the its perceived tendency toward opposite extremes: 'the presumption of pronouncing on everything, and the despair of comprehending anything' (Bacon). Their original treatises on what is now called the 'scientific method' were actually training manuals on how to tame the mind by narrowing it, the process of scientific reasoning being coextensive with the conquest and forcible restraint of the imagination. It is in some ways very similar to the mental asceticism of some Hindu and Buddhist schools. However, this poses a fundamental and insurmountable problem for the establishment of a Science of Consciousness, since this is the one, very exceptional case where science, a priori, has foregone its conceit of neutrality and is unabashedly proscriptive. Aside from threatening to place a rigorous understanding of consciousness eternally beyond our grasp, this anorexia of the imagination within the scientific discipline in general has severely limited our ability to achieve the original stated goal of communing evermore closely with Nature. In the earth sciences, especially, this manifests as a increasing dearth of material for study that hasn't been affected by the actions of man before observation, thus shattering aging notions of the possibility of a scientific objectivity. Far from heralding an 'end to science', the following paper seeks to reexamine the deep architecture of the Western scientific project in order to pin down the origin and nature of the repression of the proactive imagination as an invaluable scientific tool. It will then, through an archaeology of Western thought, attempt to recover a hidden lineage of scientific thinkers who did in fact lay down a rational basis for an alternative, imaginative science, much better equipped to grapple with problems of consciousness. Some of these will include Nicholas of Cusa, Giordano Bruno, Gottfried Leibniz, William Blake, Edgar Allan Poe, H. P. Lovecraft, and others. Theirs was a method of adapting certain literary practices to a radical new scientific subjectivity that could take into account the inherent responsibility a conscious being has in playing an intrinsic and increasingly self-conscious role in the very 'Nature' science seeks knowledge of. **P1**

*See also:*

80 **The Introspective Availability of Intentional Content**
242 **Reentrant Emergence**
45 **The Inverse Mind-Body Problem**
269 **Recent changes in the structure of consciousness?**
185 **Non-Commutative Measurement Operations in Psychology**
152 **Does Experience Outrun Attention? (And a Possible Second Demise of Consciousness Studies)**

## 1.10 Personal identity and the self

64 **Beyond Self-Reference: Taking Consciousness Seriously** Shikhar Kumar <shikhark@email.arizona.edu> (Psychology, University of Arizona, Tucson, Arizona)

The idea of self-awareness to explain consciousness is not new. Franz Brentano defined the conscious mental state as something which also represents its own occurrence. His self-representational theory of consciousness is considered as the earliest of the modern theories of consciousness. Although the theory has since been modified and referred to as Neo-Brentanian theory, the core idea remains that consciousness can be explained by self-reference. There are various theories of self-reference in the market but none of them actually solves the problem of consciousness. There is no doubt that self-awareness is one of the properties of conscious states which can be explained by self-reference but the question that whether it is the only property which generates the subjective experience is not known. In this paper I discuss that how far the idea of using self-reference goes in its attempt to solve the hard problem of consciousness. I will discuss the validity of this approach in AI which is sometimes defined as a step forward in the development of conscious and self-aware machines, if we take Gödel's machines seriously. There exists a variety of formal architectures employing self-reference which automatically assume the idea of meta-information and program wrapping around itself. A program may keep a log of its activity through a self-watching architecture in which the log is defined as the meta-information which can be used for its own improvement. For example, it may modify its program to reduce the self-monitored run time, depending on the feedback from the environment. One such architecture is the idea of Gödel's machine which has the capability of rewriting itself if at a certain stage it realizes that a rewrite is useful.

Anything like this requires a self-referential architecture where the program is aware of its own activity. Now the question is whether such architecture is conscious? There is no doubt that such ideas have lot of potential in developing more adaptive AI systems but such a design still leaves the problem of consciousness far behind. The concept of subjective experience is left untouched. Here I will try to touch upon these issues with an approach of differentiating self-reference from consciousness. It is possible that consciousness entails self-reference combined with some other (unidentified) sophisticated architectures. These are some of the philosophical issues which can be debated. The reductionist approach to the problem of consciousness assumes that if one knows the basic mechanisms of consciousness then it is possible to develop a conscious machine and self-reference is believed to be one such mechanism. Here I present a skeptical critique of this notion. Self-reference gives us some direction, but does not address the hard problem, which remains as it was". **P1**

65 **Higher Order Thoughts, Self-Ascription and Conscious Unity** Alan Thomas <a.p.thomas@kent.ac.uk> (Philosophy, Canterbury, Kent, United Kingdom)

What explains the distinctive kind of unity of the conscious mental life of a person? A simple thought is that all one's conscious mental states are owned by the person that one is. But if ownership is an experiential feature of one's conscious experiences, one could always ask whether that experience is, in fact, yours. That suggests a reductionist account of a conscious mental life as no more than the particular bundle of conscious experiences that occur in the episodic history of that person. But, as Sartre remarked of any such bundle theory, he knew of himself that he was precisely not that bundle. So it seems that a person's conscious mental life is unified precisely if one can make rational and principled additions to the bundle of one's occurrent conscious history: if one can self-ascribe any of one's thoughts. But Bernard Williams and Susan Hurley independently objected that the attempt to state what the ownership of one's thoughts consists in by attaching the "I think:" to any token thought was either regressive, in that it presupposed a pre-exisiting conscious unity, or self-defeating. It is self-defeating as the token thought "I think:p" goes no further in identifying mental ownership than the original conscious thought, "p". So the self-ascription of a conscious thought needs to be interpreted not as recognising conscious unity, but as constituting it. One must further argue that the exercise of a capacity to attach the "I think:" to any of one's thoughts shows a truth that the expanded judgement, "I think: p" does not say. In exercising the capacity to attach the "I think:" to one's thoughts, one is explaining conscious unity in a way consistent with the claims of actualist HOT theory. In an actualist HOT theory, a mental state is conscious iff it is the object of another mental state, of higher order, that stands in an intentional 'aboutness' relation to it. This paper explores the problem of conscious unity by considering our capacity to attach the "I think:" to any of our conscious thoughts. David Rosenthal has argued that an actualist HOT theory can see a higher order thought as taking groups of lower order thoughts as its objects and making them all conscious. But he does not see how this can constitute a solution to the problem of conscious unity: there is no actual thought that takes all one's conscious thoughts as its object. He retreats to offering on HOT grounds not an explanation of conscious unity, but an explanation of the "appearance" of conscious unity. It is argued that this is a mistake: actualist HOT theory must deny that a capacity can explain what makes a mental state conscious, but it need not reject a capacity approach to the unity of consciousness. (These are separate explananda.) The wide scope capacity to self-ascribe any of one's thoughts to oneself and thereby to make them conscious (while avoiding the self-referential paradox of requiring the ascribing thought to be conscious) explains conscious unity, not its exercise on any particular occasion. What its exercise on any particular occasion does is express a truth that the content of the judgement cannot itself state. This defuses Williams's and Hurley's critique. Actualist HOT theory can explain the unity of consciousness. **C15**

66 **Multiple Drafts or Anatman? Neuroscientific and Buddhist Conceptions of the Self and Language** Laura Weed <weedl@strose.edu> (Philosophy, The College of St. Rose, Albany, NY)

This paper will argue that the functionalist, multiple drafts, linguistic conception of a self cannot be correct because consciousness is an embodied, enactive, and relational phenomena that needn't be either cognitive or linguistic. First, I will argue that the most basic sense of a self is a biologically primordial, enactive phenomena, whereas linguistic capacity, especially story-telling, is a sophisticated, specifically human, cognitively directed activity. Second, I will show how contemporary neuroscience is producing an enactive, relational and emotional conception of self and mind that can better account for both mental and linguistic phenomena than the multiple drafts account can. Third, I will present a Buddhist anti-substantialist position which claims that consciousness is

a relational fact among a variety of non-substantial skandas or adjuncts of existence that co-determinately arise, creating the natural world and the mind. I will show how this non-substantialist conception of a self and world better accounts for recent discoveries in neuroscience than standard western materialist or dualist accounts can. For Dennett, as for functionalists, generally, most of our ability to think, act, or self-reflect, as a human, is a function of human evolutionary interactions between a plastic brain and an environment inhabited by Dawkins' 'memes'. Consciousness, for Dennett, is just this collection of internalized memes, which are the inputs and outputs of conceptually driven, mechanical, plastic brains. I will argue that Dennett's cognitive and linguistic story cannot explain more basic and less cognitive aspects of consciousness. The claim that there are neural correlates of consciousness is useful to the degree that the involved brain structures are tied, in direct ways, to action-intention sequences of interrelationship with an environment. Three theories that do so connect NCCs to the environment are Jaak Panksepp's Affective Neuroscience, Andy Clark's dynamic-interactive conception of mind, and Francisco Varela's conception of mind as enaction or embodied cognition. I will discuss the ways in which each of these theories better reflects an enactive and relational conception of consciousness. Finally, using the enactive, relational and primordially biological conception of consciousness developed by Varela, Panksepp and Clark, I will argue that some traditional Mahayana Buddhists had developed a conception of consciousness that better reflects contemporary neuroscientific discoveries. I will review: a) Fa Tsang's Hua Yen-Ti'en Tai view of reality as pratitya samutpada, b) Nishida Kitaro's view of consciousness as a homeground of pure experience out of which both cognition and sensation flow, and c) Thich Nhat Hanh's conception of self, reality and social relations as Interbeing. These three Buddhist philosophers interpret the self, consciousness and mind as systems of field-like relations which are inter-penetrable both with each other and with the environment, paralleling the descriptions of the enactive neuroscientists. The result is an organic view of a self as part of an eco-system, that is less essentialist and less autonomous than the typical western conceptions. This conception of self is, however, responsive to cognitive science discoveries about how functional modules of the brain interact with parts of the body and aspects of the environment. **P7**

67 **Self-Representationalism and the Problems of Subjectivity** Kenneth Williford <kwwilliford@stcloudstate.edu> (Philosophy, St. Cloud State University, St Cloud, Minnesota)

There is a strong intuition, enshrined in many theories, that consciousness involves a relation between a subject and an object. There is also a strong intuition that consciousness is, as Moore said, diaphanous, that only the objects of consciousness are manifest, while the subject and the supposed relation, be it acquaintance or a form of representation, do not appear on the phenomenal map. These two phenomenological intuitions are in serious tension, and the phenomenological tension is mirrored by an ontological one. If we opt for a relational theory of consciousness, then we seem stuck with this mysterious entity called the "subject". If we opt for a non-relational theory, it becomes very hard to explain this robust intuition of relationality and very hard to identify the categorial status of consciousness. In this paper I argue that Self-Representationalism (SR) has the resources to solve these problems. SR is the view, with a long list of notable proponents, that conscious episodes always represent or are acquainted with themselves as well as their primary objects. I argue that SR makes sense of the intuition of relationality and the intuition of diaphaneity. Episodes of consciousness are indeed relational, and both of the relata are phenomenologically manifest. The subject is not inferred but just is the unified episode itself. Yet consciousness is diaphanous: there is no separable phenomenal content that one could identify with the subject, and this does justice to the intuition of Moore and others. But it is the quest for such content that has misled philosophers (Hume comes to mind) into thinking that the subject is not a phenomenological datum. But SR has two important difficulties. It seems to imply that the subject is momentary, that it lasts only as long as an episode does, and it is difficult to find a naturalistic theory of representation that fits well with it. After considering these difficulties I conclude with a tentative proposal about developing a theory of consciousness in the absence of a plausible theory of representation. **C15**

68 **Externalism and the self. Does the self depend on representation?** Yuan-Chieh Yang <dollartrue@gmail.com> (Institution of Neuroscience, National Yang-Ming University, Taipei, Taiwan)

Regardless of what mental states or processes will be the self, most philosophers and some cognitive scientists now believe that it is logically possible that the self depends on features of the environment external to the subject's body. In this paper, I will argue that an externalist view of self-conception makes more sense than internalism. According to Antonio Damasio, the key to self-consciousness lies in the "proto-self", a concept referring to "a coherent collection of neural

patterns which constantly map, moment by moment, the state of the physical structure of the organism in its many dimensions." By his definition, proto-self, the basis of "real me," originates from these biological processes which has a representation of the body and external objects. Therefore, we thereby discriminate self from non-self and then generate a point of view based on the "first-order narrative," constructed from the sensory mappings. When sensory devices perceive external objects, the organism must constantly adapt to perception by adjusting the position of the lens and the pupil, and the muscles of the head, the neck, and the trunk. Such kinesthetic activation during perception produces an implicit and pervasive reference to one's own body. Therefore, our self-awareness can be both embedded and embodied. I will argue that our "self" should be known as a view from neither the external environment or inside the body. In fact, it's from how they interact. When we have self-awareness of ourselves, what we aware, the self, is actually defined by the interaction between the organism and the environment, and our neural basis is literally the cognitive system which makes us the first-person narrator. More specifically, I will bring forward the evidence which the representationalism has trouble with: Out of Body Experience, which one's experienced body and self can be departed. It seems to strongly support my claim, which makes the question of why the self is here instead of elsewhere more reasonable, because the self does depend on interaction of the entire environment, including perceivers and perceived objects. In conclusion, the proto-self Damasio defined should not be the most fundamental "me." In contrast, such self actually has to be referred to a view from the distinct interaction in the environment instead of the representation inside the body. **P7**

*See also:*

334 **Narrative Consciousness and Psychological Enhancement**
116 **The bodily self: from body-perception to body-ownership**
337 **The Aesthetics of Consciousness**
194 **How to Lose Yourself in Yourself: Proto-, Meta-, and Self-Consciousness.**
295 **Sense Symmetry: A Method for Tuning Consciousness's Scope**
360 **Consciousness, Cognitive liberty, and Culpability: An Examination of Constitutional Law Issues**

## *1.11 Free will and agency*

69 **We Infer Rather Than Perceive the Moment of Decision to Act in Libet's Measurement of the Time of Conscious Decision** William Banks, Isham, E. A.; Hokanson, K.; Macellaio, M. V. <wbanks@pomona.edu> (Psychology, Pomona College, Los Angeles, CA)

The growing body of neurophysiological research on the question of free will, or the lack thereof, originated with the finding of Libet, et al. that the reported time of decision to make a simple action comes at least 300 ms after the beginning of the readiness potential. The readiness potential is a component of the EEG that precedes an action by 1000 ms or more. Conscious will thus seems a latecomer in the process of choice, not the instigator. We tested whether the report of decision time marks an event in the brain, as is assumed, or is rather a post-response inference as to when the decision to act must have taken place. In Experiment 1 we used a delayed auditory beep as feedback to make the act appear to happen later than it did. The reported time of action moved forward in time proportionally to the delay in feedback, in accord with the hypothesis that the judgment of decision time is an intuitive inference of when the decision was made. In a second experiment we had participants view a delayed video image of their hands pressing the response button for the task. The video delay was 78 ms. The video delay shifted the judged time of decision by 40 ms. The fact that the shift in the inferred moment of decision was only half of the delay suggests that tactile cues as well as visual ones contributed to the perception of when the response took place. In the third experiment the participants watched a video of button-pressing with the Libet clock in view behind the hand. The participants were to report the clock time at which they thought the person doing the pressing decided to press the button. The time estimated to be the point of conscious decision was 137 ms before the press, very close to the estimate for participants' report of their own decision to press the button, whether they had previously served in the experiment or were naïve to it. The hypothetical time of conscious decision, if it exists, must come before the response and therefore could not be changed by any cue that makes the response seem even later. The clear conclusion from the post-response effects on judged decision time is that the subjective time of decision is retrospectively inferred from the perceived time of response. This finding strikes us as fundamentally changing the grounds of debate about conscious will. For proponents of free will it could be cited as a welcome disconfirmation of the finding that an unconscious brain process de-

termines the action before conscious choice. However, for the same proponents it undermines the role of conscious choice in action. For any theory of volition it shows that the conscious representation of action does not reflect critical components of the associated brain activity. **PL2**

70 **Free Will In The Human Brain. A Solution Of The Problem.** Pia Ikonen, Matti Bergström <pia.ikonen@student.hse.fi> (Management et organizations, Helsinki School of Economics, Helsinki, Finland)

The problem of free will was activated by Benjamin Libet's findings that a conscious decision to perform an act is preceeded by an unconscious process in the brain. This finding has been explained to show that there is no free will, since the unconscious processes determine the realization of the conscious decision. Libet himself in believing on a free will explains the freedom with the individual's possibility to inhibit or allowe an act, e.g. to use a "veto" or not. – We are here considering a conscious willed decision being the final end product of causal chain of logical/rational argumentation occuring in real time (tr). In this case there is no free will. In order to have a really free will to exist, there has to be processes in the brain, that do not occur in physical, real time. And in fact, such processes do exist: in psycho-physical experiments already earlier it was found (Bergstrom 1964) that in subthreshold conditions there appeared in the experiments imaginary number concepts in subject's description of the physical stimuli. The conclusion was made that unconscious brain stem processes occur in imaginary time (ti). Since according to Stephen Hawking, the imaginary time is orthogonal to the physical, real time (tr), the conscious processes are independent of the unconscious processes. This gives us a new perspective to the problem of free will. In a series of newer investigations (Bergstrom and Ikonen 2002, 2004, 2005, 2006) an empirically founded model of neuromental limbic self, it was stated that the space of this self is of Mandelbrot type, with two dimensions: one being imaginary number dimension (i) showing the effect of the brain stem, and the other one being real number dimension (r), showing the effect of neocortex to limbic self. The space of the self is complex number space (i,r) in which the dynamics of thinking and also the balance between conscious and unconscious processes in human brain occur. It could now be simulated, using the julia equation (of our model), in some cases in which the thinking was dominated by the (tr)-dimension, the thinking was consciously logico-causal, and when the thinking was, again, dominated by the (ti)-dimension, then human brain showed subconscious status emerging. In the former case no free will exists, and in the latter case a free will is possible. It could be concluded that thinking leading to a decision to act (see Cotterill) can be guided by a free will. Also the theory of a "veto" (as Libet writes) can be considered as being true and correct. This "veto" in human thinking gives an ability to freely select right possibilities for our thinking and in decision making, for living in the environment. **P1**

70a **Retroactive Modulation of Subjective Intentions: Philosophy, Science and Cyborgs**. John Jacobson, Melanie Kaelberer <jejacobs@ucsd.edu> (Philosophy & Computational Neurobiology, UCSD & Salk).

Undefeatable Rock, Paper, Scissors beats human players on every trial, even though the computer appears to move before the human player[1]. In reality, the computer displays its move after the human, but a temporal-order reversal illusion, makes it appear as if the computer displays its move first[2]. I deploy a similar trick to retroactively modulate subjective intentions, the intentions subjects' report having, and thus manipulate the subjective intention associated with an action after the action. Aesop's Fables and other research[3] tell that we confabulate intentions—make them up, after executing their action— but this paradigm catches us in the act, over very short time intervals. This novel experiment makes concrete an abstract problem in the philosophy of Free Will[4], and pays-off with an application to human-machine interface design. According to the folk notion, 'volitions' are 1) picked out by subjective intentions, 2) the causes of intentional actions, 3) what we are morally responsible for, and 4) that which learning responds to. These experiments show that 'volitions' do not have both properties 1 & 2 and can discern how the other properties will associate. Since our subjective intentions depend on the results of our actions, the experiments show that not just the past determines our intentions, but that, paradoxically, our intentions arise from both our past and future of their associated actions. Thus, there can be instances where we are neither determined by the past nor by caprice. These occur in the possibly rare cases when a random quantum transition breaks us from a Laplacian causal chain, and we maintain a narative, surf the neurogeist, such that our retroactive, subjective intention is non-capriciously ours. I will further describe two practical applications of this finding in (i) methods for tracking responsibility, and in (ii) interactive feedback systems, such as workflow interupting, online spellchecks. The first links the account of freedom to useful accounts of responsibility, and the second finds that, astonishingly, one does not need to solve the neurocoding problem to subjectively hybridize with machin-

ery—timing tricks alone allow us to merge feedback after actions into a seamless, cyborg, conscious volition(5). Refs: [1] author et al. 2005. [2] Stetson, C. & Eagleman, D.M. 2005. [3] cf. Wegner, D. 2003. [4] cf.. Pereboom, D. 2001. [5] This talk was recently presented by invitation at The Advanced Telecomunications Institute, Keihanna Science City, Japan. We will be presenting new data. **PL4**

71 **Consciousness, Agency and Will** Julian Kiverstein, Till Vierkant <j.kiverstein@ed.ac.uk> (University of Edinburgh, Edinburgh, Scotland, United Kingdom)

All conscious experiences are the experiences of agents. If an experience is conscious, the information it carries will be available to an agent to be used in the service of its deliberate, reasoned, goal-directed action. In this paper we will explore the claim that experiences used in the service of goal-direction actions will embody a kind of agency-awareness. These experiences will form parts of feedback loops that include efferent and afferent signals. When a relation of coherence obtains between these two types of signals the agent will be aware of an experience as her experience. Susan Hurley (1998) called this type of agency-awareness, "non-conceptual self-consciousness". How do we get from the non-conceptual self-consciousness to the sort of self-consciousness characteristic of willed action? The sorts of agency-awareness that arise in the course of sensorimotor behaviour seem to be very different from mental agency that is required for willed action. We have a sense of owning our actions, but there is a growing body of evidence from both social psychology and cognitive neuroscience suggesting that we may not control or initiate our own actions. The sense we have of consciously choosing to initiate an action may be illusory. We will argue that the conclusion of this research may be overblown: there is a sense in which, all of this evidence notwithstanding, we nevertheless have a kind of control over our actions. In order to account for this sort of control we need to appeal to more conceptualised forms of self-consciousness. In particular we will explore the possibility that a full-blown capacity for metarepresentation more demanding than the sorts of metacognition involved in sensorimotor behaviour might be required for willed action. We will finish up by offering some speculative thoughts about the developmental path that might take us from the sorts of representations involved in sensorimotor behaviour to metarepresentation of the sort required for mental agency. We will suggest that the deliberative capacities delivered by layer 5 of Susan Hurley's Shared Circuits Model (see Hurley forthcoming) may take us some of the way, but they probably do not take us all the way. The more demanding forms of metarepresentation may be the outcome of using something more like a traditional theory of mind to read our own minds. References Hurley, S. forthcoming: "The Shared-Circuits Model: How Control, Mirroring, and Simulation can Enable Imitation, Deliberation and Mindreading." To appear in Behavioural and Brain Sciences Hurley, S. 1998: Consciousness in Action (Cambridge, MA: Harvard University Press) **C10**

*See also:*

245 **Inference at the Mercy of the Selection of the Implying**
327 **Crossing the Corpus Callosum: Clarifying Our Ontology, Redirecting Our Agency**

## *1.12 Intentionality and representation*

72 **Propositionalism and the Content of Experience** Enrico Grube <grube@mail.utexas.edu> (Philosophy, University of Texas at Austin, Austin, TX)

Intentionalism about phenomenal consciousness is the thesis that the qualitative character of perceptual experience, how things sensorily seem to us, is wholly determined by the contents of experience (e.g. Dretske 1995, Tye 1995 & 2000, Lycan 1996, Thau 2002). In its strong version, the relation is taken to be identity: phenomenal character is one and the same as representational content of a particular sort. This of course presupposes that perceptual experiences are intentional states and that in undergoing a perceptual experience the subject stands in a relation to a particular sort of intentional content. Propositionalism is the common assumption that the contents of experience, like the contents of all intentional states, are propositions, and that accordingly perceptual experiences are to be taken as certain kinds of propositional attitudes. This assumption raises a host of questions. In particular, much controversy centers on what kinds of propositions are represented in perceptual experience. Proponents of existentialism (e.g. McGinn 1982, Davies 1992, Tye 1995, Pautz 2007) take them to be existentially quantified propositions containing only general properties and relations, while proponents of singularism (e.g. Soteriou 2000, Loar 2003, Sainsbury 2006, Tye 2007) claim that they are singular propositions containing particular objects as well as properties. Both views typically appeal to certain aspects of the phenomenology of (veridical and non-veridical) experience as motivating the inclusion or exclusion of particular objects in the con-

tents of experience. On the one hand, existentialists argue that singularism cannot account for cases of hallucinations that are phenomenally indistinguishable from corresponding veridical experiences. On the other hand, singularists argue that existentialism cannot account for cases of veridical illusions arising as a result of deviant causation. Recently it has also been argued that neither singularism nor existentialism can adequately capture the phenomenology of space and time (Schroeder and Caplan 2007). I will argue that the solution to these difficulties lies in the rejection of propositionalism. The contents of experience are not propositions, whether singular or existential, but proposition-types. Proposition-types are properties of propositions, like the property of being about a red, round, bulgy object, or the property of being about a ripe tomato, or the property of being about David Chalmers. On this view, the qualitative character of experience is wholly determined by the content shared by propositions of a given type. I will argue that this view is well motivated by the phenomenology of experience, avoids the main problems facing both singularism and existentialism, and solves the challenge posed by the phenomenology of space and time. Intentionalism can thus be saved by adopting the non-propositionalist view that in undergoing an experience the subject stands in a relation not to a proposition, but rather to a particular property or proposition-type. **C9**

73 **Space Soul Blues: An Argument for Phenomenal Intentionality** Uriah Kriegel <theuriah@gmail.com> (Philosophy, University of Arizona, Tucson, AZ)

After presenting a thought-experiment, I argue that it shows (a) that virtually every theory of intentionality pursued in the past half-century is false and (b) that we cannot understand intentionality without understanding consciousness. **P1**

74 **Perceptual Phenomenology and Direct Realism** Caleb Liang <yiliang@ntu.edu.tw> (Philosophy, National Taiwan University, Taipei, Taiwan)

I discuss the so-called "problem of perception" in relation to the Argument from Illusion: Can we directly perceive the external world? According to Direct Realism, at least sometimes perception provides direct and immediate awareness of reality. But the Argument from Illusion threatens to undermine the possibility of genuine perception. In The Problem of Perception (2002), A. D. Smith proposes a novel defense of Direct Realism based on a careful study of perceptual phenomenology. According to his theory, the intentionality of perception is explained in terms of three phenomenological features of perception: phenomenal three-dimensional spatiality, movement, and the Anstoss. He argues that this account of perceptual intentionality can resist a central premise of the Argument from Illusion, i.e. the "sense-datum inference." After presenting Smith's theory, I argue that he fails to distinguish two different tasks for the direct realist: one is to show why sensory qualities must be considered as characterizing experiences themselves rather than the objects of experiences; the other is to show how perceptions differ from mere sensations with regard to intentionality. I argue that Smith fails to recognize that the two tasks are mutually independent, and that fulfilling one does not thereby fulfilling the other. I also argue that he underestimates the threat of the so-called "sense-datum infection," the idea that a partial illusion is sufficient for a sense-datum to replace the whole ordinary physical object as the immediate object of perceptual experience. Smith's defense of Direct Realism, I suggest, is crippled by the sense-datum infection. My contention is that even if Smith's theory of perceptual intentionality is correct, Direct Realism has not been saved from the Argument from Illusion. To resist the Argument from Illusion, it is not enough to merely consider how to block the sense-datum inference. The direct realist must also find a way to undermine the sense-datum infection. If so, I suggest, Direct Realism cannot be defended by perceptual phenomenology alone. **P1**

75 **Perceptual Constancy in the Representational Nature of Visual Experience** Jennifer Matey <jmatey@gmail.com> (Philosophy Department, Florida International University, Miami, FL)

When we have a veridical visual experience, a) the given visual experience matches the scene before the eyes in content, and, b) this matching experience bears a counterfactual dependence on the scene before the eyes such that if the scene were S, then the visual experience produced would be E, and if the scene S were entirely absent, the visual experience would not be E (Lewis 1987). Two types of theories vie to account for this relation. This paper supports the representational account of the seeing relation over the view that the content of perception is constituted by information instantiated in the perceived object. The argument proceeds in two stages. First, two common arguments for the representational view are presented. Alternative direct perception theories are then considered critically. One view considered in depth is the enactive-direct realist theory of Alva Noë. According to Noë's understanding of the representational view, it cannot be true both

that, 1) visual experience tells us about size, shape and color invariant properties of objects, and that 2) these experiences are the result of internally generated representations. Since we do see objects to have these properties, Noë argues, accurate visual experiences must not be representational. While it is correct that we see invariant properties of objects, this is shown to be consistent with the representational view. **P1**

76 **Consciousness and Color Physicalism** John Morrison <jrm377@nyu.edu> (Brooklyn, NY)

Many philosophers claim that when we consciously represent a color we thereby consciously represent a physical property. While there are many arguments for this claim, most of them depend on an assumption that, due to the quantum nature of light, implies that all objects are exactly the same color. The remaining arguments depend on assumptions that are equally problematic. **P7**

77 **What language does for consciousness: Socially fixed Signs and Consciousness 'that...'** Cathal O Madagain <cathalcom@gmail.com> (Philosophy, University of Toronto, Toronto, ON, Canada)

Is there a categorical difference between the kind of consciousness linguistic creatures can have and that of nonlinguistic creatures? The notion of the content of consciousness has undergone strenuous debate, with opponents taking sides on whether it is possible, or even necessary, to have 'nonconceptual contents' of consciousness (Peacocke, Tye, Heck, Kelly, Searle), or whether all consciousness must have a conceptual basis, which is delimited by the Fregean 'generality constraint' (Evans, Brandom, McDowell, Davidson, Sedivy), thus limiting conscious content properly-so-called to propositional content, or what I have called "consciousness 'that...'". In this paper, I argue that there is a resource that is available only to the linguistic creature – the representation of public properties – and that consciousness of propositions depends on such representation, which is made available via socially or publicly fixed signs. I present my case as follows: 1) I propose a model of our acquisition of the names of properties, showing that our names for properties rely on assumptions about the experience of other language users; 2) I argue that where we are successful in our acquisition of those names, we have become successful in identifying aspects of public experience; 3) I argue that it is only via this mechanism that we can make judgments about the content of shared or public experience, and 4) that such judgments are constitutive of claims about properties, that is, propositional claims (or, just 'claims'). Overall the paper argues for a single essential criterion for distinguishing linguistic from non-linguistic consciousness, that of the socially or publicly fixed sign, and to argue on that basis that only members of a linguistic community can entertain propositional thoughts, or consciousness 'that...'. The weight of the discussion is on the mechanism whereby signs come to represent features of experience as public (1), and on the suggestion that to entertain a propositional thought is to entertain a thought about the content of public experience (4). The goal is to explain in concrete terms the prohibition against propositional thought among nonlinguistic creatures that the conceptualists are keen to make, while still allowing for nonpropositional consciousness in nonlinguistic creatures (images, sounds etc), and to emphasize the important role of the social in consciousness. **P1**

78 **Ambiguous Figures and Representationalism** Nicoletta Orlandi <nico@rice.edu> (Philosophy, Rice University, Houston, Texas)

Fiona MacPherson has recently argued (Nous 2006) that certain ambiguous figures pose an insuperable problem for representationalists, particularly for representationalists that believe that the content of experience is non-conceptual. Representationalists hold that the phenomenal properties of experience are either identical with or supervene on the representational properties of experience. This means that if a subject has two experiences that differ in "what it is like" to have them then, normally, these two experiences will be ascribed different contents. For example, the difference between what it is like to see a yellow square and what it is like to see an orange circle is mirrored by the fact that, in one experience, a yellow square is represented, in the other, an orange circle is represented. Some representationalists hold further that we should be able to specify the contents of experience in non-conceptual terms, that is, by using concepts that the subject of experience does not herself possess. MacPherson argues that certain ambiguous figures pose a problem for non-conceptual representationalists because, in viewing ambiguous figures, a subject can have experiences that differ in what it is like to have them without differing in non-conceptual content. An example of such ambiguous figures is the square-regular diamond previously discussed by Peacocke: in viewing the square-regular diamond, the way the figure looks seems to change while what is represented by the visual experience stays the same. If this is true, then representationalism is false. I think that MacPherson is mistaken. In this paper, I explain what is involved in viewing

ambiguous figures like the square-regular diamond and I argue that such figures pose no problem for (non-conceptual) representationalism. Although viewing ambiguous figures often causes a change in how the figure looks this change is also always accompanied by a change in non-conceptual content. We can often specify the change in content by pointing to differences in appearance due to orientation. Orientation has been shown to play a crucial role in how figures and objects look (Rock 1994) and it is known to cause a number of visual illusions (like the Thatcher illusion). Orientation is also involved in explaining the visual shift in the square-regular diamond case. The subject can shift from an experience of a regular diamond "normally" oriented to an experience of a square "abnormally" oriented (and vice versa). Furthermore, the subject can experience the shift even without possessing the concepts of a square and of a regular diamond. Aspect shifts do not presuppose or require the possession of concepts but only the ability to direct and hold attention. **C15**

79 **Concepts Within Consciousness: A Model of Concept Acquisition and Application as a Process of Layering and De-Layering** Joel Parthemore <jep25@sussex.ac.uk> (Informatics, PAICS Research Group, Falmer, Brighton, UK)

Having a suitable theory of consciousness depends, arguably, on getting one's theory of concepts right. Concepts relate to consciousness through the medium of experience. John McDowell has famously argued that all experience is (fully) conceptualized, and others have argued that the extent to which something is an experience is precisely the extent to which it is conceptualized. Without taking that position, one might still argue that all experience is conceptualized to some extent, using something like Evans' Generality Constraint as one's metric; and that there is no experience that is fully non-conceptualized. Concepts, from this point of view, are, or form a large portion of, the expectations that drive experience. Think of them as a projection over top of non-conceptualized experience, all but obscuring it, so that we might be tempted to think that non-conceptualized experience (or simply less than fully conceptualized experience) is inconceivable. We see, hear, and feel what we expect to until the match between expectations and current evidence breaks down in a manner we cannot ignore, and we are forced to take a closer look. (Consider Heidegger's hammer.) As, perhaps, with language (for many philosophers, closely tied to concepts and conceptual content), they represent a tool that, once we have it, we literally cannot imagine doing without. The tool comes to feel intimately a part of us. Two of the more popular contemporary theories of concepts are the informational atomism of the rationalist Jerry Fodor and the proxytypes theory of the concept empiricist Jesse Prinz. This paper presents the outline of a mechanism for concept formation and subsequent application that bridges those accounts in a way that intimately relates concepts with experience. The account goes roughly like this: regularities in the perceptual stream are recognized as salient and remembered by the organism. Regularities in the regularities and regularities in those regularities form the basis first for low-level concepts (at this level, patterns of association, per an associationist account of concepts), then increasingly high-level concepts. The higher, the more abstract the level, the more the concepts may resemble the symbol-like structures as might be found in a "language of thought". The resulting concepts can then be matched in top-down fashion against their non-conceptual analogs in present perception, layer by layer, conceptual expectations based on past experience guiding and simplifying our interaction with our environment. As in the pattern recognition process itself, there will be in this reverse process of matching representations (concepts) with representeds (referents) a balancing of time required with degree of certainty. The goal is not a perfect match but sufficient correspondence as determined by the current needs of the organism as embedded in its environment. This is very close to the notion of "representation as control" that Imogen Dickie has talked about. It's also close, I think, to the aspects of the early Wittgenstein's Picture Theory that she wants to retain. In a catch-phrase: resemblance does not yield representation; representation yields resemblance. **P7**

80 **The Introspective Availability of Intentional Content** David Pitt <dpitt@calstatela.edu> (Philosophy, Los Angeles, CA)

Some analytic philosophers (myself included) have recently been defending the thesis that there's "something it's like" to consciously think a particular thought, which is qualitatively different from what it's like to be in any other kind of conscious mental state and from what it's like to think any other thought, and which constitutes the thought's intentional content. (I call this the "intentional phenomenology thesis"). One objection to this thesis concerns the introspective availability of such content: If it is true that intentional phenomenology is constitutive of intentional content, and that conscious phenomenology is always introspectively available, then it ought to be true that the content of any concept consciously entertained is always introspectively available. But it is not. For example, one can know introspectively that one is thinking that one knows that p with-

out knowing introspectively what the content of the concept of knowledge is. Hence, it cannot be that intentional content is constituted by cognitive phenomenology. I explore three responses to this objection. First, it is not clear that all of the contents of consciousness must be equally available to introspection. The capacities for conscious experience and introspective attention to it are distinct. It is not implausible that the resolving power of the latter might be insufficient to discern all of the fine-grained details of the former, or that its scope might be limited. Second, it is possible that in cases of incomplete accessibility one is entertaining only part of the concept the relevant term expresses in one's language. In the knowledge case, for example, perhaps one is thinking only that one has justified true belief that p (one's self-attribution of a thought about knowledge is in fact false). Finally, in such cases one might be consciously entertaining only part of the relevant concept, the rest remaining unconscious, and so unavailable to conscious introspection. I conclude that the objection is not decisive against the intentional phenomenology thesis. **C2**

81 **Intentionality and Non-Intentionality of Consciousness** Tatiana Postnikova <PostnikovaTV@gmail.com> (Faculty of Philosophy, Higher School of Economics (State University), Moscow, Russia)

The challenge of the paper is in consider the problem of non-intentional consciousness. It is necessary to investigate the concept of intentionality offered by European phenomenology and continued by analytical philosophy of mind. Further is planned to inquire into non-intentional conceptions of consciousness (both continental and analytical). Russian philosophy also contains its own conceptions of non-intentionality which planned to compare with abovementioned. The main aim of declared paper is the investigation of consciousness without appealing to its content. We need to scrutiny the problem of language of thought which emerges from the problem of content of consciousness. The concomitant research task is the consideration of the reality / illusion problem. Offered paper "Intentional and non-intentional consciousness" conventionally divided in three parts. First part of paper includes the problem of intentionality in different philosophical conceptions. We examine the issues of this theme in philosophy of Franz Brentano and Edmund Husserl. Intentionality is understood as directivity of consciousness to object. Further we consider the phenomenological projects of Jean-Paul Sartre and Maurise Merleau-Ponty. Here we need to concentrate in such concepts as 'intentionality', 'object', 'content of consciousness', 'language'. Consciousness in such conceptions is defined from the content, i.e. from object-phenomenons in consciousness. Linguistic and logical analysis of language which is used by Ludvig Wittgenstein and analytical tradition is an attempt to do the content of consciousness to be objective. Philosophers deduce the existence of consciousness making the analysis of sentences of language. Significant part of this project is the investigation of analytical intentional programmes of Daniel Dennett, John Searle, Jerry Fodor, Hilary Putnam, Thomas Nagel and other actual American philosophers. After all we must make the conclusion about intentional characteristics of consciousness and reasonably explain the succeeding transition to investigation of non-intentionality. At second part of paper – "non-intentionality of consciousness" expected to examine the conceptions of French philosopher Emmanuel Levinas, American philosopher John Searle and others. Searle talks in non-intentional 'background' intentional 'figures' appears. Searle called non-intentional amorphic and indefinite states, for example, feeling. In this part of project we must explain what we can get with the investigation of non-intentionality. As a result of analysis of intentionality we can make a conclusion of inadequacy of evaluation of consciousness by sentences of language. Here we can explore the existence of thought language and is the content of language both the content of consciousness or not? But mentioned non-intentional views is not exhaustingly elucidate the theme. In third part of paper we consider Russian conception of non-intentional consciousness presented by M.K. Mamardashvili. Non-intentional project of Mamardashvili involves the idea that consciousness is separated from the content of consciousness. Therefore language and consciousness becomes divided: Mamardashvili states that language is not describe consciousness because consciousness is metatheoretical towards the language. Mamardashvili offers to divide the consciousness and self-consciousness for dividing the objects of consciousness from the consciousness. F.I. Girenok offers to understand consciousness connected to emotion which is also non-intentional conception. **P7**

82 **Introspection and the Particularity of Perceptual Experience** Susanna Schellenberg <susanna.schellenberg@anu.edu.au> (Philosophy , Australian National University, Canberra, ACT, Australia)

Traditionally, there are two fundamentally different ways of thinking about perceptual experience. One is that perception is essentially a matter of representing objects, properties, or a scene. The other is that perception is essentially a matter of standing in an awareness or an acquaintance

relation to objects, properties, or a scene. I aim to show that these two approaches are not incompatible and indeed that perception is best thought of as both representational and relational. Intentionalism can easily account for how a perception and a hallucination can be phenomenologically indistinguishable. By contrast, relationalism can easily account for the particularity of perceptual experience. I argue that any account of perceptual experience should explain both the particularity of perception and the possibility that a perception and a hallucination are phenomenologically indistinguishable. I argue that these two desiderata can be accommodated if the content of experience is understood in terms of potentially gappy de re modes of presentation. This way of thinking about the content of experience makes it possible to acknowledge that a perception and a phenomenologically indistinguishable hallucination differ in content while recognizing that they have a common element. Defending this idea will require distinguishing actual particularity from phenomenological particularity. A mental state instantiates actual particularity if the subject is causally related to a particular object. A state instantiates phenomenological particularity, if it (perceptually) seems to the subject that there is a particular object present. I will argue that only phenomenological particularity is available through introspection. But actual particularity is reflected in the content of an accurate perceptual experience: which particular object the subject is related to makes a difference to the content of the experience. So I will argue that not all aspects of the content of experience is available through introspection. **C9**

83 **Strong Representationalism and Selective Attention** Roger C. Schriner <uuchris2@aol.com> (Unitarian Universalist Association, Fremont, CA)

Introspection informs us about the contents of current perceptions. But does it also provide access to the mental or physical states which carry such contents? In seeing a blue balloon, for example, subjects know they are having an experience that represents a balloon as blue. Are they also able to access internal phenomena such as bluish qualia or a mental image of a balloon? "Strong representationalists" such as Michael Tye deny that this is so. Tye has famously claimed that "phenomenology ain't in the head" (Ten Problems of Consciousness, p. 151). For Tye, introspection reveals only what experiences represent about the external world and one's own body. It does not inform us about how these states are represented in the mind and/or brain. Those who disagree with Tye have offered counterexamples, claiming that we can access aspects of introspectable experience which go beyond representational content. Some of these examples involve attentional features of experience. For instance, a drawing may at first look like a duck, but after a slight attentional shift it seems like a rabbit. Strong representationalists have persuasively replied to the duck-rabbit example and similar cases. But we can build a better argument by considering non-visual qualia such as body sensations. Suppose one's foot hurts. One's experience obviously changes when attention shifts from pain in the heel to pain in the arch. Yet such an attention-based foreground-background shift may involve little or no change in representational content. What changes is primarily our attentional focus. Heel-pain is in the foreground at first, and then arch-pain. Thus introspection informs us about internal conscious processes, over and above the contents represented by such processes. This paper will explore selective attention to bodily sensations as a counterexample to strong representationalism, and respond to possible rebuttals. **P1**

84 **Hume's missing shade of blue and the prospects of phenomenal concept empiricism** Par Sundstrom <par.sundstrom@philos.umu.se> (Philosophy and Linguistics, Umea University, Umeå, Sweden)

According to Hume, all our thought materials are derived from experience. Hume himself draws attention to a kind of case that may appear to be a counter-example to his view: if a person has experienced all colours except bright blue, it seems possible that she could supply herself with an idea of this shade and thereby think something she had never experienced. I shall consider the prospects of phenomenal concept empiricism (PCE) in view of this case. According to PCE, there is a range of concepts *Q1*…*Qn*, for a range of sensory qualities Q1…Qn, such that a subject can possess either of *Q1*…*Qn* only if she has experienced the quality that the concept stands for. I shall first (1) distinguish different versions of PCE, and identify some live options among them. Then (2) I spell out how these live options are threatened by Hume's case. Finally (3) I consider what attitude one can and ought to take to Hume's case vis-à-vis some version of PCE or other. (1) A phenomenal concept empiricist may hold different views about what it is to possess a phenomenal concept, and different accompanying views about why experiences are necessary to acquire such a concept. I distinguish three such views. According to Imagistic PCE, possessing a phenomenal concept *Q* consists (in part) in being able to intentionally "image" (e.g., visualise) the quality Q, and in order to intentionally image Q one must have experienced Q. According to Intellectualist PCE, possessing a phenomenal concept *Q* consists (in part) in understanding what the quality Q is like, and in

order to understand what Q is like one must have experienced Q. According to Recognitionalist PCE, possessing a phenomenal concept *Q* consists (in part) in being able to "recognise" Q, and in order to recognise Q one must have experienced Q. I claim that anthropological versions of these views are live theoretical options. According to these versions, the "experience-requirement" of concept possession is not absolute, but holds as a matter of human, psychological law. Such a thesis allows that Martians (say) can acquire phenomenal concepts without experience, and even that human subjects may do so under extraordinary circumstances. But it claims that it is still a robust, law-like regularity that human subjects require experiences to possess phenomenal concepts. (2) Hume's case threatens these live theoretical options, because it seems plausible that as a matter of typical, actual, human development, we acquire understanding, and abilities to image and recognise sensory qualities that we have not experienced on the basis of having experienced similar qualities. (3) One may take either of three attitudes to Hume's case vis-à-vis some version of PCE or other. One may hold (i) that the case is a fatal counter-example to the view; (ii) that the case is a non-fatal counter-example to the view; or (iii) that the case is not a counter-example to the view. I shall promote attitude (iii), and will conclude that there are versions of PCE, which are live options, and for which Hume's case is not a counter-example. **C16**

85 **Seeing Through Appearances** Brad Thompson <bthompso@smu.edu> (Philosophy, Southern Methodist University, Dallas, TX)

The phenomenon of perceptual constancy raises difficult questions in understanding the relationship between the phenomenal character of perceptual experiences and the intentional content of those experiences. Objects typically continue to "look the same size" and "look the same shape" as the perceiver changes his or her perceptual vantage point. Nonetheless, those objects will, in a different sense "look different" with respect to the sensuous appearance of size and shape. Similarly, objects can often "look the same color" as lighting conditions vary, while also "looking different" with regard to the phenomenal color appearances. Various attempts to make sense of what is going on in cases of perceptual constancy, with regard to phenomenal character and phenomenal content, will be explored. I will then argue for two conclusions. First, perceptual constancy shows the falsity of what I call "Presentationalism" – the view that the phenomenal content of a perceptual experience consists entirely in the representation of sensuous qualities. Second, I will argue against a "mixed view" according to which phenomenal content consists in the representation of sensuous qualities and the representation of additional properties (such as non-perspectival shapes and sizes) that are not sensuously manifest in experience. Instead, I will suggest a view according to which the sensuously manifest qualities present in perceptual experience – the qualities that change in cases of perceptual constancy – are not represented at all by perceptual experiences. Rather, the phenomenal content of perceptual experience is a matter of "seeing through" the changing appearances and representing properties that are not sensuously manifest. **C9**

86 **Does Self-Representational Theory of Consciousness necessarily involve a dual content structure?** Jerry Yang <jingder_yang@yahoo.com> (Ellery Eells Memorial Center for Philosophy of Science & Professional Ethics, National Taipei University of Technology, Taipei, Taiwan-R.O.C.)

Self-Representational Theory of Consciousness or Self-representationalism has been drawing attention from consciousness researchers recently as it appears to be a good candidate for a tenable reductive theory of consciousness. A mental state is conscious, according to this theory, when it is representing an object while being represented by that very same state. In my paper I point out that Self-representationalism does not need to commit to a dual content structure as its followers suggested. The line of their thought about it is this. They think that every mental state must involve either an object or an entity such as a rose, and the content of a representational state is what it represents as being the case, or as about that object. Moreover, if every mental state must require a representation of that state as they insisted, then that representation has to be either a separate mental state or the mental state in question itself. Given that Self-representationalism does not accept any higher-order monitoring thought, its representation hence has to be that mental state itself. Prima facie, Self-representationalism has a case for its dual content structure. I challenge this view by exploring the geographical profile a conscious state is endowed with. I argue that it is justified to claim that a conscious state is represented by itself if one is willing to concede that every mental state is s neural state or brain state and hence can only be represented by such state. The adoption of this view, however, does not entail that the representation of a conscious state thus carry a distinct content, much less a different set of truth-conditions. Each conscious state should be viewed as a state with one singular content but two different functions. We may first equate a conscious state with some neurophysiological or neuropsychological information produced by the brain. The con-

tent of each conscious state then plays a role as a space where such information can travel or emit between several places. "Information space" hence could be defined by a (neural) system of places in space between which such information signals can travel. A neural region hence is part of a single information space if such information bearing signals pass from one place to another through that region. The first function of a conscious state thus is to make its content an information space. The second function of a mental state, on the other hand, may be identified in such a way that to describe a state as representational, or has a representational basis, is to say that it has a function of self-representing. When one is conscious of or aware of being in a state, I argue, it is because certain neurophysiological or neuropsychological information self-represents itself, meaning such information informs one as to the way things are or shows one how things are. The position I hold here will be strengthened by bringing in an exploration of the transactions of one's body awareness such as one's body image and body schema. **P1**

*See also:*

35 **Three Kinds of Transparency**
74 **Perceptual Phenomenology and Direct Realism**
43 **Explaining the Explanatory Gap: Beyond Monism and Dualism**
85 **Seeing Through Appearances**
2 **The Reach of Phenomenal Consciousness**
81 **Intentionality and Non-Intentionality of Consciousness**
296 **Intentionality, the Peri-personal Space and the Psychotic Experience**
303 **Intentionality, Attention and Consciousness**
3 **What It Is Like to Think. On Cognitive Phenomenology, Functionalism, and Externalism**
97 **Introspection as Conscious Achievement**

## 1.13 Miscellaneous

87 **Perception, Language and Culture in a Semantic Turn: Consciousness as Meaning** Sergio Basbaum <sergiobasbaum@pucsp.br> (Ciências da Computação, Pontificia Universidade Catolica – São Paulo, São Paulo, Brazil)

In this work, we develop on our previous effort which suggested that consciousness should be thought of in cultural terms. Should we really aim for an unique and general abstraction expected to give account of all and every human experience, in spite of history, culture, language etc.? Wouldn't this involve a loss of meaning, since – in a heideggerian view – we are supposed to protect the richness of meaning of our living experience? We will then pursue some insights on the idea that consciousness is, first and above all, meaning: it is the presence (thus not representation), for me and with me, of a world already invested with meaning: a meaningful circumstance which starts in the tension between the body and its environment, in the operations of perception, which are expanded in – and also feedback informed by – language and culture. In this sense, consciousness is understood as this highly complex melting of emotions, affections, memory, desires, intentionality etc., coupled to cultural modulation from which emerge modes of making meaning, modes of constituting a world, of making a world, of interacting with a world, of existing in a world and of sharing the making of the intersubjective agreement on reality suggested by Husserl, and later by Merleau-Ponty. To support this, our main arguments come from the Phenomenology of Martin Heidegger and Maurice Merleau-Ponty, the Anthropology of the senses of Constance Classen and David Howes, the philosophy of language of Vilém Flusser and Horst Ruthroff, and the cognitive biology of Humberto Maturana and Francisco Varela. **P7**

88 **Extended Consciousness?** Andrew Brook <abrook@ccs.carleton.ca> (Institute of Cognitive Science, Carleton University, Ottawa, ON, Canada)

Clark and Chalmers' article promoting the Extended Mind Hypothesis (1998) has stirred up a lot of interest. Not much work has been done yet on a closely related question: If cognition extends beyond brain or body, what about consciousness? How far does it extend? In this paper, four phenomena relevant to the latter question are examined: One's conscious states being dependent on the sensitive surfaces of one body; the extent of conscious proprioception; how far behaviour that I can will directly extends ('basic actions'); and, how far the decision-making apparatus extends. The four put the boundary of one's consciousness in somewhat different places but in all cases fairly close to the traditional one. And they all face some troublesome cases – in particular, language, memory, and the external element in the content of conscious representations. **C17**

89 **Consciousness and the Three Bears** Andy Clark <andy.clark@ed.ac.uk> (Philosophy, Psychology and Language Sciences, University of Edinburgh, Scotland, UK, UK)

Can any set of facts about an agent's access to information, patterns of action, or tendencies to make judgments, actually imply the presence of full – blown qualitative consciousness or phenomenal experience? I shall argue for a positive response. In particular, I shall argue for a " Three Bears" model of qualitative perceptual experience. Qualitative perceptual experience, I suggest, is what you get when you have just the right amount of access to your own information processing. Not no access at all, nor full access to every detail of inner processing, but direct non – inferential access to indirect indicators of the kind of information – pickup and processing at work. Prime contenders for such indirect indicators include access to our own sensorimotor expectations, or (more abstractly, and perhaps more convincingly) awareness of the space of actions we are poised to perform. To imagine creatures possessed of such indirect access to their own information – processing routines is, I argue, to enter a necessarily zombie – free zone. **PL3**

90 **Machines or Sentient Beings: A Panpsychist Manifesto** Stephen Deiss <deiss@appliedneuro.com> (Biology – Neurobiology-, Neurobiology Section, Integrated System Neuroscience Lab, UC San Diego, La Jolla, CA)

The prevailing scientific view is that the problem of consciousness will be solved in time by elucidation of neural mechanisms (NCC), and that no deep mystery is involved. Consciousness is an emergent property of brains and found nowhere else in nature. Other non-brain systems are purely mechanistic without consciousness, lacking the requisite complexity needed to support it. The problem of consciousness will just evaporate as we learn more about how complex nervous systems process information. However, in spite of great advances in understanding how various neural subsystems produce various behaviors and how specific perceptual deficits depend on specific brain areas or global brain systems, there remains a lot of finger pointing (literally) as to where in all this complexity consciousness comes into existence. It is highly questionable whether the problem will actually be solved even if we can turn reports of consciousness off and on at will by some experimental manipulation. The question will remain "Why does that, in particular, make the brain conscious of anything?" whether it be thalamo-cortical loops, synchrony, or low level intracellular effects. In our pervasive scientific world view it is assumed that the universe is driven by mechanisms under the control of laws of nature. The word 'mechanism' comes from the same root as the word 'machine.' Machines do not possess feelings or sensations by definition. Everywhere science has probed into the mechanisms of nature, the need to add conscious experience seems to evaporate. Thermostats have no feelings, and though they have a temperature sensor, they do not have temperature sensations according to the book of science. This whole law-based mechanistic approach then leads to the impasse known as 'the hard problem.' At what point does a lump of tissue begin to sense the world around it and then itself? Why? The UNCC (universal correlates of consciousness) approach presented here will show that consciousness is a fundamental aspect of all natural systems, as fundamental as mass or charge. This requires understanding better what a natural system is as well as a clearer definition of what sentience and consciousness are, all clarified herein. The main problem is naïve understanding of the nature of scientific inquiry in general, and of laws of nature in particular, and how these produce our preconceptions about mechanisms, living and nonliving. The take home message is that every event in nature involves the interaction between some system and its environment, and every time something new happens in nature something is sensed and a change is made, a kind of natural decision process involving constrained interpretation of what is sensed based on reflective information about system self state. There is no wizard behind the curtain guiding nature. Nature is unfolding and making its own meaning as it goes, and that can be usefully construed as a conscious process. It has often been quipped that the solution to the problem of consciousness could one day turn on a very simple insight, something overlooked in all the hubbub. This could be it. **C8**

91 **Why the Mind is the Only Problem of the Mind-Body Problem?** Diana Gasparian <anaid6@yandex.ru> (Philosophical, Moscow State University, Moscow, Russia)

It is hard to deny that the difference between body and consciousness is not a material one. In other words, the connection between consciousness and objects can only be described as conceptual, but not as physical, chemical or biological. The problem is, however, that conceptual difference remains a part of consciousness. Conceptual connections presuppose the existence of a consciousness which sets them, these connections, in place. Therefore it may be more reasonable to enter a debate on consciousness in the language of consciousness itself, without resorting to the premises of physical experience. One cannot ignore the fact that all attempts to explain consciousness through "non-consciousness" (for example, "physical") are identified as "non-consciousness"

by consciousness itself. For example, when we say that the brain induces consciousness, we cannot get away from the fact that this "brain which induces my consciousness" exists in my consciousness: the experience of consciousness turns out to be inevitably wider than any objects or phenomena which, when summoned at various instances, produce consciousness. For example, when we say, "I experience a feeling of pleasure," the "pleasure" cannot be separated, even logically, from the "consciousness of pleasure." Therefore it might be more correct to say that, "my consciousness induces my brain which induces my consciousness". Thus if we attempt to approach consciousness as we approach the world of other objects, it is difficult not to notice at least one obvious difficulty. Namely, it is different from the situation when there is a human researcher and an object of his investigation; consequently, there is some experience which itself is investigated as opposed to that consciousness which is identical to man's experience. It cannot be separated from us; we cannot step aside from it or distance ourselves from it, for consciousness is non-spatial. Consciousness is not an object that can be enumerated or related to some other object. Also consciousness can not be defined through type or sort, not because consciousness is the most general idea, but because it is not an idea at all, but the source of all the ideas, schemes, and images, and the like. Therefore, in the question, "how should we understand consciousness", consciousness confirms the impossibility of its elimination, for understanding is but another name for consciousness. **P7**

92 **Can Inner Experience Be Faithfully Described?** Russell Hurlburt, Eric Schwitzgebel <russ@unlv.nevada.edu> (Psychology, University of Nevada, Las Vegas, Las Vegas, NV)

A discussion/debate and live-interview demonstration of Descriptive Experience Sampling with audience participation Psychologist Russ Hurlburt is known for his innovative methods of exploring inner experience. Philosopher is known for his skepticism about such methods. Hurlburt and Schwitzgebel will team up (perhaps "square off" would be a better term) and interview workshop attendees about the details of their inner experience. That interview will follow Hurlburt's Descriptive Experience Sampling (DES) method. We will simulate the DES random beep in the workshop environment and ask workshop attendees to pay attention to whatever experiences were ongoing at the moments of a half-dozen random beeps. Hurlburt, Schwitzgebel, and the other workshop attendees will question the volunteers about those beeps during what DES calls the "expositional interview." During these interviews, we (all workshop participants) will conduct "sidebar" discussions about: what are the characteristics of good and bad questions; how believable are the subjects' reports; to what extent do we "lead the witness"; etc. Hurlburt and Schwitzgebel have just completed a book (Describing Inner Experience? Proponent Meets Skeptic; MIT Press, 2007) that does much the same thing as this workshop. Hurlburt is the originator of the DES method to be used here. He was also the originator of formal thought sampling methods and was the first to use beepers in the exploration of inner experience (1974). He is the author of four books and many articles on the DES method. Schwitzgebel is a leading authority about introspection and a noted skeptic about subjective reports about conscious experience. Thus this workshop intends to shine bright lights from opposing directions on many of the important questions in consciousness studies: Is it possible to apprehend and describe inner experience faithfully? Are some methods of introspection better than others, and why? Can consciousness studies do without introspection? All these questions will be discussed in the context of reports about the concrete, just-occurred experiences of workshop participants. **C17**

93 **"Retooling Sense Datum Theory: On the Existence of Abstract and Imaginary Sense Data"** Scott Jackson, Scott A. Jackson <scottjaxon@gmail.com> (Humanities, Prescott College, Tucson, AZ)

The presentation examines philosopher's ideas of sense data in relation with abstract art and redefines object with a new distinction. Object is defined as a three-dimensional volumetric material thing that is detectable with three or more of the senses. The goal of this presentation is to establish an epistemologoical basis for a first-person science of consciousness and a scientific theory of imagination that acknowledges the existence of two new previously unrecognized forms of sense data: abstract and imaginary sense data. The presentation offers a cognitive model based upon Kant's Theory of the Transcendental Imagination and attempts to clarify a small part of the historical debate on sense data which concerns itself with explaining what 'sense data' are in relation to objects. An epistemological basis capable of establishing a first-person method and a scientific theory of the imagination will address an interdisciplinary crisis in consciousness studies, cognitive science and the philosophy mind. The crisis is that the scientific method of inquiry is incapable of studying subjective first-person conscious experience. Many scholars are actively seeking an epistemology or a first-person methodology capable of probing subjective consciousness. The scientific world view tends to undervalue first-person experience and its methods but the attempt to form

a science of consciousness has many scholars investigating eastern spiritual methods and western phenomenological or introspectionists methods, often without success. The epistemology of the imagination described in this presentation examines the observable existence of abstract and imaginary sensroy data from first and third person perspectives. **P1**

94 **Brentano and Husserl on Self-Consciousness Redux** Michal Klincewicz <michal.klincewicz@gmail.com> (New York, NY)

The historical debate between Franz Brentano and Edmund Husserl is important to understanding the contemporary debate on self-consciousness. Their respective theories are being elaborated on and defended by contemporary philosophers such as Dan Zahavi, Uriah Kriegel, and Joseph Levine. The problems that face Brentano's and Husserl's theories of self-consciousness reappear in their contemporary interpretations. On the one hand, Brentano's intentionalist theory depends on Aristotelian assumptions about the nature of mind that are contrary to some of the basic tenants of cognitive science. One of them is Aristotle understanding of sensation and the unconscious. By a close reading of Brentano's interpretation of Aristotle's De Anima and the secondary literature on it it becomes clear how Brentano's Aristotelian assumptions play a role in the neo-Brentanian theories of self-consciousness. Once exposed, these assumptions alone can be a sufficient reason to reject the neo-Brentanian theories. On the other hand, Husserl's phenomenological account inherits Cartesian assumptions about the relationship between consciousness and self-consciousness. This view posits a type of privileged access that the subject has to the nature of mentality and attempts to make a science out of the phenomenology of conscious experience. The role and nature of the subject of experience in this account is most problematic as it assumes an irreducible internality to all conscious phenomena. Analysis of Husserl's text reveals how the relationship between consciousness and self-consciousness as well as the Husserlian conception of the subject is explicitly or tacitly endorsed in the neo-Husserlian literature. This endorsement is problematic for the neo-Husserlian theories of self-consciousness. The reasons why these the intentionalist and the phenomenological approaches to theorizing about self-consciousness disappoint are not unrelated. Both the Brentanian and the Husserlian line commit themselves to the epistemological priority of first-person data that collapses the distinction between the reality and appearance of conscious experience. Furthermore, both views suppose an ontological dependence of intentionality on consciousness. Intentional properties are constituted, on their views, by consciousness. In contrast to these two approaches to self-consciousness I will present alternatives. First, I will appeal to some of the work of David Rosenthal and argue that self-consciousness is, paradoxically, a phenomena best understood in terms of unconscious intentionality. Rosenthal claims that higher-order thoughts that are responsible for a state being conscious contain a function from context of utterance to the individual represented and that this is sufficient to present a conscious state as belonging to us in a seemingly unmediated way. This position entails an unintuitive view about the nature of subjectivity and the subject of experience which is defended. **P1**

95 **Brain tricks with space and time** Natika Newton <nnewton@suffolk.lib.ny.us> (Philosophy, Nassau Community College, Setauket, NY)

Stereoscopic vision and perceptual consciousness share striking features. Each is a "pop-out" experience: one either has it or not, and knows the difference. Both concern basic spatiotemporal structures. Both are objectively unanalyzable: if you lack either, what you are missing cannot be verbally conveyed. And neither provides new empirical data. This paper proposes that philosophical and scientific comparisons of these phenomena could usefully illuminate key brain tricks. While stereo vision is itself part of perceptual consciousness, the mechanisms could be parallel. Steven Pinker is struck by the phenomenon of stereoscopic vision: I think stereo vision is one of the glories of nature and a paradigm of how other parts of the mind might work. Stereoscopic vision is information processing that we experience as a particular flavor of consciousness ... (Pinker 1997, p. 241) While the brain can calculate distances using visual data from each eye, true stereoscopic vision provides an experience that can not be created by linear development from calculations yielding depth perception. It requires a solution to the "correspondence problem" – matching marks in one eye with counterparts in the other, a process requiring massive preconscious parallel processing. When we experience the result unexpectedly, as when a random dot stereogram pops out, the qualitative effect of depth is a novelty. If we had never had it, we could not have known what was missing. Several reasons tempt one to explore Pinker's suggestion that the mechanisms of stereo vision provide a useful paradigm. First, in stereoscopic vision, the brain precisely matches components of two parallel displays, without conscious rule-following by a subject, to achieve an overlapping of objects in the visual field. A similar process may also occur among disparate temporal phases of conscious experience of the present. Nick Humphrey has recently proposed such a

mechanism: feed-back loops in which the neural activity responding to a sensory stimulus "interact with the very input to which they are a response – so as to become partly self-creating and self-sustaining. ... [to sustain this activity] there will have to be very fine tuning – a precise matching of input with output, so as to provide exactly the right degree of reinforcement of the signal in the loop" (2006, p. 122-123). Both accounts describe a type of experience that both subjectively and objectively is stunningly more than the sum of its parts. Second, both stereo vision and immediate consciousness are spatio-temporal phenomena. Pinker describes a visual experience of added robustness to the three-dimensionality of space: things "pop out" in three dimensions. In the same way, experienced time becomes robust. Humphrey refers to it as "thick": while we experience time as a continuous one-dimensional flow, events can unfold and linger in our awareness. Each present moment seems both wider and slower than the physical description would suggest. In one and the same present moment we "have time" to explore the experience while it is happening. **C6**

96 **Phenomenal Contrast and the High-level Contents of Consciousness** Susanna Siegel <ssiegel@fas.harvard.edu> (Harvard University, Cambridge, MA)

Is visual consciousness limited to color, shape and motion? Or does it include things such as causation (one ball hitting another), kinds (a tree looking like a pine tree), emotions (people looking happy), and other high-level properties (cars looking expensive, clouds looking threatening)? I discuss a method for answering this question, the method of phenomenal contrast, which proceeds by noting differences between relevant pairs of experience, and isolating the source of the difference. When applied properly, this method supports the idea that the contents of visual consciousness are rich enough to include causation and many high-level kinds. **PL7**

97 **Introspection as Conscious Achievement** Maja Spener <maja.spener@philosophy.ox.ac.uk> (Philosophy, University of Oxford, Oxford, United Kingdom)

Fred Dretske and Michael Tye argue for the view that introspective awareness of phenomenal character is analogous to deferred perceptual awareness of external-world states of affairs. According to them, such introspective awareness is awareness-that rather than awareness-of. A key motivation for this view is the so-called argument from transparency. I argue that the argument from transparency properly understood does not support the deferred perception model of introspection. Moreover, getting clear on why the argument from transparency fails to do so helps to articulate a short-coming of the perceptual model of introspection itself: the deferred perception model does not make room for the conception of introspection as a conscious subjective achievement. I will explain and defend the notion of conscious subjective achievement by contrasting it with the view – put forward recently by proponents of the idea of a sui generis phenomenology of thought – that introspection of a mental state requires having a conscious experience of that mental state. **C9**

98 **Heterophenomenology's Linguistic Idealism** Keith Turausky <bickbyro@gmail.com> (Tucson, AZ)

I argue herein that Daniel Dennett (or at least his "heterophenomenological method") has fallen prey to what might be deemed "linguistic idealism." That is, Dennett continues, despite at least one ostensible denial, to put a great deal of importance "on the possibility-in-principle of getting all the 'content' in an introspective judgment 'expressed' (or 'explicit') in a sentence." The intent of this paper is to challenge any such possibility, and in so doing to follow Diana Raffman's suggestion of "representation-based, as opposed to qualia-based, objections to Dennett's propositionalist program." In considering an alternative to linguistic idealism – -specifically, a position I call "weak ineffabilism" – -I will draw on relevant arguments from outside language, especially Raffman's thoughts on the ineffability of musical experience. I will then move from such specific cases to a general consideration of human language as an inherently incomplete and approximate system for expressing the contents of consciousness. Finally, I will extend Raffman's "nuance ineffability" argument to suggest that since certain contents of consciousness simply wash over our awareness and disappear – -unavailable for introspection, leaving us without a representation, memory, or proposition to verbalize – -attention cannot be necessary for consciousness. **P7**

99 **Attention, Seeing, and Change Blindness** Michael Tye <mtye@mail.utexas.edu> (Philosophy, The University of Texas at Austin, Austin, TX)

Some theorists maintain that there is a very tight connection between attending to a thing and seeing (or being visually conscious) of that thing. This talk sides with those who hold that there is such a connection but it is denied both that attending to a thing in the visual case requires seeing it and that seeing a thing requires attending to it. The talk also draws out the consequences of a proper understanding of the relationship of attention and seeing for a proper understanding of change blindness. **PL1**

100 **General Situated Cognition** Orlin Vakarelov <okv@u.arizona.edu> (Philsophy, University of Arizona, Tucson, AZ)

In the last 25 years the fields of Cognitive Science and AI have seen tremendous developments, but also a shattering of their foundations. Numerous proposals have been put forward for providing an architectural basis of Cognition and Intelligence: Classical symbolic approach, connectionist networks, dynamical systems, environmental robotics, distributed cognition, etc. In parallel to the foundational concerns, a consensus is emerging in certain parts of the Cognitive Science community that: (1) it is difficult to understand cognition as a phenomenon isolated from its environment (situatedness) and (2) cognitive capacities are essentially informational-control in nature. Thus, a question can be raised: Is it possible to provide a foundational account of cognition that (A) encompasses the alternative foundational approaches, exploiting their advantages and reconciling their differences, and (B) absorbs naturally the essentially situated and informational-control character of cognition? The goal of this project is to suggest a general theory of cognition that answers the question affirmatively – the theory of General Situated Cognition. The account makes the following basic assumptions: (1) A cognitive system is a part of the control system of an agent. (2) An agent is a "sufficiently causally shielded" dynamical sub-system of the environment. (3) An agent is an informationally deprived system, i.e. it perceives the world through an informational bottleneck, and it has low informational capacity in comparison with the environment. Based on these assumptions, we can view cognition as the capacity of the internal dynamical organization of the agent to overcome its informational limitation and improve its control capacities – more precisely, the complexity of cognition tracks the ability of the agent to lower its relative informational entropy with the aspects of the environment that are relevant for the agent, so that it can optimize its behaviour. General Situated Cognition needs to meet two major challenges to articulate this notion of cognition: (I) It needs an appropriate account of information; and, (II) it needs an appropriate and general architectural framework for cognition. To meet (I) I suggest that information be treated as an essentially dynamical notion, emerging in the description of the macroscopic characteristics of control connections in coupled dynamical systems. Thus, describing a system informationally is describing curtain aspects of its macroscopic dynamical behavior. The most natural way of formulating this idea precisely is to take as basic the notion of informational transformation, not information. Information can be defined as something similar to a "preserved quantity" under informational transformations. Particular advantages of this approach to information are that the notion is tightly connected to the dynamical properties of the agent and its relation of the environment, and that the control role of information is, in a sense, built into the notion of an informational transformation. To meet (II) I suggest that we should model cognition as an informational network: a system of informationally and causally interconnected informational media. Each medium is capable of engaging in information-processing transformations and is capable of engaging in causal/dynamical interactions with its surroundings (within the agent or within the environment). Both the informational and causal/dynamical properties of each medium can be attuned to the role it plays in the information network. The various foundational approaches discussed above can be modeled as special cases of informational networks; thus, my approach provides a proper generalization of the typical foundational approached discussed in Cognitive Science and AI literature. As such, it provided a platform for analysis and comparison of the advantages and disadvantages of its special cases. **P7**

101 **Dark Experience: methodologies for comprehending the experiential domain** James Clement van Pelt <james.vanpelt@yale.edu> (Initiative in Religion, Science & Technology, Yale Divinity School, New Haven, CT)

1. Experience can be conceived as an activity/process, the result of that activity/process, and the domain in which that activity occurs. Whereas the Global Workspace metaphor is applied in a functionalist sense to the individual's "space" of consciousness, Experience (capitalized to indicate the domain) can be conceived as the all-encompassing experiential equivalent of the physical domain. 2. Experience can be considered a domain in the same sense as the physical cosmos, evidencing experiential equivalents of the physical properties of the cosmos such as spatiality, dimensionality, temporality, objects, forces, and lawful interactions. For example, this domain's analogue to gravity is experienced as forms of desire. In theory, experiential properties, like those of the physical domain, should be subject to exploration, analysis, correlation, and eventually understanding via methodologies appropriate to the exploration of experience, e.g. first-person inquiry techniques. 3. The interface between the two domains is provided by the probability field (Eccles) out of which quantum phenomena produce the physical universe, and experiential instrumentalities produce the states and contents known collectively as consciousness. Though dimensionless, this field can be

conceived as a kind of two-dimensional membrane separating the two domains, through which information passes representing perceptions and intentions. In principle, the maximally-ephemeral aspect of the physical (possibly microtubule interactions or fluctuating synaptic potentials) and the minimally-ephemeral aspect of the experiential (possibly experiential primitives whose structures coruscate in parallel with neural patterns) interact with the probability field, which mediates between them. 4. Just as most matter (by far) in the physical universe has been determined to be "dark matter" imperceptible by known physical means, likewise the greater part of the substance of the experiential domain can be called Dark Experience. Normal "non-dark" experience is defined by one's interactions with the physical world, which can be comprehended, conceptualized, retained in articulable memory, and knit together into a provisional worldview. Dark Experience is experience of which the experiencer is fully aware on some level as it occurs, but which cannot ordinarily be conceived as sensory-phenomenal experience or otherwise articulated so it can be brought into "normal" consciousness. 5. Because Dark Experience does not derive from sensory-phenomenal forms accumulated from physical experience, it is subtler than the latter. The more "gross" sensory-phenomenal experience and the provisional worldview arising from it tend to obscure Dark Experience, leaving only a consciousness of the local sensory-phenomenal surface of the shoreless experiential ocean, consigning countless inconceivable perceptions and experiential entities at myriad levels to inaccessible subconsciousness. Experiences obscured in this way include one's potentially authentic experience of other persons (Buber's "I-Thou") as well as all but a garishly limited pallet of physical and emotional sensations. 6. A series of examples of Dark Experience will be cited, such as tacit experience (Polanyi, et. al.) and dream forms that "slip away" upon awakening because they cannot be comprehended within the frame ordinary experience. Finally, a series of techniques useful for exploring Dark Experience will be described briefly. 7. A cursory consideration of the domain of Experience and some of its basic features strongly suggests that the processes and structures of consciousness are not likely to be less complex, extensive, and deep than those of the physical domain. Any theory of consciousness that implies otherwise is likely to be misleadingly simplistic. **P1**

102 **Is Dennett's Multiple Drafts a Verifiable Hypothesis?** Dmitry Volkov <dvolkoff@gmail.com> (Philosophy, Moscow State University, Moscow, Russian Federation)

One of the key premises in Dennett's classical work "Consciousness Explained" (1991) was relativity of conscious content – "…there are no fixed facts about the stream of consciousness independent of particular probes" . Although it was an important part of Dennett's explanation, it turned out obscure in itself. And Dennett has spent more then a decade explaining his findings. In order to demonstrate what follows from famous Multiple Drafts Theory one of the advocates, S. Blackmore set up an experiment. Results were reported on the last Tucson Conference in 2006. In this presentation I would try to prove that the experiment "Driving beyond consciousness" was simply irrelevant to Dennett's hypothesis and suggest that MD Model is unverifiable in principle. In an attempt to test MDM Dr. Blackmore asked 17 subjects to drive an X-box auto simulator while listening to a CD through headphones. Subjects were probed 16 times during 20 minutes in two different ways either by a light appearing on the driving screen or by a buzzer in the headphones. Immediately after the signal subjects were asked what they were aware of. It was expected that more answers concerning driving would follow a visual notification, and more answers concerning music after an audio stimulus. As Multiple drafts theory predicts the answers given should depend on the nature of the probe used. "The results did not provide evidence for Dennett's MD theory", says Blackmore. 128 visual probes led to 74 responses concerning driving and 54 music, while from 127 audio probes driving was the answer 70 times, music – 57. Driving concerns were dominating no matter how participants were probed. May be "technique could be developed to provide better tests…" Indeed, a better technique is needed to verify Dennett's hypothesis. Dr. Blackmore tested as if probes during her experiment could only be externally initiated. Supposing that a particular type of external interruption should determine a type of narrative, she avoided the fact that there could be internal interruptions, that her subjects could initiate probes themselves. External stimuli could play just a secondary role – trigger ready-made reports. According to Dennett when a description of the world is needed a probe is made. So why wouldn't subjects, bored by the experiment, and waiting for an occasional signal couldn't be regularly initiating self scans? After all, their main task at the time was to stand by, wait for a recurrent call to report current content of their consciousness. Perhaps there may be an objection. If the interval between the external stimuli is long enough several autoprobes can be made, several judgments dumped into the memory. The mode of request, visual or auditory, should then withdraw a corresponding report thus proving or falsifying Dennett's theory. To that we can reply: only if autoprobes resulted in both types of judgments to be stored and if

both were equally "famous" and important for subjects. With this in mind we should assume that experiment allowed for too much noise which could undermine its persuasiveness. Perhaps repetitiveness of external interruptions diminished the accuracy of experiment by encouraging the subject to regularly probe her states. But it's also likely that autostimulation would spoil almost any possible attempt to verify Dennett's hypothesis. Behavioral criteria would suffice only if report and probe were both observable. On the other hand, if probe can sneak unattended, be hidden within the set of system's internal processes, can we in general design a proper testing environment? It seems possible to test Dennett's hypothesis only with subjects that lack self-probing capacity, like the blindsighted people. But what would it prove? Maybe just the difference between people with these disabilities and normal subjects **P1**

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82 **Introspection and the Particularity of Perceptual Experience**

# 2. Neuroscience

## 2.1 Neural correlates of consciousness (general)

103 **Into the Scanner, Out of the Body: Neural Correlates of Ketamine-Induced Alterations in Body Perception** Marco Benz, David Andel; Alex Gamma; Franz X. Vollenweider <marcoabenz@hotmail.com> (University Hospital of Psychiatry, Zurich, Switzerland, St. Gallen, Switzerland)

In humans, the N-methyl-D-aspartate (NMDA) receptor antagonist ketamine produces anaesthesia at high doses, while at lower doses it causes profound alterations in consciousness. These may include changes of space and time perception, depersonalisation, derealisation, altered affect and cognition as well as hallucinatory phenomena. Alterations in body perception are also commonly reported; these may range from "floating" sensations to pronounced body distortions or the subjective experience of the self being located outside the body. Such alterations and their neural underpinnings were the focus of the present analysis. We examined the effects of an intravenous subanaesthetic dose of (S)-ketamine on subjective experience and regional cerebral blood flow (rCBF) in 30 healthy human volunteers. Positron-emission tomography (PET) was used to measure rCBF as an index of brain activity. The 5D-ABZ questionnaire (Dittrich, Lamparter and Maurer, 1999), a visual-analog rating scale for characterizing altered states of consciousness, was used to assess subjective experience. We extracted three questions from the 5D-ABZ which explicitly address alterations or loss of spatial aspects of body perception: 1) the feeling of being body-less, 2)

the feeling of being located outside of one's own body, 3) the feeling of floating. Scores on these three items were summed and correlated with rCBF. We found a significant correlation between cortical activity in the right temporoparietal junction and the magnitude of alterations of spatial body perception. These findings are in line with previous reports implicating the temporoparietal junction in out-of-body experiences and suggest a central role for this region in mediating the experience of the self and body in space. **C12**

104 **A Possible Role for the Integrated Norepinephrine System in the Continuum of Consciousness** Nancy Craigmyle <ncmyle@ix.netcom.com> (The Gurdjieff Foundation, Carmel Valley, California)

Norepinephrine (NE) is thought to be the principal neuromodulator adapting the state of the brain and the body for optimal responding in known or unknown environments. The locus coeruleus (LC) and the sympathetic nervous system (SNS), the primary sources of central (C-NE) and peripheral (P-NE) norepinephrine, respectively, are thought to form an integrated system. This system is itself flexible, adapting to environmental contingencies. The LC projects throughout the brain, enhancing the signal to noise ratio increasingly during progressive states of awakening and modulating cortical and thalamic activity to optimize behavior. Long thought to fire in bursts exclusively during orienting to external novel or significant stimuli, the LC fires in bursts in response to activity in the cortical anterior cingulate (AC), from the first 150 ms of orienting throughout the self-generated decision-making and performance monitoring process. The AC, the most consistently activated brain area during Fmri studies of meditation, fires during orienting to novel or significant stimuli and rapidly modulates both phasic and tonic firing in the LC and the SNS to optimize behavior. During stress the AC usually elevates activity in the SNS. During orienting and the associated event related potentials, the AC inhibits the SNS, initiating the decreases in P-NE, skin conductance, heart rate and respiration rate associated with orienting and meditation. Activity in the SNS is inversely related to cortical activity. This modulation of cortical activity may occur primarily via the LC by way of the vagus and nucleus tractus solitarius. Elevated P-NE, which is released particularly during familiar stress with a known coping response available, dose-dependently lowers baseline firing in the LC. Relatively low, intermediate baseline firing in the LC is thought to optimize behavior in known environments through enhanced selective attention, large bursts to significant stimuli, reduced responding to low salience distractor stimuli and rapid well-learned responses. Elevated P-NE, in rats, similarly causes a dose-dependent behavior pattern of reduced responding to low salience distractor stimuli, rapid well-learned responses, and increased resistance to extinction. A parallel behavior pattern occurs in humans with elevated P-NE. In contrast, peripheral epinephrine, the well-known adrenalin of "fight or flight", which is preferentially released in response to novel stress, elevates LC baseline firing. Higher baseline firing in the LC is thought to optimize behavior in unknown environments through enhanced labile scanning attention, bursting to various low salience stimuli and reduced selective attention. Activity in the AC during orienting, by inhibiting the SNS and increasing baseline firing and bursting to low salience stimuli in the LC, would be expected to enhance receptivity to low salience stimuli. It is of interest that long-term practitioners of mindfulness meditation develop such an enhanced receptivity. While AC activity is evident during Fmri studies of meditation, the LC is not easily visualized by conventional Fmri. The new neuromelanin magnetic resonance imaging at Tesla 3, however, can visualize in-vivo changes in the LC and holds promise for future studies. **P2**

105 **Collisions in Consciousness: The Role of a Global Neuronal Workspace in Masking and Central Limits** Stanisloas Dehaene <standehaene@yahoo.fr> (INSERM-CEA Cognitive Neuroimaging Unit, Collège de France, Gif sur Yvette, France)

The global neuronal workspace model proposes that what we subjectively experience as consciousness is the global availability of information that enters a neuronal "workspace" circuit with divergent long-distance axons. According this view, although considerable specialized processing can occur non-consciously, access to consciousness is specifically associated with the entry of information relevant to the goals of the organism into a capacity-limited workspace system that serves to dispatch information to other processors. Neurally, access to the global workspace corresponds to the sudden ignition of a distributed parieto-prefrontal system and the simultaneous top-down amplification of relevant posterior networks. Because the workspace system is capacity-limited, it can only access a single item at a time. Thus, the channelling of information into the workspace system creates a competition between incoming stimuli which is reflected in phenomena such as masking, attentional blink, and other dual-task limitations. I shall present critical tests of the global neuronal workspace model using the phenomena of masking (experiments performed with Antoine Del Cul) and the psychological refractory period (with Mariano Sigman and Jérôme

Sackur). In both paradigms, we used high-density recordings of event-related potentials (ERPs) and high-temporal-resolution fMRI to track non-conscious and conscious stages of processing. ERPs indicate that masking interferes with a late (>270 ms) and sudden non-linear divergence in brain activation (P3 component) that correlates tightly with subjective reports of visibility, and occurs simultaneously in bilateral inferior prefrontal, posterior parietal and ventral temporal regions. Earlier stages of processing can occur without consciousness. A similar distinction between early non-conscious stages and a late central stage indexed by P3 was obtained in a dual-task called the psychological refractory period paradigm (PRP). ERPs show that the PRP leaves peripheral processing intact, but selectively delays a late and global activation of distributed prefrontal and parietal areas. A new fMRI analysis, which allows for a timing precision of ~150 ms, precisely delineates the relevant parietal and prefrontal areas involved in the central workspace. Introspective data confirm that, during the PRP, subjects are only aware of the central processing duration, thus supporting the postulated relation between central processing and conscious accessibility. **PL1**

106 **Toward the Neural Correlate of Nondual Awareness** Zoran Josipovic <ZJ108@aol.com> (Center for Neural Science, New York University, New York, NY)

This presentation is a theoretical exploration of nondual awareness, pure consciousness occurring with experience, and its relevance to the search for NCC. Nondual awareness, as understood in the Tibetan Buddhist traditions of Dzogchen and Mahamudra, and the Hindu traditions of Advaita Vedanta and Shaiva Siddhanta, is an advanced stage of meditative practice where all experiences are embraced by an awareness that is non-referential, holistic and self-knowing. The available fMRI and EEG data will be discussed, and the different models for the neural correlates of nondual awareness will be proposed, including the role of the neural correlates of space in the posterior parietal cortex (Josipovic, 2006), and the simultaneous balanced activation of the ordinarily anti-correlated neural networks (Malach & Josipovic, 2006). **C12**

107 **fMRI Studies of Deception** Daniel Langleben <langlebe@upenn.edu> (University of Pennsylvania, Philadelphia, PA)

Deceit is ubiquitous in humans. Objective and reproducible means of recognition of deception in others may drastically simplify the human condition. Progress in anatomy, physiology, medicine, psychology and physics, prompted the humankind to attempt applying those developments to the study and detection of deception. The arrival of functional Magnetic Resonance Imaging (fMRI), a reliable and safe measure of regional brain activity, led to attempts to utilize fMRI for lie-detection and to define deception in terms of basic cognitive operations (Langleben, Schroeder et al. 2002; Spence 2004). Though the applied experiments indicate the feasibility of using fMRI in conjunction with forced- choice paradigms to discriminate lie from truth in laboratory setting, the clinical future of this approach depends on successful translational studies and the deeper understanding of the cognitive nature of deception. The initial model of deception as inhibition of the truth may be an oversimplification (Aron 2007). Specifically, the mostly unexplored contributions of emotion, memory and theory of mind (Grezes, Frith et al. 2004) to brain activity during deception may determine the extent of individual variability of the brain fMRI response patterns during deception and thus the susceptibility to countermeasures, the limits of accuracy and the true clinical potential of fMRI-based lie-detector. References: Aron, A. R. (2007). “The neural basis of inhibition in cognitive control.” Neuroscientist 13(3): 214-28. Grezes, J., C. D. Frith, et al. (2004). “Inferring false beliefs from the actions of oneself and others: an fMRI study.” Neuroimage 21(2): 744-50. Langleben, D. D., L. Schroeder, et al. (2002). “Brain activity during simulated deception: an event-related functional magnetic resonance study.” Neuroimage 15(3): 727-32. Spence, S. A. (2004). “The deceptive brain.” J R Soc Med 97(1): 6-9. **PL9**

108 **Using fMRI to Detect Consciousness in the Absence of Behavioral Signs** Adrian Owen <adrian.owen@mrc-cbu.cam.ac.uk> (http://www.mrc-cbu.cam.ac.uk/~adrian, MRC Cognition and Brain Sciences Unit, Cambridge, UK)

The vegetative state is one of the least understood and most ethically troublesome conditions in modern medicine. It is a rare disorder in which patients who emerge from a coma appear to be awake, but show no signs of awareness. It is extremely difficult to assess cognitive function in such individuals, because their movements may be minimal or inconsistent, or because no cognitive output is possible. We have recently demonstrated that functional neuroimaging can identify residual cognitive function and even conscious awareness in some patients who are assumed to be vegetative, but still have abilities we cannot detect by standard clinical means. In this presentation I will describe a series of functional neuroimaging paradigms that systematically increase in complexity

with respect to the cognitive processes required, and therefore allow us to infer how much cognition remains based on 'normal' patterns of activation. At the lowest level, we examine responses to various sound and speech stimuli. A significant minority of vegetative patients produce speech-related responses in the superior temporal-lobe region that are indistinguishable from those in a healthy brain. More complex linguistic stimuli, which produce distinct patterns of activation associated with comprehension, also elicit normal responses in some, but fewer, patients. However, an appropriate neural response to the meaning of spoken sentences is not unequivocal evidence of awareness. For example, we have recently demonstrated that light sedation in healthy volunteers disrupts the 'normal' neural response to speech comprehension and is associated with a marked reduction in performance. We have therefore developed a new approach in which patients assumed to be vegetative are instructed to perform mental imagery tasks at specific points during the fMRI scan. Results from a small group confirm that some patients, diagnosed as vegetative, retain the ability to understand spoken commands and to respond via their brain activity rather than speech or movement. Reproducible and robust task-dependent responses to commands without the need for practice or training could be a novel way for some vegetative, minimally conscious, or locked in patients to use their residual cognitive capacities to communicate thoughts by modulating their own neural activity. Our pilot results in 16 healthy volunteers confirm that this method can be used to communicate real-time 'yes' and 'no' responses, without the need for any overt behavior, with 100% reliability. **PL9**

109 **Decoding monkey's conscious experience during ambiguous and unambiguous motion percept reveals initial non-conscious spike activity and later neuronal correlates of consciousness in area MT** Naotsugu Tsuchiya, Alexander Maier; Nikos K. Logothetis; David A. Leopold <naotsu@gmail.com> (Psychology & Neuroscience, Caltech, Pasadena, CA)

The class of ambiguous stimuli, such as the Necker cube or the Rubin's vase, is a powerful tool to study the neuronal correlates of consciousness; under the constant physical stimulation, the conscious experience of the stimulus spontaneously flips back and forth over time. Provided with careful and strict control measures, it is possible to train monkeys to report their percepts as they see such an ambiguous stimulus, which allows us to record neuronal activity directly related to the conscious experience [Leopold, Maier, and Logothetis 2003 Journal of Consciousness Studies]. Previous electrophysiological studies with concurrent behavioral measurements during ambiguous percepts concentrated on the trial-by-trial relationship between the activity of isolated single neurons and monkeys' reports. In these studies, either the stimulus or the recorded neuron was carefully selected so that the two alternative conscious experiences maximally differentiate the spike counts of the recorded neurons. Focusing on single neurons ignores a potentially information-rich signal: the temporal correlation in the spikes of neighboring neurons. We were interested to learn how and when the firing of many neurons began to reflect the conscious perception of an ambiguous stimulus over time. Specifically, we wanted to learn the extent to which we could track the development over time of a neural correlate of consciousness. To address this issue, we trained two monkeys to report their percepts while they were seeing an ambiguous structure-from-motion stimulus. We recorded neuronal activity from the motion sensitive area MT, with 8-10 microelectrodes, each of which was independently mobilized by micro-drives. We used a decoding approach to quantify how monkeys' reports are correlated with the activity of the simultaneously recorded multiple neurons over time. For the decoding analysis, we trained a pattern classifier (regularized least square classifier) using 70% of trials and decoded the percepts from neural activity for a test set (the rest of 30% of trials). The output from the classifier in the test set was submitted to signal detection analysis to obtain non-parametric bias free measure of decoding performance (area under the curve, A'). We used spike counts with a bin size of 100 msec and combined the counts from multiple neurons in each time bin in an optimal manner with linear weights estimated by the classifier. The time resolved decoding performance was compared between ambiguous and unambiguous conditions. The ambiguity was manipulated via binocular disparity. The decoding performance attained with >100 neurons in both conditions were very accurate (A'>.9. Chance decoding performance is A'=.5), although a significant difference emerged between the ambiguous and unambiguous conditions over time. For the unambiguous condition the decoding performance was very accurate from shortly after the stimulus onset (A'>.9) and remained high throughout the stimulus presentation. In a stark contrast, the decoding performance for the ambiguous condition built up gradually (almost linearly) over time, and reached at the peak (A'~.9) at around.4-.8 sec after the stimulus onset. Our results show that the initial neuronal activity evoked by the onset of a stimulus reflects the physical properties of the input and thus is less correlated with conscious percept, while the later activity is increasingly reflective of the conscious percept of the animal. **PL5**

*See also:*

134 **Neuroscience, Kant, and the Unity of Consciousness**
54 **How "Global" is HOT Theory?**
236 **Does the Brain Produce Conscious Experience or Merely Enhance and/or Articulate It?**
128 **Hodgkin-Huxley Revisited: On the Possible Role of Quantum Transitions and Quantum Coherence in Ion Channels for Neural Signaling**
168 **Feedback May Promote Sub-threshold Dot-Motion Detection**
161 **Could Panksepp's "Seeking" System Be the Key to the Problem of Consciousness?**
272 **Parietal Cortex Expansion, Working Memory, and the Emergence of Consciousness**
95 **Brain tricks with space and time**
301 **A Simple Description of Consciousness**
49 **Resolving The "Hard Problem" Within The Circuitry of an Individual's Brain: Binding The Phenomenal Qualities of Interiority and Exteriority**
170 **Consciousness in Mathematical Reasoning**
138 **The Neural Correlates of Emotions – A Neglected Subset of the Neural Correlates of Consciousness.**
112 **Local and Global Models of Visual Perception**
243 **The Nested Hierarchy Theory of Consciousness (NHTC)**
191 **The Effects of a Self-Evaluation Task on the P300 Event Related Potential**
188 **Between the Spider's Net and the Working Theatre**
290 **What's needed to move 'Toward a Science of Consciousness'**

## 2.2 Vision

110 **Constancy First; Then Details** Eduard Alto <eduard.alto@kolumbus.fi> (Vantaa, Finland)

Objects in the left and right visual hemifields fall differently on the left and right retinae and any eyes or object movement may nonlinearly change the relationship between these two reflections. And it could be easily shown by the simple diagram, from geometry, that for various objects (e.g. a bar located close to the eyes and tilted in depth) their visible orientations on the two retinae can be quite different (up to 15 degrees and even more) and may be perceived by binocular cells of the primary visual cortex (V1) as representations of the two different objects. Reconnaissance area can be rather large. Hence, binocular cells meet the challenging problem of corresponding stimuli identification due to the lack of fixed corresponding fields. Matching the stimuli requires additional extra information. It can be shown that the three-dimensional (3D) properties of the stimuli should be determined not after but before the matching process. And the second requirement, closely combined with the first, is spatial constancy that should be established during 3D image shape generating. Fortunately, all kinds of movements (including eye drift) continuously reorganize neuronal receptive fields into anisotropic ones and fold them into 3D form due to transitions of the synaptic activity pattern dependent on stimulus, from one set of synapses within the dendritic tree to another one. Some kind of rotation arises. And this implies that information from any single photoreceptor is retained and plays its role. This 3D rotation creates capability to determine real orientation of line or surface (e.g. relative mutual orientation of the two lines located in the different areas of V1 without any links between them) because the rotation's character depends on stimulus orientation.* So not transmission of visual information in itself should be the main organizing architectonic principle of the retina and the whole thalamo-cortical pathway, but these two: (1) rearranging of stimulus representation from 2D into 3D form and redirecting it to the continuously nonlinear alternating places within the whole 3D space of the image, and (2) establishing spatial constancy. The existing experimental data have already been sufficient to offer the realistic model for constancy mechanism in V1 in principle. And besides, the process is closely associated with time delay operations on information transmission, that are critically important for mysterious phenomenon of 3D space- and constancy perception, because they substitute for short-term memory providing thereby a unique possibility to directly compare several successive phases of the image and giving to the brain an idea of the three-dimensional shapes of the objects and space. As for the flows of detailed visual information in itself, they could be transmitted through a parallel system with their branches directed and redirected to the correct destination under control of the same 3D properties- and constancy-providing system. A microtubule (as a carrier agent) hypothesis could be proposed.*Stimuli deprived of their real physical volumetric features (like random dot stereograms mostly used in experiments) can not reveal many effects. **P8**

111 **The role of feedback in visual masking, visual awareness and attention** Stephen Macknik, Susana Martinez-Conde <macknik@neuralcorrelate.com> (Neurosurgery, Lab of Behavioral Neurophys, Barrow Neurological Institute, Phoenix, AZ)

We discuss the role of feedback in visual masking, visual awareness and attention. Our analysis reveals constraints for feedback mechanisms that limit their potential role in visual masking, and in other general brain functions. We propose a feedforward model of visual masking, and provide a hypothesis to explain the role of feedback in visual masking and general visual processing. We review the anatomy and physiology of feedback mechanisms, and propose that the massive ratio of feedback versus feedforward connections in the visual system may be explained solely by the critical need for top-down attentional modulation. We discuss the merits of visual masking as a tool to discover the neural correlates of consciousness, especially as compared to other popular illusions, such as binocular rivalry. Finally, we propose a new set of neurophysiological standards needed to establish whether any given neuron or brain circuit may be the neural substrate of awareness. **C4**

112 **Local and Global Models of Visual Perception** Rafael Malach <Rafi.malach@weizmann.ac.il> (Neurobiology , Weizmann Institute, Rehovot, ISRAEL)

In my talk I will address an extremely simple question (which unfortunately has a very complex answer)- how much of the human cerebral cortex is activated during a visual percept? Most prevalent models and experimental results argue unequivocally that any conscious visual percept leads to a wide-spread activity that engages not only posterior visual areas but also parietal and frontal networks whose function is presumably to "read out" the more posterior representations. However, careful consideration of many of the relevant studies show that an unavoidable component of this activity may be related to the use of stimulus-response paradigms whereby subjects are required to report their perceptual states. Examining fMRI activations under conditions where no report or introspective evaluation is requested- such as during an engaging movie, reveals a surprisingly limited fronto-parietal activation. Furthermore, the very same networks which are most likely to carry high order self-related processes actually appear to shut-off during intense sensory-motor perception. Thus, an alternative to global models of perception is proposed. In this model a visual percept could also be generated by local networks in posterior visual cortex. The fronto-parietal spread is then hypothesized to be associated with auxiliary, not necessarily perceptual components such as motor planning, attentional modulation, working memory and introspection. Supported by ISF grant 160/07. **PL5**

113 **Microsaccades drive illusory motion in "Enigma"** Susana Martinez-Conde, Xoana G. Troncoso; Stephen L. Macknik; Jorge Otero-Millan <smart@neuralcorrelate.com> (Neurobiology, Barrow Neurological Institute, Phoenix, AZ)

Visual images consisting of repetitive patterns can elicit striking illusory motion percepts. For almost 200 years, artists, psychologists and neuroscientists have debated whether this type of illusion originates in the eye or in the brain. For more than a decade, the controversy has centered on the powerful illusory motion perceived in the painting "The Enigma", created by op-artist Isia Leviant. However, no previous study has directly correlated the Enigma illusion to any specific physiological mechanism, and so the debate rages on. Here we show that microsaccades, a type of miniature eye movement produced during visual fixation, drive illusory motion in Enigma. We asked subjects to indicate when illusory motion sped up or slowed down during the observation of Enigma, while we simultaneously recorded their eye movements with high precision. Before "faster motion" periods, the probability and magnitude of microsaccades increased. Before "slower/no motion" periods, the probability and magnitude of microsaccades decreased. These results reveal a direct link between microsaccade production and the perception of illusory motion in Enigma, and rule out the hypothesis that the origin of the illusion is purely cortical. They also have important implications for other types of illusory motion effects arising from static images. **C4**

114 **Being Conscious of What is Reachable in the Peripersonal Space** Jeroen Smeets, Jeroen Smeets, Yann Coello, Alan Wing,Joan Lopez-Moliner, Bernard Pachoud, Angela Sirigu <J.Smeets@fbw.vu.nl> (Faculty of Human Movement Sciences, VU University Amsterdam, Amsterdam, Netherlands)

The conscious experience of a continuous external world contrasts to some extent with the conscious experience of a discontinuous action space: What we see is not what we can reach. More specifically, the world in which one moves and interacts is incredibly well-organised, and is lived as homogenous and continuous both through time and space. However, it seems obvious that interactions with this world are constrained by body properties. A cup can be grasped only if our arm is long enough to reach it, and only if our fingers are strong enough to lift it. Under these circum-

stances, functional boundaries acquired with experience must serve as the basis for intentional selection and optimal control of motor acts. We will present neuroscientific evidences that suggest that the underlying mechanism for perceptually determining what is reachable involves interactions between visual and motor representations. During visuo-spatial processing, motor representations can be implicitly activated to provide the self with information on the feasibility of potential actions. By simulating potential actions, the motor system can emulate and anticipate the sensory consequences of self-generated movements, which can subsequently be used to specify the limit of .the peripersonal space. Variation in the perceptual judgement of what is reachable when recalibrating the visuo-motor system, in presence of an impaired sensory motor system due to peripheral deafferentation, or when inhibiting motor brain areas using TMS provide arguments in favour of the simulation hypothesis and suggest that representations of the body at both the experiential and functional level serve as the basis for categorising external space. **C10**

115 **Our eyeballs – dual vibration / vision sensors** Ashley Willis <ashley.willis@arup.com.au> (Structural Engineer, Arup, Melbourne, Victoria, Australia)

Our eyeballs – dual vibration / vision sensors I would like to introduce the concept that the eye's evolved to do more than just sense light – they are also intrinsically involved in the perception of sound. The ocular muscles are known to be responsible to swivel the eyeball. I suggest that this action necessarily induces waveforms to reverberate within the eyeball massive – the vitreous humour. I hypothesis that the entrained spherical waves distort the in vivo blood vessels which transmit a tangible electro-cortical response up the optic nerve to the CNS, which "learns" to "identify" patterns, and hence evolve "sense". This system inherently gives the eyes dual function – to sense light & help perceive sound. This may help explain the eyeball's physiology – which conventionally, remains paradoxical. For example, an intact sclera should aid 3D harmonics; the cornea's layering and eyeball saccades may well advantage vibration sensing / perception. In the presentation I will go into detail as to how I believe this physical system behaves. I will introduce my view that bifurcated physiological loops may well aid the onset of perceptual awareness. This system is very simple & easy to understand (up to the point of embedding consciousness itself). Coming from an engineering background I propose that calibrated parametric modelling may be useful in scientifically verifying the eyeball's vibration capabilities. This would provide a framework to greatly aid our understanding of perception, the interlinking of the senses – light and sound may be sensed only millimetres apart! – and the sensory systems synergy with the CNS. Conclusion Positing the eye as being a dual vibration and vision receptor, holds basic implications for the • Pre-vision morphological evolution of the eyeball, symbiotic with • Evolutionary development of the greater CNS, which may have conjointly facilitated the Synergetic development of the auditory system, leading to a • Theoretical framework for sense and inter-sense evolution. (Currently viewed retrospectively as Cross-Modality of Sensory Perception) • Understanding of biological evolution, linking habitat-induced morphological adaptation with incipient awareness. The duplicated ear and eye functionality (vibration detection), leads to • Defining awareness as rising from the self-referential correlation of multiple sensory mechanisms with external stimuli. • A basic framework to compare animal awareness. • Inquiring whether the enmeshing of a bifurcated vibration-sensory duality is related to one's concept of time. The exceedingly simple postulate – that the eyeball can sense vibration – provides a new framework towards greater understanding of evolution – of species, the CNS and, it is postulated, awareness, summarised within the statement: The eye-CNS-ear synergy which internally correlates sound wave stimuli is fundamentally aware. Could this be developed into real theory, provide clarity and be universally applicable? I would love to hear your response. **P2**

*See also:*

136 **Episodic global synchrony at all frequencies: implications for discrete/continuous consciousness debate.**
111 **The role of feedback in visual masking, visual awareness and attention**
109 **Decoding monkey's conscious experience during ambiguous and unambiguous motion percept reveals initial non-conscious spike activity and later neuronal correlates of consciousness in area MT**
8 **Action and Visual Consciousness**
167 **Transient Neglect: How a Visual Short-Term Memory Task Leads to Impaired Awareness for Objects in the Left Visual Field**
113 **Microsaccades drive illusory motion in "Enigma"**
119 **Consciousness Is Involved in Fine-Grained Motor Action, Sort Of**

## 2.3 Other sensory modalities

116 **The bodily self: from body-perception to body-ownership** Manos Tsakiris <manos.tsakiris@rhul.ac.uk> (Psychology, Royal Holloway University of London, Surrey, United Kingdom)

We constantly feel, see and move our body, and have no doubt that it is our own. "Body ownership" refers to the special perceptual status of one's own body, the sense that bodily sensations are unique to one's self This sense of 'body-ownership' is a basic form of self-consciousness. Correct demarcation of the physical body's boundaries seems to be essential for goal-directed action, for our sense of who we are and for our successful interaction with other agents. In a series of experiments, we studied the functional and neural signatures of body-ownership by controlling whether an external object was accepted as part of the body or not. Consistent results suggest that body-ownership arises as an interaction between multisensory perception and representations of the body's permanent structure: current sensory integration is modulated by top-down processes reflecting a pre-existing reference of the postural and visual features of one's body. This functional interaction has identifiable neural signatures in the right hemisphere. The right temporo-parietal junction modulates the assimilation of sensory signals to a model of one's body, while the subjective experience of body-ownership is correlated to activity in the right posterior insula. These structures may form a network that plays a fundamental role in self-consciousness. **C10**

*See also:*

146 **Can Global Workspace Theory and State Dependent Network Theory Explain Libet?**

## 2.4 Motor control

117 **The New Empirical Muscles of the Theory of Ideo-Motor Action** Maria Brincker <mbrincker@gc.cuny.edu> (City University of New York, Graduate Center, Brooklyn, )

The ideo-motor theory of action dates back probably 150 years and was famously developed by James in Principles of Psychology. The concept have been used to explain various phenomena, but what interests me is the basic suggestion that action commands are initiated by thoughts or mental images of the motor goal or desired effect of the action. Amble empirical evidence has been found over the years that seem to support something like such an ideo-motor process. The important and largely unanswered question is what kind of neurobiological process that could possibly be theorized to underlie ideo-motor action initiation. Interestingly our expanding knowledge of action and the workings of motor planning, execution and control processes seem to very favorable to an idea of ideo-motor story, but further seems to provide the neurobiological meat for a more informative ideo-motor theory. I shall in my talk try to outline such a neurobiological ideo-motor theory where the representation of the action goal is used as an initiator and as online control for action. A crucial element in this theory is a focus on the largely unconscious processes by which we come to represent the motor goal. My hypothesis is that our motor system is involved in automatically sketching presently possible and desired responses to ideas and external situations. Thus thinking of a desired goal of an action is normally already embedded in sensory-motor sketches of how this goal is obtainable for us right now, and it seems that it is exactly when a goal is practically embedded in this sensory-motor way that an action can be initiated by ideo-motor means. On the basis of the theoretical outline I firstly suggest that this theory makes many processes of action prediction and control – such as for example theories of 'efference copies' and forward models etc. commonly assumed in cognitive theories – look different and perhaps superfluous. Secondly, I shall try to show the explanatory potency of an ideo-motor reinterpretation of many aspects of common action theory in regards to various clinical and experimental data. Lastly I shall venture to suggest that the ideo-motor theory provides an interesting basis for a more coherent explanation of the function of consciousness and the motor system in general. **P2**

118 **Time Course of Brain Activity During the Intention to Speak** Francesca Carota, FRANCESCA CAROTA; ANDRES POSADA; CLAUDE DELPUECH*; ANGELA SIRIGU Center for Cognitive Neuroscience, CNRS, Lyon, France *INSERM U821, Hôpital Le Vinatier, Lyon, France <Francesca.Carota@isc.cnrs.fr> (CNC, CNRS, BRON, FRANCE)

When speaking, we need to select our preferred speech act in coherence with self-initiation of temporally organised sequences of articulatory motor acts. Motor control theories postulate that during movement execution the CNS generates a forward model, in order to predict the sensory consequences of an action. Forward models ensure such a prediction using the efference copy, well

ahead sensory feedback is available. We suggested that the parietal cortex may be important in maintaining such model (Sirigu, /Science/, et al.1996; Sirigu et al, /Nature Neuroscience/, 2004). Indeed, left inferior parietal lesion alters the ability to report the time at which movement intention arises. One question that remains open is whether parietal regions play a multimodal role in movement prediction and awareness. In other words, is the parietal cortex important for movement awareness in other domains such as speech? We used a paradigm based on Libet's temporal judgment task (1983). Subjects were asked to feel free to pronounce a word and then to report verbally: (a) the time when /first intended/ to speak (Intention condition), (b) the time when /they actually spoke /(Speech condition). We used Magnetoencephalography (MEG) to explore the time-course of the neural activities associated with awareness of intention to speak. Results revealed the involvement of the right parietal cortex during conscious monitoring of the intention to speak before actual speech. This activity was found about 400ms before subjects reported the time of their intention to begin pronouncing the word. These results support the hypothesis that the parietal cortex is a key region for movement planning and movement intention whether this is a hand action or a linguistic act. **PL2**

119 **Consciousness Is Involved in Fine-Grained Motor Action, Sort Of** Benjamin Kozuch <bigben@email.arizona.edu> (Philosophy, University of Arizona, Tucson, AZ)

Enjoying some consensus in the cognitive science community are the ideas that the ventral visual processing stream is the neural basis of visual consciousness, and that the function of the ventral stream is creating representations of objects for use in reasoning and planning, but not in the production of fine-grained motor actions. Recently, these ideas have been used by Andy Clark (2001) to advance the claim that our visually conscious representations do not play any important role in the execution of our fine-grained motor actions. This has resulted in an exchange with Morgan Wallhagen (Wallhagen 2007; Clark 2007), wherein Clark has argued that the information used to produce our fine-grained actions is not represented within our conscious visual experience, while Wallhagen has presented reasons for thinking it is. In this presentation I offer a fresh analysis of this issue. As of yet, the debate has neglected to consider a certain component of our conscious experience, what I refer to as our basic visual phenomenology. This consists of a spatiotemporal arrangement of colors and/or textures. Representations of objects within the basic phenomenology should not be construed as representing viewpoint-independent properties of an object (e.g., its size), and therefore cannot be said to directly correspond to those representations used in reasoning, or in motor action. Instead, they are egocentric representations that (a) are not properly seen as representing the size of the object, and (b) are precursors to both those representations used in reasoning, and those used in motor actions. This brings us to the conclusion that information within conscious visual experience is indeed used in fine-grained motor action, but not as directly as we might pre-theoretically have thought. This holds consequences for the neural correlates of visual consciousness, as the idea that conscious visual experience is isolated to the ventral stream seems unlikely when we consider many of the attributes the basic phenomenology holds. Various alternatives will be considered. **C4**

120 **Consciousness Out Of Control** Myrto Mylopoulos <myrto.mylopoulos@gmail.com> (Philosophy, Graduate Center, City University of New York, New York, NY)

That we commonly enjoy control over many of our bodily movements is hardly controversial. In this paper, I will examine one very special feature of action control, viz., its relationship with consciousness. Specifically, I will examine the intuition that bodily movements over which we have control typically involve conscious mental states, whereas bodily movements over which we do not have control, typically do not. The paper is divided into three sections. First, I describe in greater detail the question at hand, which is not to be confused with the important but distinct question of the role of consciousness in intentional action. Next, I isolate and discuss two specific features thought to be sufficient in order for one to say that one has control over one's bodily movements, viz., monitoring and inhibition. Finally, I argue that, contrary to what is often, at least tacitly, supposed, consciousness is not necessary for the monitoring or the inhibition of bodily movements, and thus not for action control in general. I draw on recent research in cognitive neuroscience for support. Sources 1. Dienes, Z. & Perner, J. (2007). Executive control without awareness: the cold control theory of hypnosis. In G. Jamieson (Ed.), Hypnosis and conscious states: The cognitive neuroscience perspective (pp. 293-314). Oxford, UK: Oxford University Press. 2. Haggard, P. (2003). Conscious awareness of intention and action. In J. Roessler & N. Eilan (Eds.), Agency and self-awareness: Issues in philosophy and psychology (p.111-127). Oxford, UK: Oxford University Press. 3. Humphreys, G.W. & Riddoch, M.J. (2003). Fractionating the Intentional Control of Behaviour: A Neuropsychological Analysis. In J. Roessler & N. Eilan (Eds.), Agency

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121 **Lost in Space- "Inverted Positioning Sensation"(IPS):as of yet Unidentified Contributing Cause For ADHD and/or LD** Rowe Young <rowey@aol.com> (Psychology, University of CT (retired), Tucson , AZ)

Human reasoning has evolved in part from the integration of our ability to sense dimensionally both the front and the back side of movement and its physical position in space. It is proposed that the interaction of visual and aural senses along with motor sensory positioning mechanisms, orchestrated by the parietal lobe (proprioception), is central to the evolution of enhanced abstract reasoning. Awareness of body movement and spatial positioning is thus an overlooked, central component of the human capacity to learn. Deficits in this area we propose, can directly impact all forms of symbolic comprehension. This research suggests that movement and positioning sensory mechanisms can sometimes be flawed, producing reversals in perception of motion and position in space. Such impairment may be evidenced by reversals in the feeling of movement, inverted body part sensation, and possibly confounded by inappropriate lateral eye dominance involvement. It is hypothesized that such impairment results from genetically acquired "neural wiring." We have labeled this impairment "inverted positioning sensation" (IPS). This research, through self report, observation, and testing using the YGLD (Young-Ginsberg Lateral Direction) assessment has identified many LD identified subjects who evidence IPS. Individuals with IPS symptoms and diagnosed LD found in 8 multigenerational families are identified in our data further suggesting a familial link. Observed and reported constellations of IPS varies from one subject to another. For example, one subject may sense inverted movements of a left foot, or sense a backward feeling right hand and/or arm. These reversed sensations can occur on one side of the body or on both, and in different body locations depending upon the subject. Several patterns related to IPS have emerged that are predictive of early academic underachievement. Usually, IPS is unrecognized by these subjects until they are asked to concentrate and report a possible difference in feeling when comparing a body part to its opposite side, and/or identified preferring to work from the bottom up on bi-manual rotational tasks. It is hypothesized that persons with IPS unknowingly learn to compensate for their misperceptions, and thus fail to recognize their presence. Individuals identified` with IPS often evidence a history of underachievement in areas where organization, written descriptions and symbolic understanding are required. Thus, classic components of much academic underachievement and or a lack of self confidence often co-occur with IPS. **P2**

*See also:*

120 **Consciousness Out Of Control**

## 2.5 Memory and learning

*See:*

247 **Does the brain implement some form of delay coordinate embedding?**

## 2.7 Neuropsychology and neuropathology

122 **Does Autism Spectrum Disorder Provide Any Insight Into the Conscious State?** Timothy DeLorey <tim@molres.org> (Neuropharmacology, Molecular Research Institute, Palo Alto)

Autism Spectrum Disorder (ASD) is a prevalent disorder that appears to be on the rise. To be diagnosed with ASD, an individual must exhibit each of the following abnormalities, deficits in normal social interactions, restricted interests/repetitive behaviors and abnormalities in verbal and non-verbal communication. However an opposing view, which is also supported by high functioning autistic individuals themselves, suggests that at the root of autism, resides a malfunctioning sensory processing system and that the above triad of diagnostic symptoms manifests from this faulty system. As sensory processing is essential to our conscious experience, a major deficits in this processing would likely lead to a skewed sense of the world. The brain region known as the thalamus, has been suggested to serve as the "gateway to consciousness" with the reticular thalamic nucleus (RTN) being an essential component of the "Searchlight" hypothesis. Although, mammals with less complex brains are not thought to be conscious in the same manner as we think of ourselves as being conscious, they do however, also possess a thalamus, which is used in a similar fashion to our own, to sample and process sensory stimuli in order to thrive within the surrounding environment. Therefore, understanding how this processing unit works in mammals or more importantly, how deficits in its ability to perform appropriately could compromise the overall success of that mammal, could provide valuable insight into what a human with a faulty RTN might experience in regards to sensing the world in which they exist. **C5**

123 **Autism Spectrum Disorders – Neurological Abnormality and/or Cramped State of Communication Shutdown?** Erik Engdahl <erik.engdahl@spray.se> (Quantum Chemistry, Uppsala University, Uppsala, Sweden)

Burns and Engdahl (1998) stressed the importance of symbolic communication in order for individual consciousness to emerge. The cornerstone is that external reflectivity at some stage of development, phylogenetically as well as ontogenetically, gets internalised. The development of individual consciousness is limited under conditions so that a person fails to acquire tools of language (verbal, sign based, etc.) and learn collective representations of self and self's activities. One such type of limited development is displayed by autism spectrum disorders (ASD). A not uncommon phenomenon known by many parents and pedagogues but seldom investigated in research literature on ASD is that occasionally people with autism indeed may be in communication for a short moment. This phenomenon may be the basis for the nowadays obsolete view that people with autism are imprisoned inside a "glass bulb." This work claims that the above-mentioned occasions of communication are momentary departures from a persistent cramped state of communication shutdown. The maintenance of the cramped state is a kind of on-going activity. The primary aspect of communication is to ensure that the communication channel remains open, something which is a non-activity within the ground or resting state of life, thus not requiring any particular ability. The secondary aspect of communication is to send or receive something through the open channel. ASD debuts early in life. In many cases, the development before the debut is good or even better than habitual. Upon careful retrospection in search for early symptoms, precursors can often be found. These precursors are in this work viewed as semi-persistent cramped states of communication shutdown. For most children such states remain semi-persistent, while they become persistent due to a neurological fragility, thus socially inevitable. For many cognitive abilities to develop into full functionality, communication is necessary. This concerns e.g. language, "mind reading," reflectivity of mind, impulse system, and self-preservation. Thus, distorted development is expected when in persistent state of communication shutdown. For development, it is the very existence of communication that is necessary for development rather than the good, pleasant, loving quality of it. The qualitative aspects of the communication may influence personality on a higher level. Symptoms would remain even in cases of later partial abandonment of the cramped state due to failed use of development time-windows when open. Burns and Engdahl (1998) elaborated on the individual reflectivity which develops by internalisation through symbolic communication. Something other to internalise is an impulse system. The everyday life as well as non-routine activities consist of a multitude of procedures. In order to remember to remember to remember... ...to perform them, a functional impulse system is necessary. If one fails early in life to internalise the impulse system, it may be possible to compensate for this by tailor-making rituals in order to ensure that external impulses are generated when needed. Reference: T.R. Burns and E. Engdahl, "The Social Construction of Consciousness" – Part 1: "Collective consciousness and its Socio-Cultural Foundations", J. of Consciousness Studies 5(1), 67-85(1998). Part 2: "Individual Selves, Self-Awareness, and Reflectivity", J. of Consciousness Studies 5(2), 166-84(1998). **P2**

124 **Auditory Hallucinations and the Bicameral Mind: New Evidence for Julian Jaynes's Neurological Model** Marcel Kuijsten <mkuijsten@hotmail.com> (Julian Jaynes Society, Henderson, NV)

Thirty years ago the psychologist Julian Jaynes presented a compelling and controversial theory of consciousness in The Origin of Consciousness in the Breakdown of the Bicameral Mind. In it he argues that consciousness (roughly, 'introspective mind-space') did not arise far back in animal evolution but is a learned process based on metaphorical language, and that prior to it's development humans operated under a previous mental model called the bicameral ('two-chambered') mind. According to Jaynes, the bicameral mode of thinking evolved along with language to facilitate information exchange between hemispheres and served as a form of control system to hold large societies together. In bicameral societies, decision-making in stressful situations is based on auditory hallucination – similar in many ways to the command hallucinations experienced by modern people with schizophrenia. Jaynes proposed a neurological model for the bicameral mind, reasoning that the areas responsible for auditory hallucinations would be the right temporal-parietal lobe areas corresponding to the language areas of the left hemisphere. He based this on three primary areas of research: studies that demonstrated auditory hallucinations in the right hemisphere under electrical stimulation; research that showed right hemisphere language competence; and studies of split-brain patients that demonstrated that the brain hemispheres can function independently. According to Jaynes, the right hemisphere issued behavioral commands in the form of auditory verbal hallucinations to the acting left hemisphere. The individual experienced these voices as the commands of their tribal leader, king, or "the gods." Although Jaynes found a great deal of evidence to support the general idea in ancient texts and history, he knew that it would be decades before neuroscience progressed to the point that his neurological model could be tested. Over the years, Jaynes's neurological model has been largely ignored and in some cases criticized by mainstream neuroscientists. However, beginning in 1999, a growing number of brain imaging studies have emerged that are highly supportive of Jaynes's neurological model. These studies show activation of the right temporal-parietal lobe areas (corresponding to Wernicke's area and Broca's area in the left hemisphere) during the generation of auditory verbal hallucinations, followed by activation in the left hemisphere language areas where presumably the hallucination is "heard." These studies are reviewed and their significance to Jaynes's theory and the study of auditory hallucinations is discussed. **C13**

125 **Neural Correlates of Response Inhibition in Patients with Schizophrenia vs. Healthy Controls: A Resting State fMRI Study.** Sangeeta Nair, Dr. Matthew J. Hoptman(1,2,3); Debra D'Angelo(1); Dr. Michael Milham(4) (1)Nathan Kline Institute, (2)NYU School of Medicine, (3)City College of CUNY,(4)NYU Child Study Center <sngt802@gmail.com> (Nathan Kline Institute for Psychiatric Research, Brooklyn, New York)

Schizophrenia, a psychiatric disorder most often characterized by cognitive impairment, involves dysfunction in one or more major areas of functioning and may present as delusions, psychosis, hallucinations and disorganized thinking and behavior. Individuals with schizophrenia are reported to engage in acts of aggression that are more severe than those with other psychiatric illnesses. Impulsive aggression, a subtype of aggression, is characterized by a "hair-trigger" response to a stimulus (Nolan & Volavka, 2004). Impulsivity is a multifaceted concept encompassing poor response inhibition and poor decision-making. Although little is known about the neural correlates of impulsivity, understanding the neural circuits of response inhibition will allow for appropriate cognitive and pharmacological interventions. Although localized pathophysiology in cortical areas may be a sufficient explanation for some signs of schizophrenia, it does not provide a compelling explanation for the symptoms. The assumption is that symptoms such as response inhibition can be better understood in terms of abnormal/ impaired interactions or integration between different cortical areas rather than as a result of localized impairment. This dysfunctional integration, expressed at a physiological level as abnormal functional connectivity, is measurable with functional neuroimaging techniques. Functional connectivity is defined as the correlations between spatially remote neurophysiological events and as the correlation between their time-dependent blood-oxygen level dependent activity (BOLD) responses. Task-based studies have implicated the deficient activation of the orbitofrontal cortex (OFC) (Aron & Poldrack, 2005), dorsolateral prefrontal cortex (DLPFC) (Menon et. al., 2001) and the anterior cingulate (ACC) (Menon et. al., 2001) as possible anatomical explanations for the poor response inhibition seen in people with schizophrenia vs. healthy controls. However, since neural circuitry is not limited to those areas activated during task-based conditions, functional connectivity under resting condition will be assessed in order to gain a greater understanding of the underlying neural networks. Additionally, because task-related fMRI is influenced by performance and attention factors (Weiss et. al., 2003), functional connectivity under resting state will be examined to assess brain functional connectivity in the absence of these confounds. I will discuss results from a study that will (i) assess

functional connectivity of the DLPFC, ACC, and OFC under resting state conditions among people with schizophrenia and healthy controls. Data from this study will be used (ii) to assess the connectivity of the DLPFC, ACC and the OFC among people with schizophrenia and healthy controls under task-based conditions, such as the AX-CPT test and to use these data (iii) to determine the predictive utility of resting state data in predicting activation under task-based fMRI condition, such as the AX-CPT test. The AX-CPT test, a variant of the Go/No-Go task, defines motor impulsivity and can be used to assess impulsive response styles. The participant will be shown a series of letters on a computer screen and be told to press a button when the letter "A" is followed by the letter "X" (Go condition), thereby setting up a pre-potent response tendency. However when the letter "A" is followed by a letter other than "X", s/he should not respond (No-Go condition). **C5**

## 2.8 Anesthesia

126 **Anesthesia: When The Front Fails To See The Back** Anthony Hudetz <ahudetz@mcw.edu> (Anesthesiology, Medical College of Wisconsin, Milwaukee, WI)

Crick and Koch (Nat Neurosci. 2003; 6(2):119) suggested that consciousness depends on the specific activity of neuronal coalitions that span from the sensory cortices to the executive regions of the prefrontal cortex. A plausible hypothesis is that anesthetic drugs produce unconsciousness by disrupting the communication along long-range, anterio-posterior neuronal pathways that bind these neuronal coalitions (Hudetz, Semin Anes Periop Med Pain 2006; 25(4):196). Recently, we obtained evidence supporting this hypothesis. Inhalational anesthetics administered to rats in concentrations that presumably produce unconsciousness suppress the information transfer between anterior and posterior brain regions. Here information transfer is estimated by nonlinear, statistical measures based on the entropy of cortical local field potentials (mutual information and transfer entropy). Both consciousness and cortico-cortical communication is restored when the cerebral cortex is activated by pharmacological stimulation of the cholinergic arousal system that originates in the nucleus Basalis of the basal forebrain. This makes the anterior-posterior information transfer a likely candidate of the NCC. A further result is that recurrent feedback information from anterior to posterior brain regions is suppressed earlier than feedforward information (Imas et al, Neurosci Lett. 2005; 387(3):145), consistent with the previous suggestions by Lamme and Roelfsema (Trends Neurosci. 2000; 23(11):571). The importance of the frontal lobes for consciousness is further emphasized by experiments that demonstrate the failure of frontal lobe activation in anesthetized animals that is normally present in waking animals (Laplante et al, Neuroscience. 2005; 132(2):501). This hypofrontality effect is a common characteristic of several anesthetics. Outstanding issues include the question of specificity of neurons and brain regions participating in the neuronal coalitions and the importance of synchronous firing (Koch and Greenfield, 2007; Sci Am. 297(4):76). In our studies, field potentials are recorded from large populations of neurons, thus, a significant contribution of sparse, specific neurons to the measured information transfer is unlikely. Likewise, gamma synchrony is not critical for anesthetic effects for several reasons. First, perception-related gamma synchronization of visual cortex neurons has been observed in both waking and anesthetized animals implying that gamma synchrony is not sufficient for visual consciousness. Second, anesthetics do not suppress gamma oscillations in visual cortex; instead, they augment them at intermediate anesthetic depths that produce unconsciousness (Imas et al, Neuroscience 2004; 123(1):269). Anesthetics also produce hypersynchronization of gamma oscillations between the frontal lobes of the two hemispheres (Hudetz, Brain Res. 2002; 954(1):123). This hypersynchronization is reversed by cortical and behavioral activation achieved by a stimulation of cholinergic receptors (Hudetz et al, Anesthesiology. 2003; 99(5):1125). Fourth, anesthetics augment, rather than suppress, the gamma burst of sensory evoked potentials at concentrations that produce unconsciousness (Imas et al, Anesthesiology 2005; 102(5):937). Finally, the significant temporal delays of information transfer along the fronto-parietal-occipital pathways reaching several hundred milliseconds imply that these regions do not work in synchrony within the gamma oscillation cycle. In conclusion, anesthetic-induced unconsciousness likely results from a disconnection of anterior and posterior regions of the brain. This effect is not a consequence of diminished gamma oscillations but of the hypersynchronization of neuronal populations which incapacitates the front of the brain to monitor sensory representations in the back of the brain. Work supported by the NIH grant GM-56398. **C18**

## 2.9 Cellular and sub-neural processes

127 **Update on Recurrent Fractal Neural Networks: From Anesthesia to Quantum Zeno Effect in Single Neuron Consciousness** Erhard Bieberich <ebieberich@mail.mcg.edu> (Institute of Molecular Medicine and Genetics, Medical College of Georgia, Augusta, GA, U.S.A.)

The spatial and temporal continuum experienced in consciousness is in conflict with neural network models based on the distributed activity of discrete neurons. Previously, the author has hypothesized that compressing the activity information ("firing pattern") of an entire neural network into a single neuron will resolve this conflict [1-5]. In this hypothesis, the neural network is based on recurrent output-to-input connectivity with fractal scaling [1,2]. The fractal architecture preserves the global network information and maps the neuronal network activity ("firing output") into the local activity patterns of dendritic spines ("dendritic input") of single neurons [1,5]. In recurrent fractal neural networks (RFNNs), the integration of the dendritic input sustains firing of the connected neurons only if the dendritic activity pattern is a down-scaled version of the neuronal network activity (self-similarity). In new studies, the author found that within single neurons, RFNNs may allow for information compression to the molecular level [5]. In RFNNs, the recurrent coupling of molecular events entails that the neuronal network activity responds faster than the relaxation times of individual ion channels in the post-synaptic membrane. This could lead to cooperative behavior of ion channels within the dendritic tree reminiscent of the quantum zeno effect ("state freezing by repeated self-measurement"). Although RFNNs do not explicitly require quantum mechanics, they may offer a possible solution to escape decoherence in models that propose quantum mechanical effects for an explanation of consciousness. The author will discuss these new studies and recent experimental evidence for fractal behavior of the brain on the molecular and neural network level. Of particular importance are reports on the fractal behavior of brain activity, which are directly linked to the level of awareness under anesthesia. The author will also discuss alternative models for single neuron consciousness [6] and their significance for RFNNs. Finally, the author will propose that RFNNs can be generated in computing devices consisting of a neuron-electrode interface ("neurochip") [7]. Implications for the generation of synthetic consciousness and its experimental analysis will be discussed. 1. Bieberich, E. (2002) Recurrent fractal neural networks: a strategy for the exchange of local and global information processing in the brain. Biosystems; 66:145-64. 2. Bieberich, E. (1998) Structure in human consciousness: A fractal approach to the topology of the self perceiving an outer world in an inner space. Cogprints. 3. Bieberich, E. (2003) Paradoxes of the Human Mind and the Crises of Atomism for an Explanation of Consciousness. The Noetic J.; 4 (Special Issue). 4. Bieberich, E. (2001) What the liar paradox can reveal about the quantum logical structure of our minds. arXiv:quant-ph/0101062 5. Bieberich, E. (1999) Non-local quantum evolution of entangled ensemble states in neural nets and its significance for brain function and a theory of consciousness. arXiv:quant-ph/9906011 6. Sevush, S. (2006) Single-neuron theory of consciousness. J. Theor. Biol.; 238:704-25. 7.Bieberich, E. and Guiseppi-Elie, A. (2004) Neuronal differentiation and synapse formation of PC12 and embryonic stem cells on interdigitated microelectrode arrays: contact structures for neuron-to-electrode signal transmission (NEST). Biosens. Bioelectron; 19:923-31. **P2**

## 2.10 Quantum neurodynamics

128 **Hodgkin-Huxley Revisited: On the Possible Role of Quantum Transitions and Quantum Coherence in Ion Channels for Neural Signaling** Gustav Bernroider, Johann Summhammer <gustav.Bernroider@sbg.ac.at> (Neurobiology, University of Salzburg, Salzburg, Austria)

The intention of this presentation is to show that a) quantum physical aspects are becoming a necessary ingredient in our conception of brain signaling and b) the emerging role of quantum concepts in the brain opens a scientific approach to an interactionistic interpretation of perceptual phenomena (i.e consciousness) as suggested before [1]. We set out with the physical part behind brain signaling which is provided by the coupled dynamics between ion-channel proteins and transmembrane voltage of the neural plasma membrane, as originally provided by Hodgkin and Huxley (HH) [2]. This classical model has now become challenged by at least two recent developments: First, there is a serious discrepancy between the predictions made by HH-type models and real signal observations from cortical neurons, particularly within the short action potential initiation (API) mechanism that is essential for (fast) coding processes in vivo [3]. The second challenge emerges from a necessary replacement of the classical view of stochastic ion motions by discrete atomic resolution dynamics, where the short range forces between ions and the surrounding protein

arise from basically quantum mechanical (QM) effects (eg [4]). We suggest a possible strategy to resolve these problems by the introduction of at least three types of quantum effects. First, a one particle quantum effect can be captured by replacing the classical motion of an ion by a wavefunction and attributing a position and time dependent potential to the hosting channel structure. Along this view Ohm's law, implicit in the HH-model, becomes resolved into quantized steps , similar to the effects observed in thin metallic wires, also at room temperature [5]. An extension of this one-particle problem to two or three ions, as observed in the concerted transit-model of voltage gated channels [6], leads to an entangled wavefunction, comparable to linear ion-trap designs in quantum computing [7]. The third approach assigns quantum effects to the atomic structure of the ion-hosting channel protein itself while keeping the ion's motion classical. There we consider parts of the channel (e.g. the filter region) as a quantum system described by one common wavefunction. In particular, this concept allows a delicate study of the ionic-carbonyl oxygen interaction terms that seem to force the oxygens into quantized vibrational states. The resulting quantum amplitude influences the probability of an ions passage through the filter region and is important for maintaining the channels selectivity to a particular ion species. The net effect of all three approaches is a change in ion conductances that have a considerable influence on the emerging classical HH-type action potential. We demonstrate an application involving a QM interpretation of the sodium activiation dynamics as provided by the classical m-gating variable in HH type signals. The resulting semi-classical, i.e. 'quantum-corrected' HH equation reproduces precisely parts of the critical API dynamics that have been observed in neocortical neurons [8]. I finally suggest how the conception behind QM can possibly narrow down the gulf between physical accounts and phenomenology in an observing agent. I argue that the manifestation of QM concepts in the brain (eg. von Neumann's Process 1 conjecture) causally propagates into classical signaling properties by a unique quantum-classical transition organized in excitable brain cells. [1] Hameroff, S & R Penrose, J Consciousness Studies, 3, 36-53 (1996) [2] Hodgkin AL & AF Huxley, J. Physiol. 463, 391 (1952) [3] Naundorf, B, F Wolf, & M. Volgushev, Nature 440, 1060 (2006) [4] Kuyucak, S et al, Rep. Prog. Phys. 64, 1427-1472 (2001)] [5] Costa-Krämer J.L et al, Phys. Rev.B 55, 5416 (1997) [6] Morais-Cabral JH et al, Nature 414, 37-42 (2001) [7] Bernroider, G & S. Roy, SPIE Proc. 5841-29, 205-214 (2005) [8] Summhammer, J & G Bernroider, Archiv: quant (2007) **PL8**

129 **Granger Causality, Synchrony and Oscillations: Testing Quantum Mechanisms of Consciousness** Stanley Klein <sklein@berkeley.edu> (School of Optometry, UC Berkeley, Berkeley, CA)

Clive Granger won the Nobel prize in economics for developing a relatively simple approach to testing causal interactions among noisy signals in time (the stock market in his case). In the past few years there has been an explosion of applications of the Granger causality approach to looking at interaction of neural signals across cortex. We have been applying this technology as well as the more standard phase coherence and synchrony approaches using electric (EEG) and magnetic (MEG) brain waves in humans doing object detection and other tasks. Two big challenges facing this type of research are: 1) going from scalp sensors to cortical activity and 2) isolating interactions between two cortical areas from common input by a third area. This talk will review the technology we use for overcoming these two obstacles and we will report our progress in measuring the causal connections among brain areas. As a bonus we will also discuss the possibility of using very rapid interactions among widely spaced brain areas to isolate the presence of quantum mechanisms. Since there are also classical mechanisms able to establish rapid long range interactions it will be seen that the quest to isolate quantum mechanisms is very difficult, but not impossible. **C19**

130 **Decoding Visual Perception: From Brain Reading to Mind Reading** Frank Tong <frank.tong@vanderbilt.edu> (Psychology, Vanderbilt University, Nashville, TN)

Is it possible to determine what a person is seeing or experiencing by measuring patterns of brain activity? Even if this were possible, would this technical achievement necessarily indicate the discovery of the neural code for visual features or objects? Here, I will describe a neuroimaging approach my lab has developed for reading out the contents of perception from the ensemble information contained in cortical activity patterns. From this, we can reliably predict if a person is viewing a vertical or tilted grating, leftward or rightward motion, a blue jay or sparrow. Whereas early visual areas contain much information about basic visual features, higher areas contain flexible information about objects. Moreover, activity patterns to unambiguous stimuli can reliably predict which of two competing visual features, overlapping in space, is most salient in a person's mind. The ability to decode a person's mental state from measured brain states brings scientists a

step closer towards understanding the neural representations that underlie the subjective contents of visual experience. **PL9**

131 **Zero point energies, consciousness and the Casimir force on microtubules** Esther Vogt, Toni Vogt <esther.vogt@afie.com> (Quantum Consciousness Academy, Lucerne, Switzerland)

In various ways, consciousness, health and well-being have been described as states of harmonic resonance with the universe. Can there be a scientific basis for such a paradigm? Quantum field theory considers the ground state of the universe (the quantum vacuum) to consist of zero point energies, photons which pop into and out of existence (proposed by Einstein in 1913) in accordance to human acknowledgment. In 1935 Henrik Casimir predicted that zero point energy photons should be detectable with two perfectly flat surface plates held closely together in precisely parallel alignment with a small gap of distance d. Visible, infrared and ultraviolet photons with wavelengths ranging from a few hundred nanometers to over a thousand nanometers are zero point energy components. Casimir showed that plates separated by, for example, a gap d of 600 nanometers would exclude photons with wavelengths longer than 600 nanometers from the gap. Outside the gap and plates, all wavelength photons can exist, so a net surplus of photons outside the plates exerts a force pushing the plates together. This is the Casimir force, which was detected and quantified in the 1980s, verifying zero point energies and playing a role in nanotechnology. In 1996 George Hall calculated the Casimir force on biological microtubules, hollow protein cylinders with hollow inner cores of only 15 nanometers. Microtubules organize cell activities including mitosis/cell division, immune function, information, learning and perhaps consciousness and feelings through quantum information processing. Playing essential roles in all facets of health and disease, microtubules are appropriate candidates to mediate harmonic resonance with the universe. As the Casimir force is proportional to the negative fourth power of d, 15 nanometer hollow inner cores within microtubules result in a significant calculated Casimir force on microtubules of up to 20 atmosphere pressure. What is the significance of such an interaction? Can we learn or be trained to tune our microtubule vibrations to resonate with zero point energies of the universe and optimize our health and consciousness? Can we extend human sensation and consciousness by harmonic resonance and balance with the zero point energy? The media platform of the Academy of Quantum Consciousness (Academy) Outreach program connects research of microtubules, biophotons and quantum consciousness with real processes bettering the human experience through the zero point energies. This leads to an interdisciplinary cooperation of natural science and human discipline. Coincidentally institutions shall be implemented in which instead of measurements new proofs of evidences will be provided by means of new scientific approaches as well as new methods of explanations. Such approaches may consist through observation of biophoton processes which cause changes within microtubules leading to an expansion of consciousness. **P8**

*See also:*

248 **The dissipative many-body model and vortices in brain waves**
286 **What Could Possibly Count as a Physical Explanation of Consciousness?**
213 **Concerning Spin as Mind-pixel: How Mind Interacts with the Brain through Electric Spin Effects**
129 **Granger Causality, Synchrony and Oscillations: Testing Quantum Mechanisms of Consciousness**
232 **Tunneling – a Phenomenon in the Brain of an Observer of Physical Objects**
283 **The dynamics of imaginary energy states in the human hair shaft, modelled on the neurone in consciousness, as they relate to changes in health and disease.**

## 2.11 Pharmacology

132 **Psychedelics and the Chemical Architecture of the Mind** Thomas Ray, Thomas Ray <tray@ou.edu> (Zoology, University of Oklahoma, Norman, Oklahoma)

Dozens of psychedelics have received full receptorome screenings by the National Institute of Mental Health's Psychoactive Drug Screening Program (NIMH-PDSP). By synthesizing receptor affinity profiles together with published human data, it has been possible to dissect the psychedelic drug experience into the components mediated by different receptors, and to characterize the mental properties mediated by dozens of receptors, and their interactions. By virtue of their diversity of receptor binding profiles, the diverse set of psychedelics collectively represents a rich set of tools for probing the chemical architecture of the human mind. These tools can be used to explore components of the psyche whose discreteness is normally obscured by their being embedded in the

complete tapestry of the mind. By activating specific components of the mind, they are made to stand out against the background of the remainder of the psyche. Thus both their discreteness and their specific contribution to the psychic whole can be better appreciated. That the revealed mental elements can be pharmaceutically manipulated, suggests that they may be naturally modulated through chemical systems. These receptor mediated mental components are the distinct elements from which the mind has been fashioned through evolution. Knowledge of the chemical architecture of the mind can provide new approaches to understanding and treating mental illness. **PL11**

*See also:*

310 **Evoking an MDMA (Ecstasy) State Through Hypnotic Suggestion Without the Drug.**

## 2.12 Neural synchrony and binding

133 **Phenomenal Binding: Two Mechansims or One?** Bruce Katz, Bruce F Katz <katz@cbis.ece.drexel.edu> (Electrical and Computer Engineering, Drexel University, Philadelphia , PA)

One of the most serious and longstanding problems in the field of consciousness is the nature of the mechanism by which aspects of a stimulus that are registered in distinct maps in the brain are brought together to form a phenomenal unity. Two broad suggestions have been made for the resolution of this difficulty. The first is binding by convergence, whereby higher-level neurons integrate collections of responses over multiple maps (Riesenhuber and Poggio, 1999). However, because of the necessarily wider receptive fields of these integrative units (otherwise, combinatorial explosion would result), this presents the new difficulty of attaching the appropriate features to the appropriate objects when more than one stimulus needs to be processed at once. One non-mutually exclusive solution to this problem, and the second major approach to binding, is to link up the sets of features via fine-grained temporal synchrony (Singer and Gray, 1995). The purpose of this talk is to suggest is that not only are binding via convergence and synchrony not mutually exclusive, they may be viewed as a special case of a more general theory of qualitative binding. This claim derives from the proposal that mental states supervene strictly on the causal interaction in the brain occurring at any given moment in time. I have argued (Katz, 2007) that any other theory (such as computational functionalism) that violates this principle would be too unwieldy to implement. The two binding mechanisms can then be seen as special cases of this principle as follows: a) most obviously, binding by synchrony implies that representations in temporal conjunction will be phenomenally bound, and b) the excitatory resonance circuits involved in convergence will serve to synchronize neural activity between the relevant neural populations, thus making convergence also consistent with time-bound causation. This account will then be used to show how phenomenal binding breaks down, and specifically, to explain when illusory conjunctions are perceived (for example, when a red circle is presented with a green triangle and a green circle is seen). An integrate-and-fire model of pattern recognition will be presented in which the principle of causal synchrony is used to determine binding between feature maps. This model makes the following predictions consistent with the experimental evidence (Prinzmetal and Keysar, 1989): i) the rate of illusory conjunctions is inversely proportional to the distance between the presented objects, ii) it is inversely proportional to exposure time, iii) it is inversely proportional to amount of attention devoted to the stimulus, and iv) processes that enhance the grouping between the objects will increase this rate. In summary, it will be argued that causal synchrony explains both binding via convergence and via synchrony and can also explain how these mechanisms can fail. REFERENCES Katz, B. (2007) Fixing functionalism. Paper presented at Toward a Science of Consciousness 2007, Budapest. Prinzmetal, W. & Keysar, B. (1989) Functional theory of illusory conjunctions and neon colors. J. Exp. Psychol. Gen., 118: 165-190. Riesenhuber, M. & Poggio, T. (1999) Are cortical models really bound by the "binding problem"? Neuron, 24:87-93. Singer, W. & Gray, C.M. (1995) Visual feature integration and the temporal correlation hypothesis. Annu. Rev. Neurosci., 18:555-586. **P8**

134 **Neuroscience, Kant, and the Unity of Consciousness** Eric LaRock <larock@oakland.edu> (Philosophy Department, Oakland University, Rochester, MI)

I take a broad framework informed by philosophy and neuroscience to explore some possible solutions to a few vision-related binding problems. One such problem is the problem of object feature binding (hereafter, OFB). For example, how do an object's features (such as shape and color) appear to consciousness as a single, unified object at any given time, if its respective features are correlated with activity in different areas of the visual cortex? Considerable attention has been directed to this problem. Engel (2003), for instance, and several other prominent neuroscientists

have proposed that neuronal synchronization is the mechanism of OFB (see also Engel et al., 1990; Crick & Koch, 1990; Singer, 1996; von der Malsburg, 1996, 1999). Engel claims that the problem of OFB is "solved by a mechanism which exploits the temporal aspects of neuronal activity" (2003, p. 134). An elaboration and critique of Engel's formulation of the neuronal synchrony account is presented. Another vision-related binding problem that has received less attention is the problem of diachronic object unity (DOU): how do an object's features appear to visual consciousness as a single, unified object over time, if its respective features are correlated with transient neuronal activities? In other words, it is difficult to see how DOU is possible from a strictly neural mechanistic perspective, since the representation of a single, unified object persists beyond the pool of cells that fire in response to the object's features (see my 2006, 2007; also O'Reilly et al, 2003). I consider some possible neural mechanistic approaches to this problem and conclude that such approaches are incomplete. In a Kantian vein, I argue that DOU also depends upon the persisting character of the cognitive subject. If plausible, the cognitive subject could make an explanatory contribution to our theory of unified consciousness and thus could not be shaved off (or eliminated) on parsimonious grounds alone. This raises a larger metaphysical question concerning the cognitive subject's relation to the brain. If the relation between the cognitive subject and the brain is not a relation of reduction, then what kind of relation could it be? I consider a few nonreductive possibilities, including the constitution view articulated by Baker (2000) and an emergentist view. I conclude that the constitution view is no better off than strictly neural mechanistic approaches to the problem of unified consciousness, but that an emergentist view does not imply the same explanatory deficiencies. **C11**

135 **Synchronized Oscillations as the Neural Correlate of Consciousness** John Lin, John Lin, M.D. <johnlin@mysmartpost.com> (Prometheus Press, Cerritos, CA 90703)

Modularization and hierarchical processing appear to be general features of all cortical processing. Using the processing of visual information as an example, this paper proposes a general model of hierarchical processing to explain how information from specialized visual areas – those processing lines, colors, motion, etc. – is integrated (and, in many instances, combined with information from other modalities, such as auditory, tactile, and semantic perceptions) to decipher the identity of an object. In the model, specialized modules are organized by hierarchical levels stacked together in a pyramidal configuration. A specialized module processes information received from subordinates at lower levels and passes the result to its superior at the next higher level. Information becomes progressively more concise, and meaningful, as it flows from the bottom of the pyramid toward the top. In the visual system, for instance, information from the retina enters the bottom level (area V1) of the pyramid, and the processed result emerges at the top (the visual association cortex). The resultant high-level representation then becomes available in conscious awareness (or the imaginary thinking theater of the mind) to interact and correlate with data from other modalities to achieve perceptual unity and understanding. In the hierarchy, feedforward pathways are frequently accompanied by reciprocal feedback pathways. Feedback pathways also exist among many levels of the hierarchy. These feedback circuits are used to provide mental predictions from higher-level representations and to exert top-down influence. Their presence sets up circular loops of feedforward and feedback circuits in the hierarchy, which create synchronized oscillations at the moment of perceptual recognition. This is because, in a steady state, when the perceptual result is correct – that is, when the perceptual result corresponds to the mental image in conscious awareness, as corroborated by results from other cortical modalities – predictions (feedback signals) will match input signals to the modules at all levels of the hierarchy, and the entire circuitry will oscillate in synchrony. Other conclusions that may be derived from this hierarchical model of modular processing include: (1)The majority of our memories about object and events in the world are stored in specialized sensory cortices that process information about those objects and events, in a distributed fashion. (2)Mental imagination likely involves feeding a concise set of information (high-level representations) to the lower sensory cortices to recreate images and sensations in conscious awareness. Conscious awareness, by itself, does not have the machinery to generate those mental images. The conscious mind, therefore, needs to rely on the same peripheral sensory apparatuses as those used to perceive objects and events in the external world to recreate those images in conscious awareness. It is well documented that people with damage to peripheral sensory cortices often suffer deficits in mental visualization and in dreaming that parallel impairment in the same cognitive domain. (3)It is entirely possible that "mirror neurons" in the premotor areas are not doing any "mirroring" at all, but are merely reflecting what is being imagined and thought of in our mind. (4)Perception is not simply a matter of feeding sensory information about an object into a circuitry and watching its identity emerge from the other end. In human perception, many mental op-

erations at higher cognitive levels are involved. It is a complex, recursive process of generating hypotheses, based on sensory clues, contextual interpretation, emotional information, and past experiences in analogous situations, and making predictions to validate and modify the working mental model by feedback correction to arrive at the most probable solution. **P8**

136 **Episodic global synchrony at all frequencies: implications for discrete/continuous consciousness debate.** Susan Pockett, Alexander V McPhail; Gary E Bold; Walter J Freeman <s.pockett@auckland.ac.nz> (Physics, University of Auckland, Auckland, New Zealand)

Until now the extensive literature on neural synchrony has concentrated on only a few frequencies, with gamma being the most popular. Here we report the presence of episodic global synchrony in EEG data at all frequencies from theta to epsilon (aka high gamma). We compare the durations of these episodes of widespread synchrony with the durations of the putative chunks of consciousness reported in psychological studies from the Buddha to the present. **C11**

137 **Consciousness, a dynamical state?** Wolf Singer <singer@mpih-frankfurt.mpg.de> (Neurophysiology, Max Planck Institute for Brain Research, Frankfurt/Main, Hesse, Germany)

A promising approach for the investigation of neuronal correlates of consciousness consists of comparing brain states associated with conscious and non conscious processing of the same stimulus material, respectively. Because of the distributed organisation of the primate brain and because of the inability to identify singular cortical or subcortical structures responsible for conscious experience, it is likely that the neuronal substrate that supports the functional states required for the constitution of conscious experience is distributed in nature. Based on the evidence that precise synchronization of oscillatory neuronal responses is likely to serve the binding of distributed computational results into coherent representations, we hypothesized that brain states compatible with conscious processing should be characterized by a high degree of synchrony, i.e. temporal coherence of activity. To this end we investigated the electrophysiological correlates of binocular rivalry in animals and of subliminal and conscious perception in human subjects. Both approaches suggest the conclusion that precise synchronization of oscillatory neuronal responses in the high frequency range (beta, gamma) plays an important role in gating the access of sensory signals to the work space of consciousness. Thus, the data support Sherrington's conjecture: "Pure conjunction in time without necessarily cerebral conjunction in space lies at the root of the solution of the problem of the unity of mind." For further reading: Fries, P., Roelfsema, P.R., Engel, A.K., König, P. and Singer, W. (1997) Synchronization of oscillatory responses in visual cortex correlates with perception in interocular rivalry, Proc. Natl. Acad. Sci. USA, 94: 12699-12704. Fries, P., Schröder, J.-H., Roelfsema, P. R., Singer, W., and Engel, A. K. (2002) Oscillatory neuronal synchronization in primary visual cortex as a correlate of stimulus selection. J. Neurosci. 22(9): 3739-3754. Melloni, L., C. Molina, M. Pena, D. Torres, W. Singer and E. Rodriguez (2007) Synchronization of neural activity across cortical areas correlates with conscious perception. J. Neurosci. 27: 2858-2865. Singer, W. (2007) Large-scale temporal coordination of cortical activity as a prerequisite for conscious experience. In The Blackwell Companion to Consciousness. Edited by M. Velmans and S. Schneider. Malden MAL: Blackwell Publishing Ltd.: 605-615. **PL6**

*See also:*

189 **How the human brain generates human nature, language, ethics, morality, and the senses of value and meaning.**
126 **Anesthesia: When The Front Fails To See The Back**
11 **Monism: A Phenomenological and Neuroscientific Perspective**
135 **Synchronized Oscillations as the Neural Correlate of Consciousness**

## *2.13 Emotion*

138 **The Neural Correlates of Emotions – A Neglected Subset of the Neural Correlates of Consciousness.** David Gelles <laneuro@aol.com> (Tarzana, CA)

Since thinking is considered a supreme quality of consciousness, the Neural Correlates of Consciousness (NCC) are predominantly sought within the confines of the cerebral cortex from where the seat of thinking presumably emanates. In the study of NCC, the five basic sensory pathways are likewise well described for their anatomy, physiology and neurochemistry by way of a study of end-organs, afferent pathways and the hierarchy of interpretive ganglion, cerebral regions and zones. Far less attention has fallen upon the Autonomic Nervous System, both central and peripheral, that sub serves the complex process of emotions. While the sensory system principally presents the external world to consciousness, it is the autonomic nervous system that presents the

internal world of emotions to consciousness. By emotions, I am referring to complex sensations attached to events, thoughts or conceptions that place a valence or tone upon the event or thought. An emotional sensation is unlike the five senses of taste, touch, smell, sound and sight. Instead, it is grouped between two polar opposites and at varying degrees between them. These poles, the Sympathetic and the Parasympathetic are classically perceived as "cold" or as "warm". Sympathetic sensations of rapid heart beat, dry mouth and mucous membranes, rapid breathing, dry skin, elevated pressure and of agitation are cold sensations. Parasympathetic sensations of slowed heart beat, moist mouth and membranes, teared eyes, lowered pressure, warm skin, fullness of breath and of calm, are warm sensations. One can assign the emotions of anger, fear, hatred, envy and dread to the sympathetic system: Conversely, sadness and grief, love, compassion, pride, exaltation and happiness, may be assigned to the parasympathetic system. Some emotions appear to combine both and lie on a continuum between sympathetic and parasympathetic. This bipolar autonomic nervous system (ANS) is peripheral or outside of the brain. But there is a central section of the ANS within the brain. The Hypothalamus is the core region and is the nucleus that coordinates processes between the peripheral and the complex central pathway-the Limbic System that ultimately includes cerebral cortical regions. The Hypothalamus also regulates the endocrine system creating a homeostatic environment. This important function will not be a part of this review. When emotions are viewed in this way, they can be assigned an esthetic and a moral quality, that is defined by the amount of sympathetic or parasympathetic tone. Events, thoughts and conceptions drive the emotive response that, in turn, informs the event or thought with emotional valence. This may be either by reflex (hard wired) or by learned behavior. In this presentation, I will outline and illustrate the functional anatomy, physiology and neurochemistry of the ANS. I will outline theories of evolution and natural selection for this system as it applies to emotions; and I will discuss the importance of this system in understanding the Neural Correlates of Consciousness. **P2**

## 2.14 Sleep and waking

139 **The Eclipse Horizon of Dream** James Pagel <pueo34@earthlink.net> (School of Medicine-Family Practice, University of Colorado , Pueblo, CO)

Cognitive neuroscientists have built their careers on simple neurotransmitter constructs of CNS functioning. There is good evidence that the neurochemical acetylcholine is an on off switch for REM sleep, modulated by other neurochemicals that include norepinephine and serotonin. This simple view has proved to be much too simple even when limited to the electrophysiological process we call REMS rather than its loosely defined correlate of "dreaming." Each CNS neuron, all hundred billion plus, are likely to utilize more than one neurotransmitter and secondary signaling systems. The neurotransmitters of the CNS have a multiplicity of highly site-specific roles that may result in net changes on behavioral states and cortical arousal that directly contrasts with effects at the microscopic level. Multiple factors and systems are involved, with no single chemical neurotransmitter identified as necessary or sufficient for modulating sleep and wakefulness. The drugs that induce disturbed dreaming and nightmares are not those that affect REM sleep. Drugs that alter REM sleep often have no effects on dreaming. Despite claims to the contrary, we have only a limited, incomplete and often incorrect knowledge of the neurochemistry of conscious states. Much of our knowledge of brain functioning comes from pathologic studies and CNS scanning. Positron emission tomography (PET) and other scanning technologies have found areas of the brain that are consistently activated during REM sleep. If REMS is dreaming, these are the areas of brain that result in dream. However, REMS may or may not be dreaming, and there is no way for the investigator to determine whether dreaming in actually occurring when these areas are activated. Extensive basal-frontal and parietal damage to the brain can produce a lack of dreaming. There are individuals, however, without a history of brain damage that function normally without ever recalling dreams. Do these individuals actually not dream? These findings have called into question whether neuropathology and CNS scanning can provide any clear evidence to support a brain-based site of origin for dreams. There are, of course, clear brain based correlates for many areas of cognition. The experience of dreaming includes visual imagery, emotions, and memories. Neuroscientists can create artificial constructs of perception and motor activity systems that have more capabilities than biological systems. Both the amygdale and hippocampus are involved in memory and emotion. Since dreaming likely utilizes the same neuroprocessing systems used for these processes in waking, these components of dream are likely to have clear brain-based correlates. There are other types of cognitive processing for which there is no clear associated or specific brain activity. Most of these processes are cognitively described as "thinking." When awake, we think. When asleep we think. Dream thought describes the personal presence of the dreamer in the dream. Such associative

thought is the framework for imaginative construction, the process through which the perceptually limited and thin images of dream and waking imagery can produce the powerful and sometimes significant experiences of dream that are capable of parodying or surpassing waking perceptually based experience. The neurobiology of the human CNS is likely one of the most complex systems ever studied. It is always tempting to force complex systems into simple constructs. However, simplified theories of cognitive function where simple physiological events occurring in the brain represent specific cognitive events such as dreaming have outlived their usefulness. We find ourselves in the interesting position where evidence is lacking to support the brain equals mind paradigm. Yet this Monist requirement lies at the basis of current neuro-scientific theories of mind. **P2**

*See also:*

70 **Free Will In The Human Brain. A Solution Of The Problem.**
177 **Phenomenological experiences in adult sleepwalkers**

## 2.15 Specific brain areas

148 **The Neural Correlates of Having Fun: Recent imaging research, social mirror theory, and some implications for the evolution of self-consciousness**
104 **A Possible Role for the Integrated Norepinephrine System in the Continuum of Consciousness**
122 **Does Autism Spectrum Disorder Provide Any Insight Into the Conscious State?**

## 2.16 Miscellaneous

140 **Firing Rate and Periodicity as Candidate Representational Codes in Somatosensory Cortex** Mike Collins <mike9943@gmail.com> (Philosophy, CUNY Graduate Center, Clifton, NJ)

Representational theories of consciousness abound, but without an associated theory of representation, the former must remain incomplete. It has been argued that resemblance based, or iconic, representations are insufficiently abstract to express truth conditions. Further, the resemblance relation is both symmetrical and non-specific whereas representation is neither. Finally, the multiplicity of structures with which a given representation is said to bear a resemblance is overwhelmingly too large to constrain a determinate content for the representation. In this paper I examine these objections and suggest that accepting them as devastating is premature. The strategy I propose is to look to the implementation of representation in the nervous system, and use that as a guide and constraint in theory development. Electrophysiological recording techniques provide a substantial amount of philosophically relevant data. Through discussion of a case study, I argue that we can identify particular states of an animal's nervous system as being identical to representations. I argue that those states are intentional in the strong philosophical sense, in the same way that propositional attitudes are, and that we can identify them as such even in the absence of a substantive philosophical theory of representation. I pursue this strategy in light of a somatosensory discrimination paradigm, originally developed by Mountcastle and colleagues, with my focus on recent investigations by Romo, Salinas and colleagues. In this experimental paradigm, monkeys (Macaca mulatta) are trained to discriminate among two successively presented vibratory stimuli in order to determine which was of a higher frequency. Single neuron intracortical recordings are made as the task is performed. I focus on neural responses in primary and secondary somatosensory cortex, and examine both periodicity and firing rate as hypothesized neural coding mechanisms. I articulate a theoretical model of representation, in which an abstract preservation of structure is a necessary element of representation, but does not sufficiently constrain content. In addition to the abstract preservation of structure, we also find that causal etiology plays an essential role in the cases under consideration. Due to the structure of the transduction mechanisms and the anatomy of the nervous system, the kinds of stimulus energy that get transduced into electro-chemical signals and then propagated along very specific neural pathways must themselves be very specific. The specificity of the kinds of energy that can be transduced into a neural code partially specifies the content of the representation. Further, we have less reason to posit representational status to "coding" mechanisms in which information is apparently available in principle, but is not used in further processing or for the control of behavior. Thus, in the cases examined, the abstract preservation of structure (and hence resemblance) is necessary for representation, but not sufficient for the having of a determinate content. **P2**

141 **Modern Consciousness Science as Fechner's Inner Psychophysics** Bill Faw <bfaw@bpc.edu> (Psychology, Brewton-Parker Colege, Mount Vernon, GA)

Gustav Fechner (1860) wanted to study "constant or lawful relationships" between the "material world" and the "mental world", which "has up to now remained merely a field for philosophical argument without solid foundation and without sure principles and methods for the progress of inquiry". He called his techniques "outer psycho-physics": deriving bridge laws between physics (presenting tones) and psyche (reporting which has a higher pitch), but, for then, ignoring mediating physiology. Fechner anticipated a later "inner psychophysics" to develop bridge laws between physics and physiology (brain processing of stimulus energy), and bridge laws between physiology and psyche. Subsequent psychophysiology works on bridging physics and physiology while physiological psychology works on bridging physiology and psyche. Recent technologies in brain scanning represent a sophisticated development of psychophysiology, creating the new field of Consciousness Science, which uses all of the techniques of outer and inner psychophysics to understand very specific parts of the "psyche" – differentiating among conscious, pre-conscious, subliminal, and non-conscious: perceptual, mental, emotional, and motor functioning – precisely the science that fulfills Fechner's projection for an "inner psychophysics"! Dominant paradigms in modern Consciousness Studies include Perceptual-, Cognitive-, Interpersonal, Animal-, Infant-, Machine-, Altered-, Expanded, Transpersonal-, Motivational-, and Quantum-Consciousness/ Unconsciousness. **C11**

142 **Toward Hierarchical Models of Perceptual Dynamics of Cerebral Cortex** Walter J Freeman, Walter J Freeman <dfreeman@berkeley.edu> (Molecular & Cell Biology, University of California at Berkeley, Berkeley, CA)

The foremost problem in studies of perception, the threshold for consciousness, is to explain how brains seek, presage, and amplify microscopic activity driven by sensory receptors, retrieve and mobilize the relevant prior knowledge about the stimuli, and disseminate the selected knowledge in preparing an appropriate intentional action. Our analyses of our experimental data show that cortex maintains by mutual excitation robust 'spontaneous' background activity that is parsed by inhibitory feedback into oscillations that are both spatially and spectrally distributed. Summation over the distributions of beta or gamma frequency ranges gives 'beats' of null spikes at intervals in the theta and alpha frequency ranges. At the minima of these beats the cortex approaches a state of criticality, in which a conditioned stimulus can trigger a micro-to-mesoscopic phase transition, provided that the stimulus selects a microscopic Hebbian nerve cell assembly that holds the memory of that class of stimuli. This phase transition in each of the primary sensory cortices is the gateway to a sequence of transitions toward a macroscopic state of recognition, which evolves into a prediction of a desired goal state that by self-similarity contains plans for actions needed to achieve that goal and corollary discharges by which to predict the sensory inputs that will verify or negate achievement of that goal. In our models, percept formation requires the conjunction of two events. One is a global intentional act of observation under limbic control (sniff, saccade, whisk, etc.) in the action-perception cycle, by which a learned stimulus can activate a Hebbian assembly. The other is the beat (null spike) that access criticality, at which a microscopic Hebbian assembly by phase transition can control mesoscopic populations in sensory cortex. We model this state of criticality, in which all frequencies and wavelengths coexist in power-law distributions, using random graph theory (neuropercolation), renormalization group theory, dissipative quantum field theory, and nonequilibrium thermodynamics. We believe our models provide a framework interrelating diverse correlates of perception, including microscopic data from spikes of 'feature binding' neurons, mesoscopic data from ECoG/LFP and averages of spike data, macroscopic data from EEG/MEG/fMRI recordings, and histological data on the distributions of connection distances among neural populations. This framework will facilitate understanding consciousness as a process that depends on transfers of energy and information between multiple hierarchical levels of neural organization. Cao TY (ed.) [1999] Conceptual Foundations of Quantum Field Theory. Cambridge UP. Freeman WJ [2007] Indirect biological measures of consciousness from field studies of brains as dynamical systems. Neural Networks 20: 1021-2031. Freeman, WJ, Vitiello G [2007] The dissipative quantum model of brain and laboratory observations. Electronic J Theoretical Physics 4, 1-18. Kozma R, Puljic M, Balister P, Bollobás B and Freeman WJ [2005]. Phase transitions in the neuropercolation model of neural populations with mixed local and non-local interactions. Biological Cybernetics 92: 367-379. Pincus D, Freeman WJ, Modell A [2007] A neurobiological model of perception: Considerations for transference. J of Psychoanalytic Psychology 24 (4): 623-640. Vitiello G [2001] My Double Unveiled. Amsterdam: John Benjamins. **C11**

143 **Double Dissociations Between Attention and Consciousness** Christof Koch, Tsuchiya, N. <koch@klab.caltech.edu> (Biology, Caltech, Pasadena, CA)

The relationship between selective attention and consciousness is a close one, leading many scholars to conflate the two. I will summarizes psychophysical and neurophysiological evidence arguing that top-down attention and consciousness are distinct phenomena that need not occur together and that can be independently manipulated. Subjects can become conscious of an isolated object, or the gist of the scene in the near absence of top-down attention. Conversely, subjects can attend to perceptually invisible objects. Most remarkable, top-down attention and consciousness can have opposing effects. Neuroimaging studies are uncovering the distinct hemodynamic signatures of selective attention and consciousness. Untangling their tight relationship is a necessary step in the elucidation of consciousness and its material substrate. **PL1**

144 **Where is I?** Barry Komisaruk <brk@psychology.rutgers.edu> (Psychology, Rutgers, The State University of New Jersey, Newark, NJ)

My fMRI research on pain and pleasure has raised questions as to which neurons produce conscious awareness, and how they do so. We see that, not surprisingly, a clamp placed on a finger activates the corresponding finger projection zone of the sensory cortex. For example, when a subject self-distracted herself by mental arithmetic, re-placement of the clamp on the finger failed to activate her finger projection zone, but her visual association region was activated. She reported that she was not aware of the finger clamp when she was visualizing multiplication of numbers. Thus, a shift in attention blocked the painful activation of the sensory cortex. Is it the activated sensory cortical neurons that generate awareness? During orgasm in women, we have reported that specific brain regions are activated, e.g., nucleus accumbens, insula, anterior cingulate cortex, and hypothalamic paraventricular nucleus. Which, if any, of the neurons in these regions produce the pleasurable feelings of orgasm? In a different one of our studies, we elicited leg movement by foot stimulation in women with traumatically severed spinal cord. Obviously, their spinal cord neurons are activated by the stimulus, but they are not aware of the activity of those neurons. What is different about "our" neurons in our spinal cord whose activation does not itself generate conscious awareness, versus "our" neurons in the sensory cortex that (presumably) do generate conscious awareness? When "I" "decide" to shift my attention, how do I do it? Where is "I"? How few neurons does it take to generate a "bit" of awareness? How does the movement of chemicals in neurons get transduced into conscious awareness? If some sort of neural circuit is necessary for awareness, what is the essential difference between the circuit and any individual neuron that is a component of the circuit in the production of conscious awareness? Where in space is the conscious awareness that is generated? Is it helpful to think that conscious awareness does not exist in the 4-dimensions that we know and think we understand? Just as we can not "bottle" the dimension of time, neither can we "bottle" conscious awareness. Physicists speculate that there are more than 4 dimensions. Does conscious awareness exist in a separate dimension in which we are embedded? **PL4**

145 **The Neurobiology of Tantric Sexual Pleasure** Jodi Lasky, Ron Shane <marends@scripps.edu> (Psychology, UC San Diego, San Diego, CA)

For centuries homosapiens have been employing coitus as a way to endogenously titrate the central nervous system's reward network. The human primate has evolved sensuous bodily protocols to activate the amygdala's nucleus accumbens as well as other D2 receptors in the mesolimbic/orbital frontal cortical complex. This organism has innate strategies whereby its unconscious neural workings evoke this specie to engage in evocative activities during its waking cycle. Tantric sexuality occurs when the male is disinclined to ejaculate but still enacts coitus in order to engender the upregulation of enkephalin expression as well as other neuropeptides associated with sentient hedonic arousal. Freud and others have asserted that cultural conditioning has modified the optimal dynamics of the CNS's reward network. The Eleusian Mysteries, Dionysian ritualism and prolonged tantric ecstasy involves the activation of highly sophisticated inveterate circuit complexes where the homosapien experiences polymorphic erotic activation or in traditional yogic terms, arouses the elusive kundalini as it ascends through the chakra channels. Today's cultural theosophy seems to prohibit the human organism from activating its ineffable hedonic circuits. The bonoboo has been observed to engage in coitus up to six times a day without ejaculating. Furthermore, mystical sexuality has been explored by a divergent array of cultures as an edifying and vitalizing way to evoke the body's etheric prodigiousness. The focus of my presentation will be to speak about the actual peptides, possible circuits and the neurological modifications in the peripheral nervous system associated with extended coitus. Furthermore, there will be a discussion as to how man's cultural edicts have altered his hardwired neurophysiological predilections. Lastly, there also will be an explication as to what constitutes man's optimal libidinous evocativeness. **P2**

146 **Can Global Workspace Theory and State Dependent Network Theory Explain Libet?** Alfred Levinson <alevinsonx@earthlink.net> (Center for Consciousness Studies, Tucson, AZ)

Global workspace theory (GWT) was developed to explain how the brain processes visual stimuli and how it leads to the conscious perception of those stimuli. Global workspace theory is extended to somatosensory stimuli and is used to explain rapid subjective experience without using Libet's backward referral. Palva et al. have shown that when the tip of a subject's index finger was electrically stimulated and the subject responded with a twitch of the finger, as the stimuli were consciously perceived the response spread from the sensorimotor and the primary somatosensory (SI) cortices to the secondary somatosensory, frontal, and parietal cortices. This is analogous to what happens during visual stimuli as postulated by GWT. Thus it is reasonable to claim that GWT can be extended to somatic sensory stimuli. This is consistent with the neural integration theory advocated by Crick, Pocket, Pollen and others. The thalamus is more than just a relay station to the cortex. In the case of somatic sensory stimuli it is where the unconsciousness – consciousness process begins. Patel et al. have found psychophysical elements of place and modality specificity in the ventral caudal nucleus of the thalamus. Kenshalo et al. have shown that stimulating SI can antidromically activate thalamic neurons. Libet shows in his experiments with patients receiving stimuli at the thalamus (VPL, VPM), medial lemniscus, and skin, subjective experience occurs almost immediately after the stimulus (20-33 ms) while neuronal adequacy recorded in the cortex takes 200-500 ms. To explain the rapid subjective experience prior to neuronal adequacy he argues requires backward referral. Stimuli at the primary somatosensory cortex do not result in subjective experience at the thalamus instead they occur at the same time as neuronal adequacy. Following Kenshalo et al., I argue that thalamic neurons were activated when the signal was received orthodromically which resulted in an evoked potential (EP) and subjective experience at the same time. When thalamic neurons were activated antidromically with a S1 stimulus there was no EP and no rapid subjective experience. I hypothesize that the signal then moves orthodromically back from the thalamus to SI where subjective experience and neuronal adequacy occur. Since the orthodromic path of stimuli from the skin and the thalamic region leads to subjective experience at the thalamus while the antidromic path of the stimulus from SI doesn't suggests that activation of the thalamic neurons leading to subjective experience is path dependent and backward referral is not needed. This should help us identify the location of the neural correlates of consciousness for somatic sensory stimuli. State dependent network theory (SDN) argues that there is no central clock. Instead cortical networks tell time as a result of time-dependent changes in synaptic and cellular properties which affect the networks' response to sensory events in a history dependent manner (Karmarkar and Buonomano). SDN can explain the rapid subjective experience of a skin stimulus, thalamic region stimuli and the delayed subjective experience of a SI stimulus. Kenshalo et al. (1980) J. Neurophysiology, 43: 1594-1614. Patel et al. (2006) J. Neurophysiology 95: 646-659. Palva et al. (2005) J. Neuroscience 25(21):5248-5258. Kamarkar and Buonomano (2007) Neuron 53: 427-438. **P2**

147 **Mirror neurons: What we can and cannot say** Corrado Sinigaglia <corrado.sinigaglia@unimi.it> (Philosophy, Università degli Studi di Milano, Milano, Italy)

Our social life rests largely on our ability to understand the behavior of others. What is this ability based on? A very influential view is that our ability to understand the behavior of others goes hand in hand with our ability to represent them as having mental states. Without this 'mind-reading' ability the behavior of others would be meaningless for us. However, over the last few years this view has been undermined by neurophysiological findings and in particular by the discovery of mirror neurons. The functional properties of these neurons indicate that intentional understanding is based primarily on a mechanism that directly matches the sensory representation of the observed actions with our own motor representation of the same actions (Rizzolatti et al., 1996; Gallese et al., 1996). This mechanism reveals how deeply motor and intentional components of action and action understanding are intertwined, suggesting that the only way to comprehend them is to start from a motor approach to intentionality (see Rizzolatti & Sinigaglia, 2007). This paper will elaborate and motivate this motor approach to intentionality, providing an account for the pivotal role of mirror neurons in the phylogeny and ontogeny of intentional understanding and also defending this role against some recent challenges – both from those who deny that mirror neurons have any intentional functions (see, for instance, Borg, 2007) and those who would relegate them to mere (motor) emulator neurons (see Csibra, 2004, 2005; Jacob, 2006) or downgrade their activation to a part of a top-down perceptual emulation (see Wilson & Knoblich, 2005). **C7**

148 **The Neural Correlates of Having Fun: Recent imaging research, social mirror theory, and some implications for the evolution of self-consciousness** Charles Whitehead <drcwhitehead@aol.com> (Wellcome Centre and Anthropology, University College London, London, UK)

The industrial revolution and the protestant work ethic have created a world in which work is valued over play, and science and technology over the arts. Educators know that play is necessary to healthy childhood development – but still see it as essentially a waste of time, and believe that the sooner children start 'working' the better. When archaeologists try to understand the evolution of the human brain, they look at stone tools, and wonder why technological changes do not correlate with brain expansion. Even neuroscientists have been influenced by this bias – so we have dozens of imaging studies of tool-use and object manipulation, but only four studies of dance, two of pretend play, and one of role-play. Yet in order to understand child development, the evolution of the brain, and the emergence of human self-consciousness, we need to look at social displays – such as dance, song, image-making, and role-play – which underpin human culture, cooperation, and the arts. Social mirror theory holds that such displays are responsible for the high levels of self-awareness and social insight in humans. I will present recent brain imaging research on play, dance, story-telling, tool-use, and related topics, and show how, in conjunction with archaeological data, we can use them to make sense of human evolution. When scientists attempt to define play, they often resort to the phrase 'just for fun'. There is no scientific definition of 'fun' – yet it is surely self-evident that when we are having fun, that is when we are being most true to our biologically given nature, and when the brain and the body are doing their most natural work. **C7**

*See also:*

141 **Modern Consciousness Science as Fechner's Inner Psychophysics**
328 **Transpersonal Phenomenological Parameters of Human Sexual Experience**
147 **Mirror neurons: What we can and cannot say**
143 **Double Dissociations Between Attention and Consciousness**
130 **Decoding Visual Perception: From Brain Reading to Mind Reading**

# 3. Cognitive Sciences and Psychology

## 3.1 Attention

149 **Can Attention Be the Key Towards an Understanding of Perceptual Consciousness?** Nivedita Gangopadhyay <Nivedita.Gangopadhyay@bristol.ac.uk> (Philosophy, University of Bristol, Bristol, United Kingdom)

Of late an increasing number of theories of perception (especially vision) try to understand perception by analyzing its observed links with action (Ballard 1991, Berthoz 2002, Findlay & Gilchrist 2003, Gibson 1979, Jacob & Jeannerod 2003, Milner & Goodale 1995, O'Regan & Noë 2001, Noë 2004, Norman 2002, Varela 1997, Varela et al. 1993). These non-orthodox or "action-oriented" theories of perception argue that the natural agency of the perceiver is crucial for understanding experience. In traditional theories of perception, e.g. Marr's theory (Marr 1982), the role of cognition in perception is generally considered to be primarily of the form of unconscious inferences at the subpersonal level. This conception of cognition implies a radical dissociation between cognition and consciousness. A major motivation for the development of the non-orthodox theories is the alleged inability of traditional accounts to offer an acceptable solution to the problem of the origin of experience and the problem of the felt quality of experience (O'Regan & Noë 2001). The non-orthodox views argue that the key explanatory concept in an account of perceptual experience is action and the notion is to be deployed in way that enables the theory to claim that action provides qualia over and above providing information about the environment. However, the question arises: how is the notion of action to be understood in order for the action-oriented theories to fulfill their claim? This paper argues that the notion of action needs to be considered as real time purposeful attentive engagement of the perceiver with the environment. The mechanism of attention primarily binds perception and action in the context of perceptual awareness. Certain features of the mechanism of attention mark it out as a critical explanatory element for perceptual awareness, namely, 1) Attention is importantly a personal level cognitive mechanism. It incorporates in

itself the characteristics of situating the perceiver in an epistemic relation to the object, e.g. by focusing on certain features of the entity that can enter into action planning, along with placing the perceiver in a position to hold some beliefs about the state in question. The deployment of this cognitive mechanism is of a nature that allows the formation of perceptual beliefs in real time along with its deployment. 2) The deployment of the mechanism of attention is necessarily accompanied by a sense of execution on the part of the perceiver. 3) In virtue of combining in itself the feature of a cognitive mechanism (by way of establishing an epistemic relation between the perceiver and the world) and a personal level mechanism (such that the perceiver can claim to be an agent in the context of its deployment), the mechanism of attention offers a reconciliation of cognition and consciousness in a way that avoids the problem of qualia and maintains the necessary explanatory relevance of cognition for a theory of visual experience. The conceptual analyses are supported by a survey of empirical studies in vision focusing on the phenomenon of active gaze redirection and examining the nature of saccadic eye movements. **P9**

150 **Attended But Unseen: Visual Attention is Not Sufficient for Visual Awareness.** Robert Kentridge, Tanja Nijboer; Charles Heywood <robert.kentridge@durham.ac.uk> (Psychology, University of Durham, Durham, UK)

Does any one psychological process give rise to visual awareness? One candidate is selective attention – when we attend to something it seems we always see it. But if attention can selectively enhance our response to an unseen stimulus then attention cannot be a sufficient precondition for awareness. Kentridge, Heywood & Weiskrantz (1999, 2004) demonstrated just such a dissociation in the blindsight subject GY. Here we test whether the dissociation generalizes to the normal population. We presented observers with pairs of coloured discs, each masked by the subsequent presentation of a coloured annulus. The discs acted as primes, speeding discrimination of the colour of the annulus when they matched in colour and slowing it when they differed. We show that the location of attention modulated the size of this priming effect. However, the primes were rendered invisible by metacontrast-masking and remained unseen despite being attended. The presence or absence of primes could not be explicitly discriminated in a forced-choice task. Visual attention could therefore facilitate processing of an invisible and cannot, therefore, be a sufficient precondition for visual awareness. **C4**

151 **Unconscious Endogenous Orienting of Attention Reflects An Automatic Shift of Attention.** Stefania Mereu, Maria Casagrande; Diana Martella; Andrea Marotta <stefania.mereu@uniroma1.it> (Rome, Italy)

Since Posner (1980) proposed the dissociation between endogenous and exogenous orienting of attention, it has been assumed that a symbolic cue would bring voluntary shifts of attention, while peripheral abrupt onset cues would induce automatic orienting of attention that has been observed even if cues were not consciously perceived. McCormick (1997) instructed subject to reorient their attention to the opposite location of the onset of a peripheral cue. Results showed that unconsciously perceived cues can facilitate their onset location after brief stimulus onset asynchronies (SOA). At longer SOA nor reorientation following predictive cues, neither IOR in a non-predictive paradigm arise, with not-consciously perceived cues. This study would examine the relationship between endogenous spatial orienting and unconscious perception, using a spatial cueing task, in which half of the cues (arrows) were rendered invisible by object substitution masking. Three experiments assessed endogenous orienting with predictive (p=.80), unpredictive (p=.50) or counterpredictive (p=.20) cues, that were rendered invisible by object substitution masking in half of the trials. 14 students participated at the first experiment. The ANOVA Masking (masked, unmasked) by Cue (valid, invalid) showed a facilitation effect for attended (cued) locations ($F1,13=16,68$; $p<.01$) and no significant interaction between cue and masking ($F<1$). In order to assess the possibility that the endogenous shift of attention could be automatic instead of voluntary, as suggested some authors (e.g. Tipples, 2002), another experiment has been run on 10 students, in which cues were unpredictive of target onset location. The ANOVA again showed a significant facilitation for cued locations ($F1,9=6,7$; $p<.005$) but no interaction between masking and cue ($F<1$). The third experiment would directly compare automatic and voluntary components of endogenous orienting. 27 subjects performed an endogenous counterpredictive cueing task that should be particularly diagnostic of which component (automatic or voluntary) is guiding subject's attention in both aware and unaware conditions. If arrows bring an automatic shift of attention, and only automatic orienting is possible in absence of cue awareness, it is possible to hypothesize a facilitation for targets presented in the attended (uncued) location, but only in the aware condition. Contrarily, in the unaware condition, we expect a facilitation in the unattended (but cued) location, caused by tendence of the subject to follow automatically the cue direction. The results showed a facilitation

for targets presented in the unattended (but cued) location ($F1,26=4$; $p<.05$), suggesting that endogenous cues could evoke automatic, but not voluntary shifts of attention, even if not consciously perceived. Our results seem also to confirm that the some endogenous cues, as an arrow, could evoke automatic rather than voluntary shifts of endogenous attention. **P9**

152 **Does Experience Outrun Attention? (And a Possible Second Demise of Consciousness Studies)** Eric Schwitzgebel <eschwitz@ucr.edu> (Philosophy, University of California at Riverside, Riverside, CA)

Do you have constant tactile experience of your feet in your shoes? Do you have constant visual experience (when your eyes are open) of the tip of your nose? Do you have visual experience of any sort, normally, when your eyes are closed? Intuitive and philosophical opinion on these questions differs widely. According to "rich" views of consciousness, consciousness contains a constant flux of many such details. "Thin" views, in contrast, hold that experience is limited at any one time to just one or a few things in attention. Attempts to settle the rich-vs.-thin debate through concurrent introspection are ruined by the "refrigerator light illusion". Attempts to address the issue through immediate retrospection raise difficulties of memory loss and "stimulus error". All existing psychological and neuroscientific research on the issue is either question-begging or indecisive, and the difficulties may prove entirely insuperable. Nonetheless, this issue is one of the most fundamental to consciousness studies. Without an adequate take on it, it's not clear how far the discipline can proceed. **PL7**

*See also:*

154 **Three Failed Arguments (Dretke, Fodor & Pylyshyn)**
321 **How to interpret apparent paranormal effects: Immediate and long-term effects of meditation on the anticipation of visual stimuli**

## 3.2 Vision

153 **Enactive Representationalism? An Expectation-Based Architecture for Perceptual Experience** Ron Chrisley <ronc@cogs.susx.ac.uk> (COGS, University of Sussex, Falmer, East Sussex, UK)

Expectation-Based Architecture (EBA) is a novel model of perceptual experience originally developed to assist in demonstrating the possibility of robotic specification of (part of) the content of visual experience (Chrisley and Parthemore 2007a, Chrisley and Parthemore 2007b). It is argued here that EBA can retain the virtues, while avoiding the pitfalls, of both representationalist and enactive accounts of experience. EBA is an enactive model in the sense of being action-based. Visual experience, or at least a component of it, is taken to consist in the mastery of visuo-motor contingencies (O'Regan and Noë 2002), and EBA models such mastery in terms of the acquisition and maintenance of action-based expectations: the ability to anticipate the visual input that would be received if the agent were to engage in this or that motor activity. However, EBA jettisons what some take to be unattractive features of O'Regan and Noë's Sensorimotor Contingency Theory (SCT). For example, in SCT, but not EBA, an agent must act at a given time in order to have an experience at that time. Further, while SCT downplays or dismisses the role of representation in experience, EBA is explicitly representational in that it is the representational (truth-evaluable) content of the expectations of the agent that is taken to constitute (a part of) the content of the visual experience of the agent. This rapprochement between enactive and representational explanations is achieved in EBA by exploiting two novel features: 1) EBA employs counterfactual representational vehicles: the representational contents that are (or at least determine) the contents of perceptual experience at any given time need not be the contents of any representation tokened at that time; they only need be contents of representations of anticipated inputs, representations that are not tokened at that time but would be tokened were the agent to perform, or consider performing, a particular action. 2) EBA employs a notion of anticipatory content that is only weakly world-directed: content that is made true or false primarily by future states of the agent. Both of these novel features themselves raise worries, however. In particular, how can weakly world directed content do justice to the intentional, robustly world-directed aspects of experience? Two possible answers are considered. One is to deny that the non-conceptual content of visual experience is robustly world-involving, and attribute the strong intentionality of visual experience to its conceptual content. This reply can be made independently of whether an account of the conceptual content of visual experience can also be given in terms of EBA, or whether some other account is required. Another reply is to claim that weak world-directedness is sufficient for robust world-directedness. The causal relations between objects and sensory inputs, together with the intentional relationship

between expectations and sensory inputs, is enough to enable intentional relationships to objects. A demonstration of a working robot implementation of EBA will be given to help illustrate the issues raised in the talk. References: Chrisley, R. and Parthemore, J. (2007a). "Synthetic Phenomenology: Exploiting Embodiment to Specify the Non-Conceptual Content of Visual Experience", Journal of Consciousness Studies 14(7):44-58. Chrisley, R. and Parthemore, J. (2007b). " Robotic Specification of the Non-Conceptual Content of Visual Experience", Proceedings of the AAAI Fall Symposium on "Consciousness and Artificial Intelligence: Theoretical foundations and current approaches", Washington DC, 8-11 November 2007. O'Regan, K. & Noë, A. (2001). "A sensorimotor account of vision and visual consciousness". Behavioral and Brain Sciences 24(5): 883-917. **C17**

154 **Three Failed Arguments (Dretke, Fodor & Pylyshyn)** Ellen Fridland, Ellen Fridland <ellenfridland@yahoo.com> (Philosophy, CUNY Graduate Center, Brooklyn, NY)

In this paper, I argue that three of the main arguments supporting a strict division between cognition and perception fail. I begin by with Fred Drestke's re-formulation of the traditional distinction between "seeing" and "seeing as". I claim that his argument is invalid. Second, I address Fodor's dismissal of cognitive penetration over time as a legitimate form of cognitive penetration and show that this claim is based on an assumption and not an argument. Lastly, I take on Pylyshyn's attempt to safeguard perception from cognition by relegating selective attention to a pre-perceptual stage and argue that this attempt, rather than addressing the issue at hand, changes the question. **P3**

155 **Do Emotional Cues Influence Shifts of Visual Spatial Attention?** Stephen Morgan <morgan@csp.edu> (Psychology, Concordia University, St. Paul, St. Paul, Mn)

It has been well documented that emotionality affects attention allocation and attentional movement through a spatial world. Experiments have typically found that scanning for a negative emotional stimulus is faster than scanning for a positive emotional stimulus. Additionally, negative emotional stimuli engage different processing styles than do positive stimuli. The present study examines whether shifts of visual spatial attention, initiated by emotional stimuli, will differ depending on the emotional valence of the initiating stimulus. Results are discussed in the context of the evolutionarily adaptive nature of a bias toward negative emotions, and the effects of this bias even outside of conscious awareness. **P9**

156 **Sensory Substitution As Sensorimotor Extension: Beyond Dominance and Deference** Erik Myin, Malika Auvray <Erik.Myin@ua.ac.be> (Philosophy, Universiteit Antwerpen, Antwerpen, Belgium)

Sensory substitution devices aim at replacing or assisting one or several functions of a deficient sensory modality by means of another sensory modality. These systems are set up so that information coming from an artificial receptor gets processed by a different sensory organ from the one normally used to deal with this information, for example by converting what normally are visual stimuli into tactile or auditory stimuli. Thus, these systems provide through an unusual sensory modality (the substituting modality) the kind of information that is normally provided through another sensory modality (the substituted modality). Various kinds of devices have been developed with the goal of allowing their users to behave as if they possessed the substituted sensory organ – at least to some degree. For instance, thanks to visual-to-tactile or visual-to-auditory conversion systems, blind persons are able to move, localize, and recognize objects in three-dimensional space. How should perception with a sensory substitution device (SSD) be understood? In particular, which sensory modality does perception acquired with a SSD belong to? Does perception with a system that projects 'tactile images' on the skin lead to visual experience or does it remain tactile? Both the dominance thesis that the acquired perception remains in the substituting modality (tactile) and the opposite deference thesis that the acquired perception belongs to the substituted modality (visual) have been defended. We propose to move beyond the understanding of sensory substitution which is given in either the dominance or the deference thesis. Specifically, we will reject the assumption, common to the traditional interpretations, that perception after sensory substitution can be conceived of as equivalent to perception in an already existing modality. We will argue that sensory substitution devices transform, extend, and augment our perceptual capacities. We will develop this view by comparing sensory substitution devices to other 'mind enhancing tools' such as pen and paper, sketchpads, or calculators. Applying an externalist analysis of mind enhancing tools to sensory substitution devices will unveil these as thoroughly transforming sensory experience and as bringing about a novel, hybrid form of perceptual, or rather sensorimotor, interaction with the environment, which does not remain confined to the traditional five senses.

Just as mind enhancing tools relocate the bounds of cognition, sensory substitution devices relocate the bounds of perception, as well as of perceptual awareness. This view of sensory substitution is responsive to the experiential shift of focus from proximal sensation to distal perception, which occurs during the process of learning how to use a sensory substitution device. Moreover, this conception closely fits the way users of sensory substitution devices describe their own experience, as recorded in a recent empirical study with a visual-to-auditory substitution device (the vOICe) by one of us (Malika Auvray). In a concluding part, we will sketch how, more generally, our account of sensory substitution can lead to a novel conception of the senses as tools or 'natural artefacts' and we will show how this allows for a refreshing perspective on various problems hampering traditional theories of the senses. **C17**

*See also:*

150 **Attended But Unseen: Visual Attention is Not Sufficient for Visual Awareness.**
234 **Mind Particles: See it by Physical Instruments.**
149 **Can Attention Be the Key Towards an Understanding of Perceptual Consciousness?**
110 **Constancy First; Then Details**
78 **Ambiguous Figures and Representationalism**
39 **A Possible Functional Role for Qualia**
75 **Perceptual Constancy in the Representational Nature of Visual Experience**
155 **Do Emotional Cues Influence Shifts of Visual Spatial Attention?**

## 3.3 Other sensory modalities

157 **'I'm not thinking of you.' Poetic metaphor: intrinsic inhibited during extrinsic, cross-modal, hand-eye, 'conscious' sensory engagement: 'losing the self' while gazing at hand drawn, beloved faces.** Kristen Corman <kristencorman@mac.com> (English, New England Conservatory of Music, Mass Art, Allston, MA )

When cross-modal connections and constraints between vision and touch are enacted as priming for face perception, this neurally-salient event shows the complexity of sensory level consciousness. Poetry frequently features this emphatic constellation. A common metaphor depicts a Lover who hand-draws a face-symbol of the Beloved on a reflecting surface such as a windowpane, mirror, or water-ice. Gazing at this sensory-rich image, the bedazzled Lover stops thinking, 'loses the self,' then returns to thought, a transformed person. I ask, why don't poets position Lovers staring at paintings? Why is the light-varying reflecting surface necessary? Malach (2006) and Hasson (2004) find that while observers watch a movie, brains "tick" together during natural vision of sensory-riveting scenes involving faces and hands, and the prefrontal is inhibited. Golland (2006) explicates extrinsic-intrinsic systems and line-drawn faces. Easton shows that cross-modal priming is as strong across as within modalities (1997;2001). Rodriguez (1999) examines phase-lag synchrony prompted by face perception. Selected poems report conscious thought, cessation of introspection, the onset of intense sensory (but conscious) engagement, and the return of thought: Merrill's "Vision of the Garden"(Water Street,1962); Schubert-Müller's "Dream of Spring," "On the River," "Numbness"(Winter's Journey,1829); "Rain of Tears" ("Miller-Maid,for reading in winter,"SongCycle,1816); Tennyson's " Lady of Shalott"(1842); Meng Hao-jan's Mountain Poems,pp.46;64-65(689-740). Poetry aims to "resist intelligence almost successfully" and instead open "the feelings, the subconscious." Windowpanes are portals through which the Lover sees serial depths of an interior, rather than exterior world. James Merrill's Lover traces a face on a pane, sees through its portal to the brilliant pleasure of shapes in winter-nature, finds that face anew in the Beloved, and sees through him, as portal, to an ecstatic shape in spring-nature, "Joy outstretched in our bodies' place." While Merrill embodies Joy by re-tracing body-shape, Schubert's despair yearns for the body itself to return. Tennyson's modeling mirror shatters, obliterating life and language when its subject directly sees the dazzling real, rather than reflected, object. Yet Meng describes observed experience as a sense-blending: what you know is where you know it, and that modal-location is melded blissfully with world. I suggest that the light-variations of the reflecting surface metaphorically register cognitive shifts between active and inhibited phases of introspective ("intrinsic") and perceptual ("extrinsic") systems. Language is neural, embodied, and integrated: both lingual and visual images evoke concepts (Damasio,1989a,b). But does one global integration account for prefrontally-inhibited, sensory consciousness? Is 'losing the self' after hand-eye priming an instance of "lateral/distributed consciousness" (Hameroff, 2007)? Though Lovers are conscious, does visual constraint modulate emergence? Visual-metaphors demonstrate that intense sensory engagement enacts a gap in thinking, allowing the observer a neural shake-up

to 'know' feeling and thought outside of what intrinsic thinking might offer. The salient face is often drawn; fine motor grips engage sensory consciousness. The emotional salience of the scene may be grounded through perceptual cross-modal and mirror neuron processes. Face perception induces phase-lag synchrony, relevant to the local-global debate. Are there potential insights between desynchronization during phase-lag synchrony and intrinsic system inhibition during intense sensory engagement? **P3**

158 **Phantom Limb "Touch" Suggests That A "Mind-Limb" Extends Beyond the Physical Body And Can Interact with Reality, Producing Physiological Sensations** Robert Mays, Suzanne Mays <mays@ieee.org> (Chapel Hill, NC)

A phantom limb is the vivid subjective experience of the presence of a limb that is absent congenitally or through amputation. The phenomenon of phantom limb "touch" has not been reported to our knowledge. We have completed exploratory experiments with subject M.G., a 56-year-old, college educated woman with congenital digital agenesis (missing five fingers of the left hand). In many respects, M.G. experiences her phantom fingers in the same way as other phantom limb subjects. However, she also reports physical sensations in her finger buds, palm and arm (tingling, warmth, pressure) when her phantom fingers are "touched" by an object or by her right hand. When "touched" on the head by M.G., other people report feeling warmth and pressure, and seeing inner visual images (e.g., a dark circle with a white ring of light) which are reminiscent of visual sensations evoked by electrical brain stimulation. In earlier work (Mays and Mays, 2008, in press), we postulated that the self-conscious mind (SCM) is an autonomous "field of consciousness" which ordinarily is united with and operates through the mediation of the brain, but which separates from the body in the near-death experience (NDE). This view is supported by evidence from NDEs and from various neurological phenomena. NDE phenomena include apparent subtle interactions with physical processes (light, sound, surfaces), including interactions with "in-body" persons, suggesting that the non-material SCM is able to interact in some physical way with brain neurons. Since the SCM in this view is a spatially extended field, coextensive with the physical body, then in the absence of a physical limb, a part of the SCM will still project beyond the stump as a kind of "mind-limb" which is experienced as a phantom limb. The spatial region of the phantom/mind-limb then should exhibit some of the properties of the SCM "body" in the NDE out-of-body experience, such as subtle interactions when a physical object enters the spatial region of the phantom, possibly causing physical sensations in the body, and subtle interactions of the phantom limb with another person's physical body, which could be felt by the other person. In our experiments with M.G., we found preliminary evidence supporting both of these properties. M.G. reports physical sensations in her finger buds, in her left palm, along the left arm and in a specific spot in her upper left arm, when her phantom fingers are "touched", and presents objective physiological reactions (increased skin color, twitching of the finger buds). Other people reported subtle but definite physiological sensations (warmth, pressure in the head and sinuses, unusual inner visual images) when "touched" on the face or back of the head by M.G.'s phantom fingers. The visual images include shadows, light, dark circle with white ring, gradually progressing oblique white lines forming a sword-like shape, gradually forming channel rising from abdomen up and ending with bright white light in the head, and arcs of colored light rising up with changing colors. In this paper, we present the detailed phenomenology of phantom limb "touch" and address alternate explanations. **P3**

*See also:*

297 **The Enactive Torch: Promoting First-Person Phenomenology in the Study of Enactive Perception**
156 **Sensory Substitution As Sensorimotor Extension: Beyond Dominance and Deference**

## 3.4 Memory and learning

159 **Consciousness and Memory** Ron Karr <karr88@comcast.net> (Sunnyvale, CA)

Memory is a key aspect of consciousness. This paper raises some issues related to consciousness and memory that sometimes seem underemphasized, particularly in philosophical theories of consciousness. Memory might reasonably be defined as "preservation of information across spans of time", which would also seem to be a necessary (though not sufficient) condition for consciousness. Memory spans vary between extremely short to an organism's lifetime. A "conscious experience", at least in humans, seems to involve a time scale on the order of a few seconds, often identified with working memory. This fact should provide constraints on theories of consciousness; for example, it's not clear how a purely functionalist model can explain it. Longer-term forms

such as episodic memory may not be strictly needed for the existence of consciousness but contribute to its contents. But what is certainly required for consciousness is the ability to bind successive moments of experience on an extremely short-term scale. This ability is typically not labeled as memory, perhaps because it is always present in normal life. But it may be what breaks down in states like anesthesia or coma: the brain is still responding to a degree, but individual moments are not connected, and hence no real consciousness exists. "Reportability" and "access" are key concepts in consciousness studies. But much of of what we "experience" consciously for a brief time is not remembered. As shown by experiments like Sperling's (1960), a large amount of information is potentially accessible prior to a decision on what to report; once the decision is made, a smaller amount is actually accessible/reportable. This potential access seems to be a form of consciousness, yet frustrates the ability for first-person reports. One can envision (at present, only as a thought experiment) the "ultimate" brain-scanning technology that would allow the brain correlates of all aspects of conscious (and unconscious) experience to be identified in real time. This capability would greatly expand the notion of reliable reportability. Such a device would allow resolving such controversies as whether the apparent failure to perceive stimuli in change blindness experiments, or the phenomenon of "unconscious driving", are truly failures of consciousness or memory. Perhaps the thought experiment alone will shed some light in these areas. **P3**

*See also:*

258 **Mystery of the Hemispheres: An Evolutionary Loop**

## 3.5 Emotion

160 **The Phenomenal Mindreader** Stephen Biggs <stephen.biggs@u.toronto.ca> (Philosophy, University of Toronto, Toronto, ON, Cananda)

Recently, authors working in various fields have applied the spirit of simulation theory (Harris, 1992; Goldman, 1992, 2000) to emotional states. Psychologists Preston et al. (2002), for example, claim that simulated emotions play an important role in some third-person mental state attributions (3PAs). Philosophers Goldman et al. (2005), meanwhile, argue that observing facial behavior leads those attributing mental states (i.e. mindreaders) to generate emotions that they use in 3PAs. In a similar vein, neuroscientists Jackson et al. (2005) argue that simulated pains allow mindreaders to understand the pains of those to whom they make attributions (i.e. targets). This work intimates two interesting hypotheses. The phenomenal simulation hypothesis holds that mindreaders sometimes simulate targets' phenomenal states. The phenomenal mindreading hypothesis holds that this phenomenal simulation plays an important role in some 3PAs. Although the extent of similarity between simulated and ordinary phenomenal states remains unclear, neuropsychological and behavioral evidence strongly supports the phenomenal simulation hypothesis (cf. Author, 2007). Accordingly, the phenomenal mindreading hypothesis merits exploration. This paper explores the phenomenal mindreading hypothesis, which it divides into three component hypotheses: (Hc) Phenomenal simulation causes some third-person phenomenal state attributions. (Hf) Phenomenal simulation facilitates some third-person phenomenal state attributions. (Hd) Phenomenal simulation deepens simulators' understanding of targtes. The paper then considers empirical and intuitive evidence that bears on each hypothesis. Empirical evidence, I conclude, only tenuously supports (Hc) and (Hf). Intuitive evidence (involving a simple thought-experiment), however, strongly supports (Hd). Accordingly, (ceteris paribus) phenomenal simulation deepens simulators' understanding of targets. The paper concludes, therefore, that we have good reason (albeit surprising reason) to endorse the phenomenal mindreading hypothesis. **C3**

161 **Could Panksepp's "Seeking" System Be the Key to the Problem of Consciousness?** Ralph Ellis <ralphellis@mindspring.com> (Philosophy/Editor, Consciousness & Emotion, Clark Atlanta University, Atlanta, GA)

The idea that emotion is the indispensable ingredient of consciousness in all modalities is not new. Cytowic and Damasio have suggested it. Damasio, Penfield, and recently Merker show that we can gradually eliminate cortical areas without eliminating "core consciousness," whereas if we knock out emotional areas, all types of consciousness become impossible. However, opponents insist that "emotional" areas also release neurotransmitters to the cortex that have nothing to do with emotion, and are merely necessary in the way that supplying electrical current is necessary for a radio to work. The radio (the cortex) is still what makes the music (consciousness). The subcortex is only a way of getting the power to the radio. What is needed is a coherent story about the specific way in which emotion grounds other conscious states. I suggest that such a story is offered by Panksepp's emotional "seeking" system, combined with arguments for the emerging "enactivist"

approach to consciousness and some neglected evidence from ERP, perceptual priming, and motor imagery studies. Donaghue's monkeys play computer games by moving the joy stick "with their minds" – i.e., by forming motor imagery detected by electrodes. The thrust of my argument is that the motivation to activate motor imagery relative to environmental situations is a necessary ingredient in all consciousness, including perceptual consciousness. Because initiating motor processes is efferent rather than afferent, we can clearly see that the sum total of afferent processes can never produce consciousness – not even perceptual consciousness. A significant amount of motivated efferent activation, however, does produce consciousness. The modality and qualitative content of the consciousness may depend on what kind of afferent input is present, but the existence of consciousness does not. The story is therefore just the reverse of what the initial critics of the emotivist view charged. A significant amount of motivation toward efferent action is not only necessary but also sufficient for consciousness, whereas afferent input is necessary for perception only in the way that the perceived object is necessary: it affects the what-content of the consciousness, but is not a part of the substrate of the consciousness. Afference is not what does or executes the consciousness. Afferent processing of input is neither necessary nor sufficient for consciousness (e.g., inattentional and change blindness, ERP results, perceptual priming studies). The specific role of emotional processes, especially Panksepp's "seeking" system, in gearing us up for imagined actions can help us understand why this is the case. Panksepp demonstrates that mammalian emotional tendencies like play, exploration, nurturance, bonding, and the "seeking" system are the same circuits that initiate action. Their motivational thrust is precisely to gear the animal up for action. When the elaborated action tendencies are inhibited, that is when we get action imagery rather than overt action; it is only a short step then to argue that, if consciously understanding the environment is a way of assessing its possible action affordances, then Panksepp's emotional activations are the key element in this consciousness. **C3**

162 **"Consciousness and Emotions: Radical or Moderate Embodiment?"** David Murphy <dgmurphy@truman.edu> (Philosophy and Religion, Truman State University, Kirksville, Missouri)

Assertions regarding consciousness, emotions, and embodiment intersect as illustrated by Jesse Prinz's arguments that "the somatic approach" encompasses all emotions and that a moderate position regarding the embodiment of consciousness should be preferred over a radical one. The somatic view he proposes, while illuminating, falls short of being encompassing partly because a stronger case can be made for the constitutive, not merely causal, role of world and body in relation to emotions than he acknowledges. Embodiment can refer conventionally to the physical body or more broadly to the lived in body. Moving well beyond the conventional sense, Giovanna Colombetti and Evan Thompson make a strong case for an enactive approach, extending the application of contentions regarding embodied cognition which have gained momentum in recent years to emotions. In a lesser key, the broad sense of embodiment is also found in the interpretations of emotions and consciousness advanced by neo-Jamesians Prinz and Antonio Damasio. In spite of the affinities between enactive and neo-Jamesian approaches, differences emerge which can be illuminated by way of a second distinction regarding embodiment, i.e., between it playing a constitutive or causal role. The criticisms Fred Adams and Ken Aizawa raise against transcranialists, particularly Andy Clark, illustrate the debate. Concerning emotions, radical embodiment theorists Colombetti and Thompson sharply criticize Prinz; in turn, Prinz argues against a radical conception of the embodiment of consciousness, stressing not only the cost of withdrawing support for the supervenience of consciousness on the brain but contests key examples provided by advocates of radical embodiment. Should the burden of proof indeed fall on advocates of radical embodiment, opting for the more conservative endorsement of embodiment would be advisable. Three considerations back a more favorable assessment of radical embodiment, however. The lack of established criteria regarding what counts as constitutive and causal respectively counts as license for seriously entertaining the more radical position. Also, a strong case can be made for a position more congenial than Prinz's with the enactive approach without invoking the contested constitutive nature of embodiment, as examination of the situated approach articulated by Paul Griffiths and Andreas Scarantino demonstrates. Finally, particular examples backing the constitutive position become more compelling upon review, once a less onerous burden of proof is established along with a framework more congenial with a position inclusive of advocacy of radical embodiment. The case for radical embodiment concerning cognition looks strongest, but a radical interpretation of the embodiment of emotions and consciousness can be backed credibly, suggesting the desirability, albeit not the necessity, of stretching the boundaries of the somatic approach beyond those Prinz delineates. **P3**

*See also:*

37 **A Proposal for a Turing Test of Emotion.**
41 **Consciousness as the Interface between Cognition and Emotion ('ICE Theory')**

## 3.6 Language

163 **Linguistic Determinism and the Technological Singularity** Carl Flygt <carlflygt@gmail.com> (San Jose State University, Burlingame, CA)

The thesis of linguistic determinism contains the idea that nothing is available to conscious experience outside its capacity to apply words to it. A possible experience is what it is solely in virtue of its being constituted by language (Wittgenstein). Ontologically, on the same thesis, similar experiences under different language patterns are incommensurable (Whorf-Sapir). The thesis is applicable in science as well (Winch, Kuhn). The thesis of the technological singularity is that at some point in the foreseeable future, the products of collective intelligence, namely hyperpowerful and internetworked computers, robots and nanotechnology, will so supersede our capacity to understand them, to put their designs and their purposes into a language of our own, that they will replace us as the most intelligent form of decision-making on the planet (Kurzweil). Taken together, these two theses point at an important question: how are experience, language and society likely to evolve in response to the "alien and unintelligible tradition of thought and practice" (MacIntyre) portended by the products of our own innovation and collective intelligence? This complex question, which implicates such sociological areas as economic development, environmental problems, cultural norms, education, political practice, demographics and consciousness studies, can perhaps be simplified and made tractable by asking a prior question about the nature of conversation. Is a theory of conversation, which on the thesis of linguistic determinism reduces to a theory of human consciousness and its microexpression through the body, possible, and if it is, how is it relevant to the human adaptation to the world of the future? Having recently proffered one (2006), I believe such a theory is altogether possible, and if this theory is true I think it will prove to be substantially relevant to a future form of social and cultural life. This future form of human life will incorporate the occult dimensions of human existence, such as those answering questions about the nature of birth, death and cosmic existence after death and before birth, should any such pertain as matters of fact, with hyper-intelligent and super-technological developments that may accrue over a period of time not unforeseeably distant. Certainly one can imagine a scenario under the foregoing assumptions: 1. Networked artificial intelligence increases exponentially, leading to all manner of fantastic transformations in human consciousness, including virtual realities indistinguishable from and on balance preferable to normal reality, and the mechanical capacity to project inner realities into three-dimensional space. 2. Moral and linguistic intelligence increases in parallel with this trend, thanks to new ways of using language in conversation and exploiting the collective intelligence of social systems heretofore discoverable only on large spatial and temporal scales. 3. Humanity enters a new evolutionary epoch which can only be characterized properly as materially spiritual. It will be the purpose of this talk to describe how moral intelligence can be expected to increase given the dual pressures of technological innovation on the one hand and socio-cultural innovation, with particular reference to conversation theory, collective intelligence and the theory of linguistic determinism, on the other. **P3**

164 **Consciousness is just a word: Julian Jaynes and contemporary psychology** John Limber <john.limber@unh.edu> (Psychology, University of New Hampshire, Durham, NH)

Julian Jaynes (1976) classic work on consciousness (C), the Origin of Consciousness (OC) shares a common problem with current discussions on the topic – what IS C anyway? Jaynes believed he knew – "there are several uses of the word consciousness which we may immediately discard as incorrect." As one can imagine, readers remained unconvinced that their favorite notion of C was "incorrect". Many readers, much like Jaynes himself, had a preconceived notion of C – as if the word 'C' had some rigid meaning, universally true. To avoid squabbling, I will try to extract the essence of his insights, call it Jaynes' consciousness (J-con) and move on – extending those ideas in light of recent research. Simply put, J-con is a quite limited cognitive process involving manipulation of representations: ... a succession of different conditions which I have been taught to call thoughts, images, memories, interior dialogues, regrets… all interweaving with… exterior sensations of which I am selectively aware.' Among the provocative claims in OC was that C was a cultural artifact of the last several thousand years. This abrupt expansion of cognition was aided by the development of language – not biological evolution but a recent extension of vocabulary as early humans expanded their thoughts and insights – in particular the lexicalization of subjective, cogni-

tive processes. Pushed by vocabulary growth, metaphoric shifts in meaning, and cultural innovations internalizing existing social language for intrapersonal communication, J-con brought the modern mind – with it's subjective beliefs of self and others – to homo Sapiens. Jaynes recognized the evidence for his hypotheses was weak but then he was writing when many believed whatever psychologists needed to know about language could be found in rats or birds. Today, research on language and cognitive processes expands exponentially. And some of it gives intriguing support to something like J-con. First I will sketch out a model of how J-con might work – essentially a process whereby fluent speakers have their thoughts automatically encoded into available representations – typically words. There are tight empirical constraints on this – encoding must be quick enough to catch the thought, words that fit the thought must be readily available and of course this will only reflect the very tip of the thought iceberg. J-con then is the primary – yet very limited and indirect – means by which we imperfectly know our thoughts – via the voice in our head. J-con was more than a epiphenomenal mind-wandering experience. It became a personally driven intrapersonal operating system capable of a variety of new tasks including expanding imagination, creating episodic memories, expanded life narratives, and generally facilitating breaking away from the event probabilities of everyday zombie life. Although the contents of C were not necessarily linguistic, the control of C is primarily via language. Just as we indirectly hear our thoughts through J-con, we can indirectly guide or prime those thoughts by talking to ourselves – J-con's 'structions.' As one child expressed it, there is much to be learned talking with my brain. **C13**

*See also:*

98 **Heterophenomenology's Linguistic Idealism**
118 **Time Course of Brain Activity During the Intention to Speak**

## *3.7 Mental imagery*

165 **Relations of Hypnotic Susceptibility, Absorption, Imagery, Sexual Fantasy, Sexual Daydreaming, and Social Desirability to Sexual Satisfaction** Dr. Gregory Holler <gholler@comcast.net> (Behavioral Sciences, University of Phoenix, Oakland, CA)

This study investigated whether perceptual, sexual, and personality variables would predict sexual satisfaction in heterosexually active males and females (N = 101). Hypothesized predictors were hypnotic susceptibility, absorption, imagery, sexual daydreaming, sexual fantasy, social desirability, and sexual satisfaction as measured by the Tellegen Absorption Scale (TAS), Betts Questionnaire Upon Mental Imagery (QMI), Sexual Daydreaming Scale (SDS), Hurlbert Index of Sexual Fantasy (ISF), Marlowe-Crowne Social Desirability Scale (MC), and the Sexual History Form (SHF) respectively. The criterion variable of sexual satisfaction was measured by the Sexual History Form (SHF). Correlations, gender comparisons, hierarchical stepwise multiple regression, and path analyses tested hypotheses.Significant correlations were found between imagery and sexual fantasy ($r = -.28$, $p < .01$), sexual daydreaming and sexual fantasy ($r = .29$, $p < .01$), and sexual fantasy and sexual satisfaction ($r = -.55$, $p < .01$). Multiple regression analysis revealed key predictors related to sexual satisfaction for the total sample ($R = .29$), for males ($R = .40$), and for females ($R = .64$). In males, sexual fantasy significantly predicted sexual satisfaction ($r = -.35$, $p < .05$). In females, sexual daydreaming ($r = -.29$, $p < .05$) and sexual fantasy ($r = -.63$, $p < .01$) correlated significantly with sexual satisfaction. Path analytic models were non-recursive. Direct effects showed a path coefficient of -.55 between sexual fantasy and sexual satisfaction. Gender differences in the two path models suggested that some constructs are more important to females than males. **P9**

166 **Influence of Meditation Styles on Visual/Spatial Cognition** Maria Kozhevnikov, Zoran Josipovic, New York University; Louchakova, Olga, Institute of Transpersonal Psychology <mkozhevn@gmu.edu> (Mental Imagery and Human-Computer Interaction Laboratory, George Mason University, Fairfax, VA)

The current study examined the effects of concentration versus open awareness meditation on visual/spatial processing. Specifically, we compared the effect of the Tibetan Deity-yoga meditation (concentration style), which employs focused attention and intensive visualization and Rigpa or "emptiness" meditation (open awareness style), which employs evenly distributed attention. Deity yoga and "emptiness" meditation groups completed computerized mental rotation and visual memory tests before and after meditation. Their performance in these tests was compared with the performance of the two non-meditator control groups who either rested or solved other visual-spatial tasks between the testing sessions. The results showed that only the Deity yoga meditation group improved from pretest to posttest on the visual/spatial tasks. These findings may have relevance for

the training of visual/spatial abilities and suggest that different meditation techniques may have different effect on cognition. **C5**

*See also:*

175 **Correlates of Bad Dream and Nightmare Narratives: Implications for a Neurocognitive Model of Disturbed Dream Generation**
359 **Lucid 2.0 a Development Environment for Synthesizing and Measuring Interactive Audio and Visual Experiences**

## 3.8 Implicit and explicit processes

*See:*

171 **The Discrete Generation of Consciousness**

## 3.9 Unconscious/conscious processes

167 **Transient Neglect: How a Visual Short-Term Memory Task Leads to Impaired Awareness for Objects in the Left Visual Field** Emrich Stephen, Susanne Ferber <steve.emrich@utoronto.ca> (Psychology, University of Toronto, Toronto, Ontario, Canada)

One of the most perplexing and interesting neuropsychological disorders is that of visual neglect. These right-brain damaged patients have no conscious awareness for anything located in the contralesional half of the visual field, even though the visual pathways remain intact. Likewise, individuals suffering from visual extinction after unilateral brain damage demonstrate an impaired awareness for stimuli in one half of the visual field under the presence of bilaterally presented stimuli. Although neglect and extinction have traditionally been associated with impaired attentional processes, current models of neglect suggest that it is also associated with a profound deficit in visuo-spatial memory. Interestingly, recent experiments (Todd, Fougnie, & Marois, 2005) have demonstrated that increases in visual short-term memory (VSTM) load produce decreases in neural activity in the right temporo-parietal junction (TPJ), the same region associated with neglect. Here, we tested in healthy individuals whether increases in VSTM load could produce deficits in awareness for objects presented on the left visual field. During the maintenance period of either a low-load or high-load VSTM task, participants were presented with objects appearing in the left or right visual fields, either unilaterally or bilaterally. After participants were probed with respect to the VSTM task, they were asked to report the number and identities of objects presented during the memory delay. The results demonstrate that memory load had no effect on participants' ability to report that an object was in fact presented, and accuracy for detection was equal on both the left and right visual fields. However, under a high visual memory load, accuracy in reporting the identities of the objects was significantly impaired under bilateral presentation relative to unilateral conditions. Interestingly, we also demonstrate that this impairment in object processing under a high memory load was significantly more pronounced in the left visual field compared to the right, reflecting the deficits observed following damage to the right TPJ. In addition, when only a single object was presented in the left visual field, the ability to report its identity was strongly correlated with the individual's memory capacity, whereas performance on the right was uncorrelated with memory. These results have numerous implications for the role of visual short-term memory in the production of conscious visual experience. First, we provide additional support that visual neglect and visual extinction may arise in part from impairments in visuo-spatial memory. In healthy adults, a high load placed on visual short-term memory may mimic the deficits observed in visual neglect patients by temporarily impairing the attentional orienting processes subserved by the right TPJ, in addition to preventing information from entering visuo-spatial memory. In other words, under conditions of high visuo-spatial memory load healthy adults may demonstrate momentary deficits in conscious awareness that reflect those of neglect patients. In addition, our findings suggest that visual short-term memory, and the neural substrates supporting these processes, may play an important role in conscious visual perception more generally, but these mechanisms may be lateralized. **C4**

168 **Feedback May Promote Sub-threshold Dot-Motion Detection** Steve Holloway, Krista Heintzelman; Nestor Gomez; Michael McBeath <srh@asu.edu> (Cognition, Action, Perception Program, Arizona State University, Phoenix, AZ)

Objective: Recently, it was reported that the human visual system can learn a task-irrelevant background feature, despite the stimuli being presented below the threshold of perception (Watanabe, Náñez, & Sasaki, 2001; Seitz & Watanabe, 2003; Seitz & Watanabe, 2005). Moreover,

it has been shown that the addition of feedback alone can elicit learning, even when sub-threshold stimuli are used (Seitz, Náñez, Holloway, Tsushima, & Watanabe, 2006). The current study was designed to test the effect of feedback on sub-threshold dot-motion detection. Method: Participants were presented with 100% coherent dot motion at six randomly interleaved contrasts, sub-threshold through supra-threshold levels (0, 0.14, 0.2, 0.28, 0.42, 0.6 cd/m2). Subjects were instructed to use a mouse-click to choose one of four arrows that corresponded to the direction of the motion stimulus (i.e., 70°, 160°, 250°, 340°). Every direction was presented 30 times at each contrast level; thus, each subject completed 720 trials per session. Pre-test trials were administered without feedback and were immediately followed by 720 post-test trials with feedback. Feedback consisted of the subject receiving a green "+" symbol coupled with a high-pitched tone for correct responses and a red "x" coupled with a low-pitched tone for incorrect responses. A control group was given the same tests, at the same intervals, with both pre and post-tests trials being presented without feedback. Results: In the experimental group, the data showed that a significant increase in performance was observed when comparing the pre-test to the post-test conditions, where the stimuli were presented below threshold. This improvement was not observed in the control group. Conclusions: The results of this study demonstrate that feedback may act to subserve performance, even when stimuli are presented below the threshold of cognitive awareness. This outcome is interesting given the fact that performance improved, even though the participants were not consciously aware of the direction of motion. In fact, most subjects reported that they could not see any dot motion at all for the majority of the trials. Although mainstream psychological thought promotes the idea that there is a definitive separation between conscious and subconscious neural processing, the results reported herein bring into question the clarity of our understanding of these systems. Future research should examine whether neural responses to low-level environmental stimuli can contribute to cognitive performance or decision-making. **C18**

169 **Category discrimination without awareness in normal subjects, via dichoptic color fusion** Aaron Schurger, Min-Soo Kim, Anne Treisman, Jonathan D. Cohen <schurger@princeton.edu> (Psychology, Princeton University, Princeton, NJ)

A pale orange color presented to one eye and a pale green color presented to the other, results in the visual experience of yellow – the two colors "mix" in the visual cortex through an as yet unknown neurodynamic compromise. A similar mixing can be achieved with other color pairs (for example reds and blues mix to yield an experience of violet). Moutoussis and Zeki (2002) developed a very clever method of rendering simple line drawings invisible to the observer using dichoptic color fusion. The edges of the line drawing are blurred and the two colors must be approximately isoluminant. Under these conditions, a green foreground and orange background in one eye, fuse with an orange foreground and green background in the other eye, yielding an experience of yellow everywhere – although with one eye closed, the object becomes visible. At high levels of color contrast the experience is of binocular rivalry, but below a certain threshold the object disappears into a sea of yellow. Importantly, the object is visible at this same color contrast if the foreground and background color are the same in both eyes. We used dichoptic color fusion to render stimuli difficult to see, and asked subjects to discriminate faces from houses. Subjects were asked to guess the category of the stimulus (face or house) and then, after each guess, to bet (real $) on the accuracy of their own guesses (Persaud et al, 2007). Within a certain range of color contrasts, subjects were quite good at guessing the category of the stimulus, and yet completely failed to make use of this information to maximize their earnings, suggesting that they did not consciously "see" the stimuli at these contrast levels. This "gap" between accuracy and awareness is quite robust: we have replicated the effect in different testing environments (including an MRI scanner), and in different variants of the paradigm. We are currently using this paradigm as part of a functional magnetic resonance imaging study, in order to examine the way the brain processes information without awareness. **C18**

170 **Consciousness in Mathematical Reasoning** John Selden, Annie Selden, New Mexico State University <js9484@usit.net> (Mathematical Sciences, New Mexico State University, Las Cruces, NM)

Although there is wide agreement that phenomenal consciousness exists, the nature of its functions is another matter. Especially since the work of Libit, et al [Time of conscious intention to act in relation to onset of cerebral activity (readiness potential), Brain, 106, 623-642], and later Lau, et al [Attention to intention, Science, 303, 1208-1210], the idea that consciousness causes action, at least in the immediate sense, is problematic [Pockett, et al (Eds.), Does Consciousness Cause Behavior?, 2006]. Indeed, even the possibility that consciousness might be an epiphenomenon has not been lightly dismissed [Pauen, et al (Eds.), Journal of Consciousness Studies, 13 (1-2)]. This lack

of precise, reliable information about the functions of consciousness is probably unhelpful in searching for its neurological correlates. In the paper we point out a way consciousness is necessary for a particular kind of mathematical reasoning. We consider the enacting of knowledge that is both procedural, knowing how [Hiebert, (Ed.) Conceptual and Procedural Knowledge, 1986], and knowing to, or when to, physically or mentally act [Mason & Spence, Ed. Studies in Math, 28, 135-161]. We take a fine-grained approach, focusing on, not procedures, but individual steps in them. We call the mental structure encoding both the information needed to recognize a situation calling for an act and how to achieve it, a behavioral schema. We then offer two simple examples and the following six observations on the way behavioral schemas are enacted. I. Within very broad contextual considerations, behavioral schemas are immediately available. They do not normally have to be remembered, that is, searched for and brought to mind. II. Behavioral schemas operate outside of consciousness. One is not aware of doing anything immediately prior to the resulting action. III. Behavioral schemas tend to produce immediate action, which is likely to lead to a further, later action. One becomes conscious of the action resulting from a behavioral schema as it occurs or immediately after it occurs. IV. A behavioral schema that would produce a particular action cannot pass that information, outside of consciousness, to be acted on by another behavioral schema. The first action must actually take place and become conscious in order to become information acted on by the second behavioral schema. That is, one cannot "chain together" behavioral schema in a way that functions outside of consciousness and produces consciousness only of the action of the last behavioral schema. For example, if the solution to a linear equation would normally require several steps, one cannot give the final answer without being conscious of some of the intermediate steps. V. An action due to a behavioral schema depends on conscious input, at least in large part. A stimulus need not become conscious to influence a person's actions, but such influence is normally not precise enough to trigger a behavioral schema. VI. Behavioral schemas are acquired (learned) through habituation. That is, to acquire such a schema a person should carry out the appropriate action correctly a number of times. Changing an incorrect behavioral schema requires similar practice. **P3**

171 **The Discrete Generation of Consciousness** Richard Sieb <siebr@shaw.ca> (Edmonton, Alberta, Canada, Edmonton, Alberta, Canada)

There are two contrasting types of information processing that might give rise to consciousness. Continuous information processing proceeds in an uninterrupted continuous fashion. This processing is best described as rapid, reliable, accurate, stereotyped, and mechanistic, with little integration. Discrete information processing is processing that occurs over distinct (discrete) intervals or periods of time. That is, it is processing that is separated into separate independent distinct periods. This processing is best described as slower, variable, flexible, new or novel, and highly integrated. Much empirical evidence suggests that consciousness (conscious experience) is produced by a discrete type of information process, rather than a continuous process. For example, it appears to take an interval of time (several hundred milliseconds) to produce consciousness, consciousness is entirely different from the sensory input that gives rise to it, consciousness is always new or novel (different) and appears to function in the production of voluntary new or novel intentional actions (this requires significant integration), consciousness is uniformly maintained for a short period of time and then abruptly terminated, filling-in of conscious experience occurs, conscious experience is highly unified and coherent (suggesting it originates from significant integration), and many of the illusions (wagon wheel, vase-rabbit, Necker Cube, perceptual, geometrical, etc.) and many other phenomena involving consciousness (inattentional blindness, binocular rivalry, change blindness, synesthesia, neglect, etc.) can best be explained utilizing a discrete mechanism for the production of consciousness. In addition, human intelligence may be a manifestation of consciousness and discrete information processing, while machine intelligence may be a manifestation of nonconscious continuous information processing. The brain does possess a neural mechanism for discrete information processing. This mechanism utilizes positive (excitatory) feedback or re-entry. In positive feedback, the output of neurons is fed back to re-excite the same neurons from which it arose (recurrent feedback). These neurons therefore generate more output, which produces more excitatory (positive) feedback, which produces more output, and so on, leading to an exponential increase in the activation of the neurons. These excitatory events also produce inhibitory influences, which dampen the excitatory influences, eventually producing a balance (equilibrium) between excitatory and inhibitory influences. This is a stable state, which is an actual physical state, and which can have physical effects on other brain systems, including response systems. Positive feedback thus produces integrated processing over a discrete period of time and hence is a type of discrete information processing. Each period of processing represents a separate independent

discrete unit. This type of processing is always new or novel, variable and flexible; as its components are always different and vary from one moment to the next. Many phenomena (candle flames, other flames, waves, groups, organizations, cells, families, etc.) arise from such dynamics. This type of discrete information processing is known as nonlinear emergence and is responsible for a vast number of natural phenomena. Since consciousness arises from perception, a similar mechanism involving perception could be responsible for consciousness. It has been found that when the re-entry mechanisms of the brain are disrupted, consciousness is impaired. **P9**

172 **The Consumption Analysis Loop in the Ouroboros Model, Basis for the Allocation of Attention and for the Emergence of Consciousness** Knud Thomsen <knud.thomsen@psi.ch> (NUM, Paul Scherrer Institut, Villigen PSI, Switzerland)

Minds are primarily concerned with data processing in a wide sense. A basic algorithmic structure for efficient minds is proposed. The following initially unconscious activity cycle is identified: ... anticipation, action / perception, evaluation, anticipation,... Extensive evidence in the literature tells that all concepts are organized and stored as schemata, i.e. frames connecting specific constituents. According to the Ouroboros Model activation at a time of part of a schema biases the whole structure and, in particular, missing features, thus triggering expectations. An iterative recursive monitor process termed "consumption analysis" is checking how well such expectations fit with successive activations. Expectations can be violated, met or even exceeded, giving rise to negative or positive emotions, respectively. If the first (unconscious) guess on what frame a certain feature belongs to was right, the recursive process will quickly converge and result in one strongly activated concept. Consumption analysis then yields that all features are nicely "consumed" and nothing is left over; all data are consistent and coherently linked in the selected interpretation. Important aha-experiences, relevant to the actor, catch attention and become conscious by evoking higher order personality activation (HOPA) connecting the context and details of the task as well as of the actor. Proved useful, such episodes are preferably committed to long term memory. For acting in the real world it is generally of advantage to bring all available information to bear in a consistent manner. Enforcing coherence and directing attention towards missing pieces are fundamental contributions of the underlying data evaluation loop in the Ouroboros Model. If in a specific situation topical "local" information does not suffice to obtain a unique and coherent interpretation, activation spreads and more remote content is considered. Data from the episodic memory will always contain some anchoring to the actor. Thus she is becoming more involved as the need for a solution becomes more pressing and activation extends. With high enough weight, significant gaps in the understanding of a situation will thus trigger HOPA and turn conscious, too. A special quality emerges as soon as information about the owner of the process is self-reflexively included and associated representations, i.e. self models and autobiographic memory, are embraced as a focus in the same basic process. When the actor himself is in the center of his attention, other content fades, loses importance and weight. This starts when looking at ones toes and continues to recollections and reflections on personal experiences, plans, preferences and attitudes. Deeply anchored in our whole body, this self-reflective and self-relevant nonlinear recursively looping activity in the brain is including and inducing a sense of ownership for actions as well as "qualia" and all associated emotions; – our total personal experience. Consistency is the main criterion for judging the value and relevance of primary sensory percepts, and even more so the "truth" of theories of highest complexity, abstraction and remoteness. In healthy humans consistency prevails over the whole person and personality, from un- and pre- conscious roots to the highest levels of a self-reflective conscious mind. **P9**

*See also:*

101 **Dark Experience: methodologies for comprehending the experiential domain**
169 **Category discrimination without awareness in normal subjects, via dichoptic color fusion**
151 **Unconscious Endogenous Orienting of Attention Reflects An Automatic Shift of Attention.**
223 **Modeling Connectedness in Complex Spacetime using Minkowski Norm and Split-complex Numbers.**

## *3.10 Sleep and dreaming*

173 **Consciousness during dreaming: Is there anything more than an anomalous state?** Fernando de Pablos <fdepablos@msn.com> (Psychiatry, Hospital General Universitario Morales Meseguer, Murcia , Spain)

One of the fascinating properties of consciousness is, no doubt, its occurrence in the state of sleep, during dreaming. However the received scientific model regards dreaming consciousness as anomalous and dreaming content as fundamentally bizarre, ( Hobson, Pace-Schott, and Stickgold, 2003) This is conceptually to be understood as if the phenomenological variations that make dreams different from wake conscious experiences were due to malfunctioning or failures of consciousness during the state of sleep. In this respect, for example, Revonsou ( 2006 ) have proposed failures in binding. This vision may contain some obvious truth but fails to uncover properties of consciousness which may be helpful to refine our understanding. We believe that there are also in dreaming consciousness positive manifestations not explainable by simple malfunction or failures but, to the contrary, they point to higher order integrative processes in conscious construction. These higher order functions have no parallel in wake consciousness and constitute the phenomena of precognitive dreaming. A cursory definition of precognitive dreaming refers to a category of dream incorporating future events of the dreamer's life. The replay of the future experience may be at times long and complex with a compelling phenomenal equality between the dream and the real experience. They may be more frequent than previously thought if the researcher hold no a priory assumption. For instance in a recent comprehensive historical review of the biological basis of dreaming ( Gottesmann, 2007 ), the famous and often quoted dream of Maury is still regarded as a normal dream induced by an external stimuli instantaneously , when, if properly analyzed it is a clear cut example of a precognitive dream. I reproduce the fragment from Gottesmann : I am dreaming about the (revolutionary) Terror. I witness scenes of carnage. I appear before the revolutionary tribunal. I see Robespierre, Marat, Fouquier-Tinville, all the ugly figures of that terrible epoch ; I debate with them; finally, after numerous events, I remember imperfectly, I am convicted, sentenced to death, driven off in a cart, amidst a countless throng, to the revolution square I mount the scaffold, the hangman attaches me to the fatal board, operates it, the blade falls; I fell that my head is separated from my trunk. I awake in the most violent anguish, and I feel the bedpost which has come loose and fallen on my cervical vertebrae like the blade of the guillotine.(p.8-9 Thus the classical interpretation of this dream is that a physical stimuli acting while the subject is sleeping, (the bedpost falling over the head ) generates the dream, in a matter of a second and wakes up the subject. This explanation , on a close examining, is non obvious and if we had not a priory prejudice over dream formation , a more parsimonious explanation would have been to regard the dream as a precognitive elaboration, which may run for minutes, of the latter event of Maury fully awake , feeling and watching the bedpost which had fallen upon his neck. Here, the same empirical data : a dream, can be given two quite different explanations depending on accepting the event that generates the dream as occurring in time before or after the dream. Corresponding conceptual models of consciousness will differ. To what extent this backwards redundancy of brain activity and of conscious experience happens systematically along ours lives, and for what reasons, are only two of the many questions that can be formulated and that may help us understand better consciousness **P3**

174 **Dreams and Electronic Media: Current Status** Jayne Gackenbach, Beena Kuruvilla <gackenbachj@macewan.ca> (Psychology, Grant MacEwan College, Edmonton, Alberta, Canada)

In a series of studies Gackenbach and colleagues have been investigating the relationship between media use and dreams. Specifically she has identified a positive relationship between video game play and lucid/control dreaming in self reports from long term retrospective inquires (Gackenbach, 2006). More recently this was confirmed with dream and media information collected from college students dreams which were gathered the morning after the dream on well resting nights. Not only were lucid and control dreams associated with video game play, but also with heavier use of various types of electronic media This dream/media use factor was most marked by higher loadings of interactive media like computer use and video game play, with other media loading significantly but not as markers (Gackenbach & Kurvilla, 2007). In another study, preliminary content analysis of hard core gamers using the Hall and Van de Castle system, showed that while there were gamer/norm differences there were more similarities (Gackenbach et al, 2007). However, the differences are worth noting in that while gamers were more aggressive in their dreams than norms, when they dreamt about aggression, they tended to report fewer dreams with aggression than norms. Another noteworthy difference was that gamers dreamt more of imaginary and dead characters than the male norms. Also although gamers were scored as having more self negativity in their dreams than the male norms they also had fewer misfortunes than the male norms. This last was interpreted as perhaps there is a social isolation component to their dreams but there is also a sense of control over the dream and thus less misfortune happening in their dreams.

This set of analysis was on dreams gathered from an intensive interview and thus were long term retrospections. In this paper we will briefly summarize the aforementioned two studies and add a report about a third study. Hall and VandeCastle analysis of morning after, well rested dreams from a much larger pool of subjects were done along with an analysis of bizarreness in dreams. These two analyses were done on hard core and casual gamers from college student samples. Additionally the total and type of media used the day before the dream information will be considered and connected to the dream content information. References Gackenbach, J.I. (2006). Video game play and lucid dreams: Implications for the development of consciousness. Dreaming: Journal of the Association for the Study of Dreams, 16(2), 96-110. Gackenbach, J.I. & Kuruvilla, B. (2007, June). Dreams and Media Use. Paper presented at the annual meeting of the International Association for the Study of Dreams, Sonoma, CA. Gackenbach, J.I., Matty, Ian, Kuruvilla, Beena, Olischefski, Jordan, Zederayko, Alexis & Samaha, Ashley Nicole (2007). Video Game Play: Waking and Dreaming Consciousness. Under editorial consideration. **C21**

175 **Correlates of Bad Dream and Nightmare Narratives: Implications for a Neurocognitive Model of Disturbed Dream Generation** Ross Levin, Gary Fireman; Jamie Schumpf; Tracy Kisner <rlevin@ymail.yu.edu> (Ferkauf Graduate School of Psychology, Yeshiva University, Bronx, New York)

Nightmares are highly prevalent, with 85% of individuals reporting at least one annual nightmare (Levin, 1994; Levin & Nielsen, 2007). Research suggests a relationship between nightmares and well-being. Frequent nightmares are associated with high levels of waking negative affect, heightened stress, and psychopathology. In addition, women report a significantly greater number of nightmares than men (Levin, 1994; Levin & Nielsen, 2007; Nielsen et al., 2000; Nielsen, Stenstrom & Levin, 2006) Recent research on disturbed dreaming suggests that dreaming falls on a continuum ranging from normal dreams to pathological traumatic nightmares, with bad dreams and nightmares falling in between. According to Levin and Nielsen (2007; Nielsen & Levin, 2007), normal dreaming provides novel contexts for highly charged negative emotional memories, thus leading to their eventual extinction, a process endemic to emotional imagery processing. Thus, disturbed dreaming in general and nightmares in particular reflect failures of emotion regulation and that these pathogenic mechanisms should be detectable within the narratives of these experiences. However, empirical investigation of these cognitive mechanisms has yet to be conducted and no study has examined the content of disturbed dreaming prospectively to determine whether differences exists between bad dream and nightmare narratives. The present study examined disturbed dream narratives, a methodology rarely used in empirical research but which suggests fertile ground for understanding dream experiences. Few validated dream coding systems exist with even fewer that investigate emotional processing. The most well-validated dream coding system (Hall and Van de Castle, 1966) is particularly useful in examining the frequency, intensity, and direction of aggression (e.g., victim or perpetrator) which may clarify differences between nightmares and bad dreams. To further elucidate content differences between bad dreams and nightmares, two waking narrative coding systems were used; the Linguistic Inquiry and Word Count (Francis and Pennebaker, 1993) which measures cognitive changes and emotional expression in narratives, both of which are indicative of emotional processing, and a coding system developed by Foa, Molnar, and Cashman (1995) to measure emotional change in the narratives of sexual assault victims. This system maintains that emotional change is inversely related to fragmentation of cognitive processes. 312 participants filled out self report measures and recorded their disturbed dream narratives for 21 days, generating 642 complete narratives. The findings generally support Levin and Nielsen's (2007) model of disturbed dream generation with nightmares showing more disturbances of emotion regulation than bad dreams (more fragmentation, more death and aggression references) with significant gender differences noted. Also consistent with this model, bad dream narratives contained more emotion dysregulation than the normal population, but were milder than nightmares. Last, different waking variables were associated with distinct narrative outcome variables for gender. Male narratives contained more death references while female narratives contained more victimization references. Thus, psychosocial determinants such as past abuse, maladaptive coping style and negative attribution style along with daytime stress were related to nocturnal disturbances and deficits in emotional processing. **C18**

176 **Understanding Psi and Non-Psi Dreams** Phil McClung <philwvup@hotmail.com> (Psychology, Parkersburg, WV)

When we are asleep, our subconscious mind often presents us important information through dreams. Our extrasensory perception (ESP) abilities are wide-awake when we are asleep. This poster presentation will provide you with an illustration for activating and understanding your

dreams. It will also illustrate how you can recall any type of dream, how to distinguish between psi and non-psi dreams, how to become the director of your dreams and finally how to understand your dreams. In addition, Jungian, Adlerian and Freudian dream interpretation techniques will be correlated to leading dream theories and dream work approaches. **P3**

177 **Phenomenological experiences in adult sleepwalkers** Antonio Zadra, Mathieu Pilon; Jacques Montplaisir <antonio.zadra@umontreal.ca> (Psychology, Université de Montréal, Montreal, Quebec, Canada)

Sleepwalking is a parasomnia characterized by misperception and relative unresponsiveness to the environment, mental disorientation and variable retrograde amnesia. Behavioral manifestations of varying degrees of complexity and duration arise from incomplete awakenings, usually from slow-wave sleep (stage 3 and 4 sleep). Somnambulistic actions can take many forms, ranging from mundane or stereotyped behaviors to complex activities such as playing a musical instrument or driving an automobile. Relatively little is known, however, about the phenomenological aspects of this parasomnia. The present study included 68 adult patients (26 men, 42 women, mean age = 33.2 ±11.8 years) consecutively referred to our sleep disorders clinic for chronic sleepwalking. Of these, 51 (75%) reported that their sleepwalking began during childhood or early adolescence while 16 (23%) reported adult onset. At the time of the study, episodes were experienced once or more per week by 60% of the participants and once or more per month by another 25% of sleepwalkers. All participants underwent at least one polysomnographic assessment in the sleep laboratory and were free of any other major sleep disorder. Participants completed a detailed questionnaire assessing various aspects of their sleepwalking, including history, suspected precipitating factors, nature and frequency of somnambulistic behaviors, and recall of accompanying sleep mentation. This information was used to investigate phenomenological dimensions of their somnambulistic episodes. Results showed that perceptual elements from the sleeper's actual environment during somnambulistic episodes were sometimes (25%), often (37%) or always (16%) recalled by the sleepwalkers. Forty-seven patients (69%) reported that various forms of mental content or sleep mentation (e.g., images, thoughts, emotions) often or always accompanied their episodes. Furthermore, episodes were described by 37% of the sample as being often or always triggered by some form of sleep mentation. Only 7 of the patients (10%) reported that their somnambulistic behaviors were never related to an underlying logic, motivation, or sense of urgency. Emotions were described by 52 sleepwalkers (76%) as being often or always experienced during their episodes. The most commonly reported emotions were fear, panic, confusion, anger, frustration and helplessness. Although sleepwalking is often characterized in terms of its automatic behaviors, the present results suggest that perceptual, cognitive and affective dimensions play an important role in the subjective experience of adult sleepwalking. Morning recall of nocturnal somnambulistic episodes may also be greater than generally believed. The displayed behaviors are construed by most patients as being motivated by an intrinsic sense of urgency or underlying logic that accounts for their actions during actual episodes. Variations in the motor and emotional manifestations of sleepwalking may be related to different activation patterns of the cingulate cortex as it modulates behaviour in response to emotional processes. **C18**

*See also:*

139 **The Eclipse Horizon of Dream**

## 3.11 Cognitive development

178 **Exploring Inner Experience: An Expedition into Adolescent Consciousness** Sarah Akhter, Russell T. Hurlburt <akhters@unlv.nevada.edu> (Psychology, University of Nevada – Las Vegas, Las Vegas, NV)

Adolescence famously is known as a time of storm and stress, hormones, and crises of identity. While this may be partially true, there is a gaping hole in our understanding: we know remarkably little about adolescents' inner phenomenology. What is the actual inner experience of real adolescents? In an attempt to explore this, we set out on a journey into the heart of adolescent consciousness. We aimed to penetrate the realm of conventional observation and retrospective self-report and to access the actual phenomenology of lived inner experience by using Descriptive Experience Sampling (DES) with a sample of six adolescents. DES subjects wear random beepers in their natural everyday environments over a period of 5-10 days each. Subjects are trained to observe the phenomenology of their inner experience each time the beeper sounds and to describe that inner experience to the investigators. We tried to be phenomenologically ruthless in that we tried to bracket all interpretations, explanations, and beliefs about inner experience to allow the raw and ac-

tual phenomena of inner experience to emerge as unscathed by narrative, history, or presuppositions as possible. Preliminarily we asked, Can adolescents do DES? Do they have sufficiently developed capacities to be able to identify and discuss the phenomena of their own inner experience? The answer to these questions was for the most part, yes, but not always: five of six subjects consistently were able to apprehend and discuss their inner experience, but one subject had great difficulty with the task. Furthermore, we observed a range in complexity of inner experience across subjects. We speculate that the reason for these differences may be that adolescents are in the process of developing and refining inner experience itself. Our second driving question in this study was, Is adolescent inner experience the same as adult inner experience? The answer to this question was in some ways, yes, and in some ways, no. While there were similarities, there were also striking differences, which point to the notion that inner experience itself passes through developmental stages and is not static over the lifespan. For example, we discovered that our adolescents had very infrequent experience of emotion, despite the fact that they had frequent emotional behavior. This pattern is illustrated in the following inner experience sample: RD's friend had kicked him in his knee, and RD was saying angrily, "Why'd you do that?!" But RD did not feel angry; he recognized that he was angry only by observing the tone of his own voice, that is, by a third-person observation of his own phenomenology. As a result of this and other observations, we conjecture that (a) acting angrily, (b) recognizing anger in a third-person way, and (c) feeling anger in a first-person may be three separate skills that are acquired at very different rates and times across development: (a) during infancy, (b) during childhood, and (c) during adolescence. We will advance that conjecture very tentatively, but will use it to demonstrate the importance of careful first-person observations of inner experience. **PL12**

179 **Why Babies Are More Conscious Than We Are.** Alison Gopnik <gopnik@berkeley.edu> (Psychology, UC Berkeley, Berkeley, CA)

What is it like to be a baby? I will suggest that neurological and psychological findings can provide insight into infant phenomenology. In adults we see an association between vivid consciousness, plasticity and attention. In the adult system this attention is typically focused on a small part of the external or internal world and involves inhibition of consciousness of other parts of the world. I will suggest that infants have a similar vivid phenomenology, also associated with plasticity, but that it is distributed across their entire field and does not lead to inhibition.They have lantern consciousness rather than spotlight consciousness. I will cite a variety of neurological as well as psychological findings in support of this view. This state may be similar to certain meditative states. Considering baby consciousness also may cause us to doubt theories of consciousness that postulate a close link between focused high-level attention and conscious phenomenology. Babies are less focused but more conscious than we are. **PL12**

180 **Does Consciousness Develop?** Philip Zelazo <zelazo@umn.edu> (Institute of Child Development, University of Minnesota, Minneapolis, MN)

Does consciousness develop? The contents of human consciousness obviously change with age, and our interactions with the world clearly influence our ideas about self, subjectivity, volition, and other minds, among many related constructs. But it is more difficult to determine whether the quality of phenomenological experience is similarly transformed, or whether the cognitive and behavioural functions of consciousness change as children develop. In this talk, I argue that while a fundamental aspect of consciousness ("minimal consciousness") is developmentally invariant, the structure and functions of conscious experience do in fact develop, as minimal consciousness comes to participate in additional degrees of reflection, or the recursive reprocessing of the contents of minimal consciousness via neural circuits involving hierarchically arranged regions of prefrontal cortex. According to the levels of consciousness (LOC) model (e.g., Zelazo, 2004), development of prefrontal cortex is associated with several age-related increases in the highest degree of reflection, or level of consciousness, that infants and children are able to muster in response to situational demands. These increases in level of consciousness have important consequences for (1) the quality of experience, (2) the potential for recall, (3) the complexity of children's explicit knowledge structures, and (4) the possibility of the conscious control of thought, emotion, and action. In addition to reviewing neural and behavioral evidence for the model, I will emphasize the relevance of developmental data to our understanding of the functional significance of subjective experience in general. **PL12**

*See also:*

270 **The potential future development of consciousness**
178 **Exploring Inner Experience: An Expedition into Adolescent Consciousness**

193 **Self-Consciousness and Intersubjectivity in Young Children**
361 **Strategies for Countering the Teaching of Hatred to Children**
196 **Troyer Level of Consciousness Inventory(TLOCI): Measuring the invisible.**
121 **Lost in Space- "Inverted Positioning Sensation"(IPS):as of yet Unidentified Contributing Cause For ADHD and/or LD**

## 3.12 Artificial intelligence & robotics

181 **Theory of Mind in Artificial Neural Networks and Related Systems: Towards a Computational Model of Consciousness** Peter Breznay, Peter T. Breznay <breznayp@uwgb.edu> (Computer Science, University of Wisconsin – Green Bay, Green Bay, Wisconsin, U.S.A.)

In the past decade and half, a number of approaches have been proposed, and a few attempts made, to define, to model and create consciousness, or some aspect thereof, in an engineered, primarily computational, artifact. Some theorists, building especially on the ideas of Igor Aleksander, Bernard Baars and Pentti Haikonen consider the field of Artificial Consciousness (AC) or Machine Consciousness (MC) a separate field of investigation that connects Artificial Intelligence (AI) research to consciousness studies as practiced in the neurosciences and philosophy. Results have been reported regarding artificial entities, such as Junichi Takeno's robot, which perhaps passed certain tests of consciousness, such as the mirror test, and was reportedly able to distinguish its own image in a mirror from another robot. Most of these approaches and experiments face theoretical difficulties in actually defining what is required of an entity to be considered conscious, and what tests prove the existence of consciousness or, in a more limited sense, awareness, in a given entity, natural or artificial. In this research we attempt to open a new direction in AC investigations. Inspired by recent research on apes and monkeys, specifically by Dorothy Cheney and Robert Seyfarth, we propose that a fundamental, or perhaps the fundamental, aspect of consciousness is the presence of a sufficiently strong theory of mind in a given entity. Theory of Mind or ToM refers to the ability to attribute mental states to others different from one's own. Our approach is to provide a computational account of the emergence of ToM ability in artificial entities, in particular in Artificial Neural Networks (ANNs) and various modifications and generalizations of the ANN model. ANNs and other Machine Learning (ML) models are efficient tools of problem solving in fields where algorithmic or other direct computational approaches are difficult or impossible to use. Part of the non-algorithmic problem solving power of ANNs is a result of their structure which is based on a simulation to some extent of the neural structure of the human (and animal) brain. Due to the neurological nature of the ANN paradigm, it is also well suited to the study of specific aspects of cognitive abilities in humans and animals, such as learning and memory. Our main proposition is that the computational explanatory power of the ANN paradigm has not been fully exploited with regard to consciousness until now, chiefly due to the lack of recognition of the importance of ToM abilities in consciousness. There is also a general lack of interest in the ANN community to apply the neural network paradigm to consciousness studies. As an initial attempt, we designed relatively simple, well defined ANN and ANN-like networks, structured with the intention of providing them with the computational capacity to develop some level of ToM ability. In particular, we study the computational structures that enable children from about 3 years of age to show the presence of a strong ToM. Our results point to the computational importance of "mirror neuron" structures for the emergence of ToM. **C3**

182 **The Prospects for Creating Conscious Machines** Lyle Long, Lyle N. Long, Troy D. Kelley, and Michael, J. Wenger <lnl@caltech.edu> (Engineering, Penn State / Caltech, Univ. Park, PA)

While there have been discussions of computers reaching human levels of intelligence [Kurzweil (2000), Moravec (1998)], we should not over-simplify the issue of building intelligent or conscious machines. We should also not conflate intelligence and consciousness. Many computational problems may involve trade-offs of intelligence and consciousness. The largest current computer is the 212,992 processor IBM BlueGene (74 terabytes memory and 596 teraflops peak speed). It could probably simulate 10^13 synapses [Long and Gupta, 2008], while humans have about 10^15. There are many unknowns, however, related to wiring diagrams, software, hardware, algorithms, learning, sensory input, and motor-control output. A machine that combines intelligence and consciousness cannot just be an isolated computer. It will need to be a complex system of systems and be capable of learning and understanding real world situations. The key, however, is emergent behavior development through a variety of algorithmic techniques including: genetic algorithms, machine learning, cognitive architectures and connectionist methods. Humans will not be capable of completely specifying and programming the entire system; learning and emergent be-

havior [Koch, 2004] will be a stringent requirement for development. Conscious machines will need to be embedded in the real world with significant input/output capabilities and the ability to learn from people and experience. They will also need to be able to use context to modulate the expression of learning. The human sensory systems use hundreds of millions of cells, and there are roughly 600 muscles in the human body. The fascinating robotic vehicles in the DARPA Urban Challenge have very few sensor systems (e.g. lasers, cameras, and radar) and very few motor-control output channels. They also required complex software and teams of engineers. Cognitive architectures (e.g. Soar, SS-RICS, and ACT/R), have been implemented on mobile robots [Hanford, Janrathitikarn, and Long (2008) and Avery, Kelley, and Davani (2006)], but these too are not very capable yet. Biological systems and computers can be compared in terms of in terms of memory and speed, but these are only two of the requirements for an intelligent machine. Evolution is basically an optimization program, and the human brain has been evolving for at least 4 million years. Genetic algorithms and evolutionary techniques can be used to simulate human evolution; however, duplicating the conditions that led to the evolution of the human brain would be difficult, if not impossible. Symbolic A.I. will not lead to machines capable of duplicating human behavior. Connectionists and subsumptive architectures will not, by themselves, lead to the development of human-level intelligence nor the functional characteristics that define consciousness. Rule-based systems and cognitive architectures require humans to program the rules, and this process is not scalable to billions of rules (a.k.a. the Frame problem). The machines will need to rely on hybrid systems and emergent behavior; and they will need to be carefully taught and "mothered" by teams of engineers and scientists. In conclusion, human-level intelligence and consciousness might be possible as an emergent property of a massively parallel learning machine using a hybrid system of algorithms, architectures, and computational mechanisms. **P3**

*See also:*

153 **Enactive Representationalism? An Expectation-Based Architecture for Perceptual Experience**
226 **Consciousness in Engineering Units**

## 3.13 Neural networks and connectionism

183 **Implementation of an Adaptive Resonance Network Model of Empathy** David Glanzer <glanzerd@emu.edu> (Graduate Counseling Program, Eastern Mennonite University, Harrisonburg, VA)

The functional components and behaviors of Carpenter & Grossberg's (1987) Adaptive Resonance Theory (neural network theory) was used (Glanzer, 2006) in a theoretical description of the dynamics of empathy as a resonant system. This theory has been implemented as a computer model, and dynamics relevant to understanding empathic resonance are described. This exploration dovetails with the concept of "betweenness," reviewed by Arisaka (2001), and Glanzer's (2004) work on the locus of consciousness in empathy. **P3**

184 **The 'conscious pilot': Synchronized dendritic webs move through brain neurocomputational networks to mediate consciousness** Stuart Hameroff <hameroff@u.arizona.edu> (University of Arizona, Tucson, Arizona)

Chalmers' 'easy problems' include the brain's non-conscious abilities to discriminate and react to stimuli, integrate information, focus attention and control behavior, also expressed as 'zombie', or 'auto-pilot' modes. Chalmers' 'hard problem' is the question of how the brain produces subjective conscious experience which, unlike non-conscious auto-pilot modes, is not amenable to conventional neurocomputational explanations. 'Easy problem' auto-pilot modes and 'hard problem' conscious experience are not mutually exclusive. At times, auto-pilot modes become driven by, or accompanied by, conscious experience. For example we often perform complex behaviors while daydreaming, on auto-pilot with consciousness somewhere else. But when a horn sounds or a light flashes, we consciously perceive the scene and assume conscious control. Rather than distinguishing between auto-pilot modes and consciousness, the essential distinction may be between auto-pilot modes which are, or are not, accompanied by some added fleeting feature which conveys conscious experience and choices – the 'conscious pilot'. Consider an airplane cruising on auto-pilot. The conscious pilot is present, but not directly in control – perhaps he/she is reading a magazine, sleeping and dreaming, or chatting in the main cabin. Suddenly turbulence occurs, or an alarm sounds. The conscious pilot 'tunes in and takes over', directing his/her attention to the cockpit view and instrument readings, assuming control of the plane. When the situation is resolved the auto-pilot resumes monitoring and control, and the conscious pilot visits with the flight attendant. In the

metaphor, the auto-pilot is the plane's on-board flight computer and instruments. In the brain, the non-conscious auto-pilot is readily explained by neurocomputation: neuronal dendrites receive and integrate spike-mediated synaptic inputs, and when threshold is met, axonal spikes are fired as outputs. Discrete information states ('bits') are conveyed by axonal spikes/firings. What about conscious modes? The best measurable correlate of consciousness is gamma synchrony EEG (coherent 30 to 90 Hz field potential oscillations), occurring in various brain regions which change over time and move through the brain, or globally, e.g. cortical or thalamo-cortical gamma synchrony. The mobile synchrony correlating with consciousness is produced not by axonal spikes/firings, but via networks of neighboring neuronal dendrites connected 'sideways' by gap junctions ('dendritic webs'). In computer terms, dendritic webs are laterally-connected input/integration layers embedded in feed-forward and feed-back networks. Gap junction openings and closings evolve dynamical dendritic web topologies moving throughout axonal-dendritic networks accompanied by gamma synchrony and consciousness. (Within cytoplasmic interiors of dendritic webs, the Penrose-Hameroff Orch OR model proposes quantum computations in microtubules underlie consciousness.) Gamma synchronized dendritic webs are perfectly suited to function as the brain's 'conscious pilot', moving throughout neurocomputational axonal-dendritic networks, able to tune in and take over from non-conscious auto-pilot modes. **PL8**

*See also:*

182 **The Prospects for Creating Conscious Machines**

## 3.14 Cognitive architectures

185 **Non-Commutative Measurement Operations in Psychology** Harald Atmanspacher, Harald Atmanspacher <haa@igpp.de> (Theory and Data Analysis, Institut for Frontier Areas of Psychology, 79098 Freiburg, Germany)

It is argued and demonstrated that non-commutativity plays a significant role in measurement operations in psychology. In simple words this means that the result of successive operations $A$ and $B$ depends on their sequence, $AB$ or $BA$. This is to be expected if measurement operations are conceived as interactions between measuring and measured system rather than mappings from measured to measuring system. Such interactive measurement operations can be formalized by multiplicative sets of operators which do not commute with each other, $AB eq BA$. Pertinent examples are presented: (i) processes involved in the perception of bistable stimuli, for which experimental results confirm a non-commutative modeling framework, (ii) processes involved in learning operations, whose simulation on small, graph-theoretically studied networks yields non-commutative properties, and (iii) the influence of sequential effects in the design of questionnaires. **C6**

186 **What's GLOBAL About Globalist Theories of Consciousness? Getting it Straight.** Bernard Baars, Katharine A. McGovern, PhD <bbaars@comcast.net> (Senior Fellow at , The Neurosciences Institute-San Diego, Lafayette, CA)

The Global Workspace Theory (GWT) of conscious experience is widely cited but little understood. One common question concerns the "global access" that is enabled by a GW architecture. Ned Block has suggested there may be "access consciousness" without experiential consciousness, but the evidence for that view is debatable at best. GWT suggests multiple kinds of global (or widespread) access in the brain, including access by the "self as observer" to the "objects of experience." This may indeed be as close to a deep conceptual definition of consciousness as we have today. But a GW architecture inherently provides multiple kinds of access – it is a "hub of hubs" among numerous specialized AND global brain capacities. GWT also provides a functional case for the well-known limited-capacity features of consciousness, which are the opposite of "global," in that we can only experience one coherent conscious event at any moment. The functionality of GW architectures has been shown in a number of computational applications. We review the latest cognitive and brain evidence on global access in both ordinary and disordered states of consciousness, specify the varieties of access a GW architecture may provide, and give some plausible brain hypotheses for a GW function. Finally, we compare and contrast GWT with other globalist theories such as Neural Darwinism. **PL5**

187 **Two Conscious Beings from Two Different Representational Loops** Frank Heile <frank@heile.org> (Santa Clara, CA, Santa Clara, CA)

The "loop hypothesis" is that consciousness will result from having a sufficiently detailed active representational loop – that is when a representational system has a very detailed representation of

the world in which it is active and when it has a sufficiently detailed representation of itself in that world then the system will become conscious. This hypothesis cannot be proven, but if the hypothesis is assumed to be true, then some very interesting and believable ideas about how human consciousness is structured and how it has evolved can be developed. These kinds of convincing explanations of observed phenomena give evidence for the validity of the loop hypothesis. When we look at the various representational systems that humans use, we find that there are two major qualitatively different systems. The first one, the primary representational system, uses the visual, auditory and kinesthetic sense systems of the brain/body to represent the world and ourselves in that world. The second representational system is totally symbolic – it uses the abstract symbols of language to represent the world and ourselves – the "I". So by the loop hypothesis the primary representational system gives rise to a primary consciousness and the language representational system gives rise to the symbolic consciousness. Thus there are two conscious "beings" in each human brain/body at the same time – the primary consciousness and the symbolic consciousness. The primary conscious is ancient from an evolutionary point of view – we share this consciousness with many animals. On the other hand, the symbolic consciousness is very recent – it only arose in the last 30,000 to 100,000 years as language developed into a sufficiently detailed representational system on which the loop hypothesis can be applied. Furthermore, since only humans have a full rich language system, the symbolic consciousness is uniquely human. Some say that if an experience is conscious, it must be reportable. By this definition, the symbolic consciousness is the most obviously conscious entity since by definition it has language which makes it easy to report about the conscious experience. However, the primary consciousness can make non-verbal reports and has many other attributes commonly associated with consciousness, so we argue that there is a real, separate primary consciousness. And in fact, we find that the primary consciousness does most of the actual work of living life, whereas the symbolic consciousness usually just sits back, observes what is going on, sets some overall goals, comments on the progress, and ends up taking most of the credit for whatever is accomplished. Finally a compelling story about the development of the "God" concept and spirituality can be told by examining the time in our early prehistory when language was just becoming rich enough to create a new consciousness. So when this early weaker, less capable symbolic consciousness encounters the pre-existing, enigmatic and powerful primary consciousness that was in control, the symbolic consciousness might have represented this primary consciousness as being a kind of "God". Thus, new insights into the evolution of "God" consciousness and spirituality will be explored. **P3**

188 **Between the Spider's Net and the Working Theatre** Gabriel Mograbi <gabriel.mograbi@gmail.com> (UFRJ (Federal University of Rio de Janeiro), Rio de Janeiro, Brazil)

In my talk in the last TSC (Budapest), I have put forward an account of emergence as a physicalist standpoint and I finished the presentation showing one of its possible instantiations in Stanilas Dehaene's interpretation of Bernard Baars' Theory of Global Workspace beyond the presentation of some empirical evidence. My aim, this time, is to develop the ideas that were merely postulated in the end of last presentation in a more detailed and fine-grained way, considering how different levels of information processing could be integrated into a Global Workspace. My strategy to accomplish this task is to articulate the specific relevance of different levels of information processing, especially the difference between types of top-down control and bottom-up mechanisms. I will also highlight how conscious biofeedback would make a case for the recruitment of unconscious routines by conscious goals. Although my standpoint is an interpretation of Baars' theory as an example of emergence in the relationship between different neuronal networks, I will disagree with the metaphoric picture of consciousness as a theatre. Baars warns us that he is not taking the so-called "Cartesian Theatre" in its canonical formulation to be what he is willing to describe. Baars' metaphoric "Working Theatre" is not committed with the misleading features of a "Cartesian Theatre" in which consciousness experience comes together in a single point of the brain. Anyhow the idea of consciousness as theatre even as a working one could be taken to reinforce that consciousness is essentially representational and in this sense it would still be a misleading comparison. Of course, as contemporary theatre could be claimed to go beyond representation, this idea would be alluded to explain Baars' persistence on the metaphor. As Baars himself acknowledge the limitations of the metaphor, my only concern here is to establish the limits of a representational approach to consciousness. Aside this particular point where a more critical approach will be held, I want to evaluate how powerful the idea of a global workspace is to account for the decision-making and executive functions. Some experiments will be philosophically interpreted in the light of these theoretical background not only considering Baars' model but the taxonomy de-

veloped by Dehaene and colleagues. I will critically assess the fact that unconscious information processing is supposed to be out of the global workspace. **P9**

189 **How the human brain generates human nature, language, ethics, morality, and the senses of value and meaning.** David Saunders <drsaunders42@earthlink.net> (San Diego, CA)

The main function of the human brain is to act as a correlation machine. To facilitate this, logic suggests that at every synapse there are two discrete memories and they are correlated, that there is a relationship between them. It therefore follows that by the time a baby is born, there are two correlated memories at the billions of synapses in the various centers throughout its developing brain. De facto, by the time of its birth, that baby's brain has been programmed, and that programming is called its human nature. The mechanism that determines the inevitable synaptic correlations is built into the very structure of its developing brain, generated by its human genome and environmental influences. Some of the things included in human nature programming are language, ethics, morality, and the senses of value and meaning. (Because the structure of the brain of a chimpanzee, mouse, bird, fish or fly differs, each will form memory correlations unique to its species and result in the brain programming of that specie's nature.) It is interesting to note that if the above neural and brain architectures are coupled with a 'coherent flashing' of memories across all of the brain centers when any synapse 'fires', a number of things can be understood: that perceptions and thoughts are the split second, parallel, geometric chaining of correlated memories found at synapses in centers all across the brain; that the only places where a memory flashed across all of the brain will interact is when it encounters itself at a synapse in some other specialized brain center, (where of course it will be correlated with some other memory, one of the two memories reflecting what that center specializes in); that memories in 'flash transit' pass through each other like ghosts without interacting; that neuronal 'synchronous firing' is an epiphenomenon, a by-product; that 'spontaneous' synaptic firings probably are not spontaneous at all, but elicited by 'flashed memories'; that all of the above explain brain binding or the "binding problem"; and that mind, self and consciousness probably are created by the sheer speed of the never ending, parallel, geometric cascades of flashing, correlated, global, feedback looping perceptions and thoughts generated by the correlation machine, the human brain. **P3**

*See also:*

186 **What's GLOBAL About Globalist Theories of Consciousness? Getting it Straight.**
7 **Embodied Cognition: Dualism Redux?**

## 3.15 Ethology

190 **The Mirror Test Can't Tell Us Whether Animals Have Self-Consciousness Or Not** Ling-Fong Kuo <s19409018@ym.edu.tw> (Taipei, Taiwan )

In his famous mirror test, G. G. Gallup, posited chimpanzees in front of mirrors, such that the chimpanzees could see the reflections of themselves. Then experimenters marked two red spots on the chimpanzees and observed that chimpanzees seeing the reflection spontaneously touched the red spots. Experimenters use such mirror experiments to prove that animals that could perform these actions possess self-consciousness. Their conclusion is based on the assumption that the chimpanzees must "know" that the mirror images are themselves to touch themselves, and only animal with this concept and awareness of self could pass the mirror test. However I argue that the link between this action and possessing self-consciousness cannot be established by this mirror experiment. Chimpanzees can learn that when they push a pump, water flows out. But we never think that doing this action needs the concept of self. They just understand the relation between their actions and the change of environment. Similarly, one cannot exclude that this might also be the case in the mirror test; chimpanzees might have associated hand-raising, spot touching with the corresponding movements and changes in the mirror, instead of perceiving the image as "oneself." Thus, when new red spots appear, chimpanzees know how to manipulate the changes in the mirror, such as having the "chimpanzee" in the mirror touch the red spot by moving its' own hands in an appropriate way. That's because they understand the relation between their actions and the change of the mirror images. They don't need to know the images in mirror were themselves to pass the test, so the mirror test can't show us definitely whether animals have self-consciousness or not. **P9**

## 3.16 Self-consciousness and metacognition

191 **The Effects of a Self-Evaluation Task on the P300 Event Related Potential** Joel Alexander, Alvaro Hernandez; Daniel Lima; Stephanie Williams; Ronald Alexander

<alexanj@wou.edu> (Psychology, Western Oregon University, Monmouth, Oregon)

It has been demonstrated that self-identity stimuli (e.g., name, date of birth) produce an increase in P300 amplitude. Additionally, it has been shown that P300 amplitude is highly sensitive to emotional self-evaluation (Alexander, et al., 2005). The present study is a replication of the Alexander et al. 2005 study with more subjects and more electrode recording locations. The study was designed to capture an introspective moment during a task that required emotional self-evaluation related to an infrequent, random stimulus void of self-identity qualities. The design of the study was different from previous stimulus-driven self-identity stimulus studies in that the base sensory discrimination task was constant across all three conditions. All subjects started with a standard tone discrimination task (oddball) during condition 1. In conditions 2 and 3 the subjects were required complete a secondary cognitive task in addition to the standard sensory discrimination task where they would be required to make a second stimulus-related judgment after their initial response. Condition 2 required subjects to index a mental count if the tone was a target, in addition to tone discrimination. Condition 3 required subjects to self evaluated it they were surprised by the occurrence of the target tone given the random and infrequent nature of the target tone presentation. During these conditions ERPs were recorded across 32 electrode sites. Similar to the self-identity stimulus studies, results indicated a large increase in P300 amplitude during the condition with the self-evaluation component compared to the other conditions. These results imply that self-evaluation may utilize more cortical resources than non-self related cognitive-discrimination tasks. **P2**

192 **Metacognition Without Metarepresentation: Implications for Consciousness Studies** Alexandre Billon, Joëlle Proust (IJN – CNRS – EHESS – ENS) <abillon@gmail.com> (Lille III – CNRS Etiolles, France, Etiolles, France)

Metacognition is often defined as thinking about thinking. It is exemplified in all the activities through which one is trying to predict and evaluate one's own mental dispositions, states and properties for their cognitive adequacy. Recent work on macaques and dolphins shows that such capacities are present in non-human species. If one takes for granted that these animals do not metarepresent their own mental states, these results contradict the popular view that metacognition has a metarepresentational structure. However, this last view might be wrong; semantic and functional properties such as causal contiguity, epistemic transparency, representational promiscuity and procedural reflexivity are present in metacognition but missing in metarepresentation, while open-ended recursivity and inferential promiscuity only occur in metarepresentation. If metacognition and metarepresentation are semantically and functionally distinct, the further question arises whether there are forms of reflexive consciousness, based on metacognition, that do not require explicit self-attribution. Arguments in favor of a positive response will be offered. **C10**

193 **Self-Consciousness and Intersubjectivity in Young Children** Nevia Dolcini <nevia.dolcini@unimc.it> (Philosophy, University of Macerata, Macerata, Macerata, Italy)

Recently some working on intersubjectivity and theory of mind have argued that the capacity to attribute conscious mental states to oneself and to others in an explicit and reflective way is not necessary to the possession of an elementary form of intersubjectivity (see, e.g., the last chapter of Dan Zahavi's Subjectivity and Selfhood). According to this type of view, infants have the capacity to recognize themselves and other subjects in a prereflective, non-conceptual and yet conscious way from infancy; and they can thus be said to be in possession of intersubjective capacities almost from the beginning of life. In striking contrast, the standard tests used in the theory of mind (e.g., the False Belief Task) are typically taken to indicate that children younger than four are not in possession of a theory of mind or capable of genuine intersubjectivity. In this paper I articulate and defend the claim that both lines of reasoning are incorrect. While no one disputes that infants exhibit behaviors that are attuned to the presence of other subjects, the attribution of a conscious sense of self and a conscious sense of others to them is not adequately evidenced by the available data. The available data could equally well be explained on the hypothesis that infants engage in automated behaviors that are crucially attuned to the presence of others and yet lack, even in a prereflective form, any sense of self or other. But the conclusions about the age of possession of a theory of mind typically drawn on the basis of the False Belief Task are surely incorrect as well; children are likely to be in possession of a theory of mind significantly earlier than the age of four. I argue that the False Belief Task has some crucial flaws that can explain why younger children do not succeed at it, and I show that there is another test, the Indexical Gestures Task, that indicates the presence of a theory of mind and that children as young as two years and three months old succeed at. The conscious use of indexical gestures (pointing, etc.) indicates that the gesturer is aware of his or her own knowledge, the likely beliefs of the other even when those beliefs differ from his or her own, aware of objects in the common perceptual field, and able to make a prediction about the likely response

to the gesture. This is sufficient to indicate the presence of a theory of mind, and absent a theory of mind, we cannot properly attribute intersubjective capacities to children. **C3**

194 **How to Lose Yourself in Yourself: Proto-, Meta-, and Self-Consciousness.** Anastasia Gorbunova, Francesco Giorlando <gorbunov@email.arizona.edu> (Psychology, University of Arizona, Tucson, AZ)

The inquiry into self-consciousness has traditionally approached the question via the subject-object relationship. From this perspective, the idea of the emergence of consciousness has been explored by a number of models including Chalmers' exploration of panpsychism; in these models, the central question is of describing the interaction between consciousness and the physical world. The limitation of this view of the phenomenon of consciousness is that it searches for a definitive form of consciousness. The authors argue for exploring phenomenology as a dynamic process, a means of this interaction instead of a synonym for self-consciousness. This interaction is presented as a triadic structure, discriminating between self-consciousness that pertains to the introspective quality of self-awareness, meta-consciousness that relates to the process of interaction between the selves, and proto-conscious awareness of the environment. In this model, proto-consciousness is conceived as similar to Chalmers' proto-panpsychism. However, the authors describe the dynamics of the personal experience, rather than the "possession" of consciousness. This is expanded into the inter-personal domain. Self-consciousness is conceived as a special case of the dynamics of consciousness and the inter-personal interactions are the source of meta-conscious awareness, or "synamics". This might also be described in terms of how observables arise as defined states through a formulation of the measurement problem in Quantum Field Theory. Similarities are drawn with Dennett's multiple-drafts model; however, this is expanded out of the individual self-conscious, into the meta-conscious description. Further, the phenomena illustrating the synamics of consciousness are discussed, such as subjective experience of time versus common flow of time between observers, the relevance of embodiment in space and time to the physical identity of a conscious human being, and memory and representation as they shape one's inner identity and provide for a dissociation between the self, others and the outside world. This latter point leads the authors into discovering ways of merging or blurring the boundary between one self-consciousness and another in processes that involve the flow of information in temporal and spatial proximity; for example, speech, music, sex, or meditation. The authors conclude with the proposal of a unified manner in which meta-consciousness and its correlation with observed reality is both derived from but, by necessity, divided into different aspects. These issues are discussed here in order to provide understanding between researchers and philosophers interested in studying various aspects of consciousness. **P3**

195 **Is there a sense of agency for thought?** Joëlle Proust <jproust@ehess.fr> (Institut Jean-Nicod, CNRS, Paris, France)

The distinction between a sense of ownership and a sense of agency was introduced in the philosophical literature to account for the subjective experience of many deluded patients with schizophrenia. Although they have normal proprioceptive and visual experience while acting, (and therefore, a preserved sense of ownership), they often feel that someone else is acting through them (they present a disturbed sense of agency). Another frequent delusion is still more intimately associated with self-knowledge: patients experience "thought insertion"; they complain that some of their thoughts are in their minds (and, to this extent, are experienced subjectively), but at the same time are not theirs in the agentive sense; they speculate retrospectively that someone else has inserted them "into their heads", making them think these ideas (using futurist brain technology, or otherwise). This kind of experience is often used to claim that there is a strong analogy between thinking and acting in patients with schizophenia as well as in normal subjects. The goal of the talk will be to examine whether thinking can be agentive. Thinking encompasses all sorts of different attitudes, from considering, judging, comparing, evaluating and reasoning to imagining, visualising, desiring, intending, planning and deciding. One often has the sense of "owning" a thought – of having first-person knowledge of one's having this thought. A more contentious type of experience associated with thinking is that of intending to think this particular thought: it is the sense of feeling agentive while thinking. To be entitled to forming, on the basis of an occurrent experience, the belief that one is presently acting mentally, it must be shown that a sense of agency is veridical only for those occurrent thoughts, if any, which are under our will, namely those that independently qualify as mental actions. If no such justification is available, we would have to join the sceptic by claiming that a subject may never be entitled, to know when, and even whether, she acts mentally. In order to clarify this important epistemological issue, we will provide a definition of mental action exposing the functional connection between agency in thought and metacognitive thinking.

Metacognitive feelings will be shown to play a crucial role in a thinker's entitlement to feel agentive in specific thought episodes. **C2**

196 **Troyer Level of Consciousness Inventory(TLOCI): Measuring the invisible.** Julie Troyer, Matt, Babcock; Mandolin, Ortega <Julie.Troyer@nau.edu> (Psychology, Northern Arizona University, Sedona, Arizona)

The present study intended to accomplish two aims: 1) examine quantitatively the reliability and validity of a newly developed instrument designed to measure levels of consciousness, the Troyer Level of Consciousness Inventory (TLOCI) within a pilot test (N=17) and 2) to qualitatively analyze the readability, content, and design of the TLOCI through focus group discussion (N=17). The TLOCI is based on the Level of Consciousness model presented by Dr. Alain Morin and is based on a theory of self-awareness that can be associated with the work of Duval & Wicklund (1972), Fenigstein, Scheier, & Buss (1975) and Trapnell & Campbell (1999). The sample consisted of 17 undergraduate (6 male, 11 female) students at Northern Arizona University who voluntarily participated in the study. Participants were administered the TLOCI as well as asked a series of open-ended and directed questions regarding the instrument itself. Theoretical exploratory factor analysis posits promising results. The qualitative focus group data was coded and substantial evidence supports the positive readability, understandability, and usability of the TLOCI. Results from both the qualitative and quantitative aspects of this study support the reliability and validity of the TLOCI as a viable means of measuring levels of consciousness. The creation of a statistically and practically sound means of assessing consciousness assists in operationalizing the definition by providing a psychometric means of measuring the construct. **P9**

*See also:*

71 **Consciousness, Agency and Will**
94 **Brentano and Husserl on Self-Consciousness Redux**
56 **Simulation, self-knowledge and metacognitive judgement.**
62 **Introspective Ascent and the Thinness of First-Person Authority**

## *3.17 Temporal consciousness*

197 **The Solution to the Problem of the Time of Consciousness: What is Needed is "Time," not "Representation"** Peng Chien, Allen Y. Houng <emmapchien@yahoo.com.tw> (Institute of Neuroscience, National Yang Ming University, Taipei, Taiwan)

To solve the problem of conscious experience, many think that we have to investigate consciousness of the present, consciousness of the moment when events happen, or consciousness of the duration of time. One example is the "time stamp" or the representation of time proposed by Dennett and Kinsbourne (1992). In their paper, Dennett and Kinsbourne propose the distinction between "the representation of time" and "the time of representation" to dissolve the temporal anomalies resulted from Cartesian Materialism, e.g. color Phi, the cutaneous rabbit, and Libet's backward referral. They argue that if the time stamp is what constitutes our awareness of time regardless the time of representation, we will find these temporal anomalies dissolved. In this paper, I will argue that Dennett and Kinsbourne did not successfully dissolve the temporal anomalies. The main reason is that the representation of time is not 'time' in physics, but just representation. Furthermore, time in physics can not be represented, and the representation of time is just the representation of "the order of events happening in consciousness." Thus, if we want to solve the problem of the "time" of consciousness, we can not just provide "representation" as solution. What is really needed to solve the problem is "physical time." I will propose in this paper that the real solution to the problem of the time of consciousness is "the time of representation," which is real time in physics. **P9**

198 **Temporal Experience and the Counting Problem** Philippe Chuard <pchuard@smu.edu> (Philosophy, Southern Methodist University, Dallas, TX)

What happens when you experience a succession of events such as a melody or the flight of a cockatoo? For the so-called 'retention theory', you enjoy a succession of short-lived experiences, each representing a single event in the succession of events. Not so, according to proponents of the specious present: you can have a single, temporally extended, experience representing all the events and their succession. Though many find the specious present mysterious, theoretically unmotivated, or just plain inconsistent, it's not easy to properly argue against it. In this paper, I consider what seems to be the most promising argument for the claim that you do, in fact, have a succession of experiences-and not just a single experience-when you see or hear (or ...) a succession of events: the division argument. The argument (in its different guises) relies on three different

principles for the individuation of perceptual experiences. Unfortunately, though intuitively plausible at first, such principles have rather undesirable consequences when applied to spatial experiences (experiences of objects in space). To block such consequences, I develop a weak form of perceptual holism borrowed from Berkeley. I then argue that such holism cannot be used by the advocates of the specious present to resist the division argument. **C6**

199 **The Role of Phenomenal Time in the Emergence of Consciousness** Erich Harth <eharth@twcny.rr.com> (Physics, Syracuse University, Jamesville, NY)

I adopt the premise that mental phenomena are emergent qualities accompanying particular neural activities. For an explanation of this emergence, it is not enough to locate brain areas and activities that consistently correlate with particular mental states, but a plausible causal link between the two must be sought. Positive feedback often leads to the emergence of novel events such as strange patterns in video feedback. In such phenomena, chains of cause and effect are presumed to follow one another in an orderly fashion. The chains are not always traceable, as in biological processes that have been called 'autopoiesis' (1), from the Greek meaning 'self-creation'. Thus, a cell creates its own components, maintains itself through feedback,and is capable of creating its own replica. But a cell has to be there to begin with. For an object to truly create itself – call it 'radical autopoiesis' – cause and effect would have to be coincident, past and future would have to meld. Feedback is ubiquitous in the brain, especially along sensory pathways. A property unique to the brain, is the creation of phenomenal time, the experienced temporal arrangement of events, in which clock time is often distorted and even inverted (2,3). Events are perceived on a non-physical time-scale, and the mixing of sensations with stored past information, and projections into the future, further contribute to the uniqueness of phenomenal time. I propose that in human brains, the temporal distortions in phenomenal time, together with positive feedback, make possible the emergence of consciousness through a process of radical autopoiesis. 1. H. Maturana & F. Varela (1980). "Autopoiesis and cognition" in Boston Studies in the Philosophy of Science, ed. Cohen & Wartofsky (Dordrecht: Reidel). 2. B. Libet (2004). Mind Time: The Temporal Factor in Consciousness. (Cambridge: Harvard). 3. C. Sommerfield et al. (2006). "Predictive codes for forthcoming perception in the frontal cortex". Science 314, 1311-1314. **C6**

200 **Time-consciousness and Normal, Everyday consciousness** Christopher Lay, Christopher Lay <clay@uci.edu> (Philosophy , UC Irvine, Irvine, CA)

Time-consciousness plays an important role in normal, everyday consciousness. Indeed, any complete analysis of normal consciousness must account for the role of time-consciousness therein. As examples of the importance of time-consciousness in normal consciousness, I will show how time-consciousness accounts for the experience of a unified consciousness, and the identification of objects of perception and thought in normal consciousness. From these considerations I shall argue that time-consciousness is a necessary feature of normal consciousness. While Zahavi argues, in effect, for the latter thesis, he seems at times to make the further claim that time-consciousness is also sufficient for normal consciousness. I shall argue against that further claim by showing how time-consciousness, and not normal consciousness, can be plausibly attributed to certain types of sleepwalkers. I will conclude with general remarks about the value of time-consciousness to the contemporary debate, especially for the self-representational approaches to consciousness. **C6**

201 **An Intertwinement of Time & Karma: Phenomenology of a High-Speed Racecar Crash** Jack Sam <jsama@sfu.ca> (School of Interactive Arts and Technology, Simon Fraser University, Surrey, BC, Canada)

Based on a highly subjective account of my high-impact racecar crash in the rain, I examined this experience from the theories of pure duration, volitional action and Karma (the process of intention). In time-critical situations such as racing, one's perception of time shifts away from an awareness to mathematically measured time and becomes distorted according to one's conscious causation and orientation. This paper will explore the salient phenomenal developments and anomalies of perceptual disturbances arising from my racing shunt. Using Francisco Varela's Wheel of Life as a framework for understanding the conditioned mind and fostering mindfulness, I described my process of bodily attunement to my racecar and to the racetrack. Becoming mindfully focused on my breathing, heart rate and the movement of my limbs, the durational experience of the external world normalized to my internal cycles. Regardless of the extreme speeds I was traveling, it was actually I who had accelerated while the world had slowed down. While ignorantly expecting a repetition of my successful lapping experience from earlier in the day, my car went into sudden oversteer towards a concrete barrier. I mapped Ben Libet's detailed analysis of neuronal and somatic

activity to the twelve sequential links of the Wheel of Life in order to explore the antedating of sensory awareness at the moment I realized I was losing control. What was a steady climb towards of a state of real-time consciousness was violently fractured, reestablishing the dualistic delay between sensory awareness and volitional action. Immediately after, the car hit the concrete head-on and spun 270 degrees into a dead stop in the middle of the track. Perhaps it was preventable or perhaps not. For hindsight into what my possible options were, Henri Bergson's notion that a completely free act requires the mind to allow something real to happen before it is even conceivably possible provides an insight into the nature of experience. The creative mind cannot be bound by time but rather requires openness and detachment from the both lack of experience in a novel situation as well as the reliance on incomplete experience (ignorance). Finally, I describe the crash from the haptic, visual, vestibular and interoceptive phenomenon directly resulting from the impact. By studying the causal process of intention from Varela's studies in Buddhism, the electrochemical events from Libet's physiological experiments and theories on the nature of creativity from Bergson's Continental Philosophy, as well as corroboration from championship race drivers, I posit a perspective on the intertwinement of time and Karma in order to consider their mutual mutability within psycho-subjective sensations. **P9**

*See also:*

70a **Retroactive Modulation of Subjective Intentions: Philosophy, Science and Cyborgs**

## 3.18 Intelligence and creativity

202 **Emergence and Collective Creativity** Meredith Tromble <mtromble@sfai.edu> (School of Interdisciplinary Studies, San Francisco Art Institute, San Francisco, California)

Could the concept of "emergence" be applied to further the creative process of artist collectives? This talk outlines a theoretical and practical investigation into structures of collective art activity that may be particularly productive, leading to the emergence of higher order creativity or "genius" from an artist collective. Emergence – the appearance of higher-order patterns from the actions of individual agents following their own, local rules rather than the directions of a "boss" intelligence – appears in galaxies, cities, and anthills, in living and non-living structures. In human interactions, it appears in mob behaviors and sidewalk traffic; various artist collectives have also explored the possibility of promoting it in creative work. This work may contribute to articulating different aspects of the phenomena, such as the "second-order" emergence characteristic of situations in which agents recognize emergent phenomena, proposed by computational sociologist Nigel Gilbert. Presenting work from contemporary artist collectives and exploring ideas from research in anthropology, complexity and network theory, neurology, primate biology, and psychology, this talk ferries between art, science, and critical theory. It addresses a question which is at present too large and unruly to address in a wholly "scientific" manner but which may be approached through writing, research, and the imagination. **P3**

*See also:*

230 **On Conscious Development of Mind**

## 3.19 Miscellaneous

203 **Quantitative and Qualitative Analyses of the Ascribed Characteristics of Spiritual Discernment: Higher Consciousness or Self-Deception?** Robert Benefield, Shantel Shaffer University of South Carolina at Aiken Frederick L. Newman Florida International University <rbenefield@etbu.edu> (Behavioral Sciences, East Texas Baptist University, Marshall, Texas)

The Spiritual Discernment Survey (SDS) was developed based on the most frequently cited commonalities found in a compilation of definitions and characteristics of spiritual discernment derived from a variety of sources. An exploratory factor analysis of the responses of pilot study participants (n =173) was utilized to determine the major vectors describing the ascribed characteristics of spiritual discernment (Principle Axis extraction) and the relationship the factors have with each other (Oblique rotation). Seven factors were obtained and combined to produce a total spiritual discernment score. The revised SDS was posted on a web site and participant responses (n=289) were examined as a function of gender, education level, religious affiliation, and political orientation. At least five of the factors and total score were impacted by the demographic variables. Qualitative analysis (based on the seven factors) was conducted on the open-ended questions on

the SDS (n=462) and on-line recordings of "prophets" who posted prophecies on elijahlist.com (n=215). Summaries of the major findings of both types of analyses are reported. **P3**

204 **The Five Most Frequent Phenomena of Inner Experience: Base Rates, Individual Differences and Methodological Considerations** Chris Heavey, Russell T. Hurlburt <chris.heavey@unlv.edu> (Psychology, University of Nevada, Las Vegas, Las Vegas, NV, U.S.A.)

Descriptive Experience Sampling (DES) was developed by Hurlburt (1990, 1993) to provide faithful descriptions of moments of naturally occurring inner experience. DES involves giving subjects a random beeper that they take with them into their everyday life. When the beep sounds, subjects jot down notes about their experience at the moment of the beep. Within 24 hours they are interviewed with the goal of apprehending and faithfully describing their experience at each sampled moment. Previous studies using DES (e.g., Hurlburt, 1990, 1993; Hurlburt & Heavey, 2002, 2006; Hurlburt & Schwitzgebel, 2007) have discovered five phenomena that occur frequently in inner experience. We developed a codebook for these five phenomena (Hurlburt & Heavey, 1999) and showed that we could reliably determine their presence or absence in moments of experience (Hurlburt & Heavey, 2002). These five phenomena are inner speech, inner seeing (aka mental images), unsymbolized thinking, feelings, and sensory awareness. Some of these phenomena are well known to consciousness researchers (inner speech, inner seeing, and feelings), but others are not (sensory awareness and unsymbolized thinking). In the present paper we provide estimates of the base rates of these phenomena in everyday waking experience and examine individual differences in their relative frequency. We used DES to describe 10 randomly identified moments of inner experience from each of 30 participants selected from a stratified sample of college students. We found that each of the five phenomena occurred in approximately one quarter of sampled moments, that the frequency of these phenomena varied widely across individuals, that there were no significant gender differences in the relative frequencies of these phenomena, and that higher frequencies of inner speech were modestly associated with lower levels of psychological distress. These findings have several important implications for the field of consciousness studies. For example, other researchers using other methods have given estimates of the base rate of inner speech that differ dramatically from our 26% and from each other: 75% (Klinger & Cox, 1987-1988), and 100% (Baars, 2003); similarly, Watson's (2000) claim that emotion is experienced 100% of the time is dramatically higher than our 26%. These discrepant estimates highlight the importance of methodological issues when exploring inner experience. For the field of consciousness studies to trust and incorporate first-person reports, we must determine the characteristics of adequate methods and resolve these highly divergent estimates of the relative frequency of common phenomena. Additionally, the large individual differences discovered in our study make clear that the common assumption of similarity of inner experience across normal subjects is untenable. **PL7**

205 **The Weight of Being: Psychological Perspectives on the Existential Moment** Jacob Hirsh <jacob.hirsh@utoronto.ca> (Psychology, Toronto, Ontario, Canada)

Compared to other mammals, humans have evolved a greater capacity for abstraction and higher-order regulation of behaviour. As the prefrontal cortex expanded in human evolution, so too did the capacity for nesting basic biological goals within more complex systems of sensorimotor organization (Swanson, 2000). Consequently, human behaviour is regulated not only by immediate biological needs, but also by more abstract, conceptual goals. This increased ability for abstraction brings with it the challenge of deciding how to interpret the personal significance of any given experience. Greater cognitive complexity leads to an expanded horizon of interpretation, such that the subjective meaning of an experience is shaped by the current mindset of the individual. When an event relates to the achievement of an individual's current goals, it is deemed important and personally meaningful; however, if an event is deemed to be unrelated to one's current goals, little attention will be paid (Carver & Scheier, 1998). When experiencing subjectively important events, arousal and exploratory systems become engaged, such that information is processed more thoroughly. As a consequence of this enhanced attention and arousal, neural plasticity is facilitated, causing the current experience to have a stronger influence on the individual's neural organization. Experiences that are interpreted by the cognitive system as being more significant thus have a greater influence on an individual's trajectory through life. We can therefore understand the felt "existential weight" of a given moment as the extent to which it relates to an individual's most valued goals, located at the highest levels of behavioural organization. The flexibility of the human mind, however, allows the significance of any experience to be reinterpreted in terms of any number of different goals. To someone who has adopted a narrowly-defined goal such as "making money", the realm of important events is limited to those which relate to personal finance. If, how-

ever, an individual adopts an open-ended goal such as "discovering the meaning of life", every single moment could provide potentially relevant information and thereby be tagged as personally meaningful. The more open to experience an individual is, the more he will perceive meaning in his environment, and the more plasticity will be observed in his cognitive organization (Peterson & Carson, 2000). The importance, or existential weight, of any given experience will vary not only between individuals, but also within individuals as different goals are adopted across the lifespan. Within this framework, human experience can be best understood as operating in five dimensions: four dimensions of space and time, and the fifth dimension of human meaning. To borrow a gravitational metaphor, the existential weight of a particular moment will determine the strength of that moment's influence on an individual's life. Just as space-time is curved around large masses, so too is human experience curved around fluctuations in the existential weight of being. Such a theory of "existential relativity" could be useful in understanding the subjective landscape of human experience. **P9**

206 **Is there really any evidence for retrocausation?** Susan Pockett <center@sbs.arizona.edu> (Physics, University of Auckland, Auckland, NEW ZEALAND)

The interpretation of various experimental data which have been taken as demonstrating retrocausation will be discussed. **PL2**

*See also:*

356 **Individual Differences in Video Game Play and Presence**
277 **The Relationship Between Unconscious Abandonment Issues and Mental, Emotional, and Physical Health**
273 **Determining how best to study the evolutionary function of consciousness**
338 **Virtual Reality: Image Structure and Consciousness Organization**
299 **Descriptive Experience Sampling of Bulimia Nervosa: A Case Study Illustrating the Importance of Careful Examination of Phenomena**
320 **"Is Consciousness Distinct From Attention?"**

# 4. Physical and Biological Sciences

## 4.1 Quantum theory

207 **Two Meanings of "Unity of Consciousness" in Relation to Quantum Mechanics.** Gerard Blommestijn <gblomm@gmail.com> (Amstelveen, Netherlands)

The term "unity of consciousness" may be used for (1) the inner experience that we all have, of being one single entity, one person, one "I". But it may also be used for (2) the idea that all consciousness of all beings is in reality one and the same consciousness, one "World-soul". In order to explain the "unity of consciousness" in its first meaning (1) in scientific terms, we have to search in our understanding of nature for a unifying principle that is so tight that it binds parts of a system into a real unity. The Quantum Mechanical (QM) entanglement principle joins parts of a system together in such a way that a change in one part of the system directly effects the other parts, without transmission of signals, particles, waves or whatever. If this QM entanglement principle is responsible for the "unity of consciousness", it means that the signal processing in (the brain of) the organism must be able to work toward a single complex entangled wave function, the reduction of which is identical to all the experiencing and choosing that the "I" does at that moment. ("I" or "I-ness" is that which experiences in an organism.) Just before its reduction this wave function contains in a vast QM superposition all the different possibilities of perception and choice that the "I" has at that moment. This gives a model of reality in which causality is back in quantum mechanics, in which there is free will and in which there is transfer of (experiential) information to the "I" ("I-ness") and transfer of causes from it, all without energy transfer! Quantum mechanical entanglement then binds the separate parts of the total of experiences and causes together to one complete phenomenal perspective of experiences and causes. But how then about the second "unity of consciousness" (2) in the meaning of one "World-soul"? Could that unity also originate from a big all-encompassing entangled wave function? And do we need another principle or concept to account for the sense of separation that we feel with respect to other beings, instead of experiencing and acting in the awareness that all consciousness in reality is this one "World-soul"? The so-called Heisenberg picture of

QM shows a strong resemblance with this view: the fixed state vector (corresponding to the unchanging "World-soul" or central "I-ness") is seen by "the illusion" (the "veils") of the variable operators. These operators represent observables as well as "actables/choosables". The total of measured quantities is then the grand total of all experiences and choices of all beings through which the "World-soul" experiences and chooses. In the depth of the entanglement between the different beings there may be effects of the unity of their "consciousnesses", for instance: in this picture the joint origin of all beings reflects itself in the creation of entanglements that have to do with the deep unity-feeling that we can have with fellow-beings. I would like to discuss the above issues with the audience. **P4**

208 **Quantum Mechanics Rigorously Implies Consciousness is Nonphysical** Casey Blood <crescentrd@aol.com> (Physics, Sarasota, FL)

The presumption that consciousness is a product of the brain implicitly rests on the assumption that all there is is this material existence. The most appropriate discipline for examining this hypothesis is quantum mechanics, the very successful theory of the physical universe. There are two relevant facts about quantum mechanics. The first is that it has given the correct answer in every situation where the mathematics can be done; it has never been wrong. Because quantum mechanics, by itself, can account for all the experimental evidence, there is no evidence left over to imply that particles, or any other objective forms of matter, exist. Thus there is no confirmation from physics that there is an objective, material existence. Arguments in physics texts which claim to show there are particles have not explored the properties of the wave function in sufficient depth. The photoelectric effect, the Compton effect, localization (only one film grain exposed per photon in a double slit experiment), particle-like trajectories in a cloud chamber, the discrete properties of matter such as charge and atomic "graininess," and other particlelike phenomena can all be explained by the properties of the wave function alone. Wave-particle duality arises because the wave function is different from a classical wave; it has both wavelike and particlelike properties. The second relevant fact is that the wave function of quantum mechanics contains many versions of reality, rather than just a single, objective version. One could conceivably obtain an objective (that is, single-version) reality by having the wave function collapse down to just one version. But there is no experimental evidence for collapse. And the current GRW-Pearle theory of collapse has many assumptions that are far outside usual physical theory. So, since there is no evidence to the contrary, let us assume only the wave function, with all its versions of reality, exists. In that case, one can mathematically prove that conscious perception of only one version cannot come from within quantum mechanics. There cannot be some special area of the brain, for example, that corresponds to conscious perception of just one version. The only choice left is that the aspect which perceives only one version must be outside the laws of quantum mechanics. That is, each of us must have a nonphysical perceiving aspect that looks into physical reality and perceives just one of the quantum mechanical versions of physical reality. The nonphysical perceiving aspect is not subject to the laws of quantum mechanics. It does not alter the wave function or the mathematics of quantum mechanics in any way; it only perceives (one branch of the wave function of the associated brain-body). And since it is nonphysical, it is, of course, not located anywhere (such as in the brain) in physical three-dimensional space. If we grant the assumptions – only the wave function exists, with all its branches – this nonphysical perceiving aspect is the source of conscious awareness (of one version of the wave function). It is the feature that distinguishes sentient beings from laboratory detectors. **C19**

209 **The SubQuantum Foundations for the Informational Essence of all Consciousness-Related Phenomena.** Robert Boyd, Dr. Adrian Klein MDD <rnboyd@iqonline.net> (Princeton Biotechnologies, Inc., Knoxville, TN)

The SubQuantum Information Transport perspective is capable of accomodating all sentience and consciousness studies, and importantly, all Psi phenomena. At the same time, this new understanding arrives as a self-consistent and experimentally provable new perspective. External stimuli-modulated broad Quantum structures in Hypocampal, and connected cortical areas, are identifiable as specific, multistructurally extended connection patterns, which arise across the Brain . These connection patterns are encoded in the SubQuantum as subsets of various complexities in the information fields, per Bohm's implicate order, wherefrom they are retrievable by higher order functions of the Self Conscious Structure (SCS) – such as attention, emotional triggers and intention. This recall effect results in a replication of the Brain's quantum map, into the neural structures by the Information field corresponding to them. Contextually sensitive interpretations of perceptual modalities as supported by Garret Stanley's experimental results get deterministic primacy over integrated patterns of neural network activity. Conscious integration is controlled by se-

lective neocortically top-down modulated neuronal responses, as suggested by Alex Meier's recent experimental results, which are consistent with observations of proactive determinism which ambient and inherent Information fields impose on neural correlates in conscious systems. It is the underlying SubQuantum control, which brings about the observed selective, sentient, and deterministic Quantum dynamics in neural structures. Informational presets, as residing in the quantum potential, are stored in the hyperspace inherent to each infinitesimal, which presets are actualized, according to the additive quantum phase state conditions. These Information controlled availabilities then become operative in Quantum phase-state transitions. This model is similar to Lothar Schafer's recent model, which similarly suggests that such preselections involve "virtual states". The Informational aspects of the SQ regime are translated into quantum processes which are subsequently operating in neural systems, thus ontologically different structures such as Information and energy become dynamically interactive patterns via a hyperdimensional transduction process by means of a bidirectional Quantum efficiency vector, which links the organizing Information fields to their physically energetic equivalents, which subsequently arise in the Brain. We defend a seemingly paradoxical monistic dualism by emphasizing the hyperdimensional attributes of the Subquantum structures as the common denominator for both Informational and Energetic matrices, while between these ontologically distinct domains, there arises an assymetrical dualistic interaction, wherein, energetic processes run under Information control. This view implies that Information fields have a deterministic, and proactive effect on the Quantum-energy processes in the Brain, which in turn, provide the originations of neurological basis. Given the axiomatic extension of Subquantum structures into hyperdimensional (transcendental) Information fields, we describe SubQuantum structures of various complexity exhibiting an inherent Time function that conveys to them an Information carrier function operative in an infinite range of velocities according to Information-related deterministic data. We can safely describe Information/Energy interplay, in terms of Bohmian implication orders of reality. From this perspective, subjective experience is not defined in epiphenomenological terms, rather, subjective experience is related to neuroquantic correlates by the reversed epistemologic causality we suggest. **P4**

210 **On a Fundamental, Nondeterministic Problem Solving Mechanism Explaining the Wholeness of Perception** Giuseppe Castagnoli <giuseppe.castagnoli@gmail.com> (Former technical director of Elsag Bailey, Pieve Ligure (Genova), Genova, Italy)

Assuming that consciousness is information processing, I show that the wholeness (or Gestalt) appearing in the introspective analysis of perception calls for a special form of computation. The wholeness of either perception or computation is here defined as "perfect simultaneous dependence (correlation) between all the continuous variables describing a physical situation" – like between the variables related by a fundamental physical law. There is no wholeness in classical computation. For example, in the bounching ball model of reversible computation, the variables at stake are ball positions and momenta. Outside collisions, there is no simultaneous dependence between the variables of different balls. In the instant of (idealized) collision, there is simultaneous dependence between the variables of the colliding balls, but this is limited to ball pairs to avoid the many body problem. By assuming a perfect simultaneous dependence between all computational variables, one can devise an idealized classical machine that, thanks to a many body interaction, reversibly and nondeterministically produces the solution of a Boolean problem under the simultaneous influence of all the problem constraints. Noticeably, the mathematical description of this machine, as it is, represents a realistic quantum computation. The machine configuration space is replaced by the phase space of a quantum register. The perfect relation between the coordinates of the machine parts is transferred to the populations of the reduced density operators of the register parts. The solution of the problem – the measurement outcome – is reversibly and nondeterministically produced under the simultaneous influence of the state before measurement and the quantum principle. I call this fundamental problem solving mechanism "simultaneous computation". On the one side, the notion of simultaneous computation shows the importance of extending the physical representation of the quantum algorithms to the problem constraints-solution interdependence, namely to problem solving. This shows that the speed up essentially relies on state vector reduction. The speed up becomes "quantum precognition" of the solution, the reduction of the initial ignorance of the solution due to backdating, to before running the algorithm, a time-symmetric part of the state vector reduction on the solution. As such, it is bounded by state vector reduction through an entropic inequality. On the other, simultaneous computation explains the wholeness of perception, our perceiving a lot of information all together and simultaneously in the psychological "present". A quantum state can hold any amount of information, which is processed by the sequence: preparation/unitary transformation/measurement. The entire processing is

characterized by simultaneous dependence (correlation) between any two populations at any pair of times, like between entangled polarizations. The time interval spanned by backdated state vector reduction, characterized by correlation across time, would correspond to the notion of "present". The fact that, in perception, we take into account many things at the same time, acquires a literal meaning: taking into account many things at the same time is exactly what nondeterministic many body interaction (simultaneous computation) does. Consciousness as information processing would rely on a fundamental, nondeterministic problem solving mechanism. Instead, the deterministic, two-body character of classical computation prevents taking into account many (so to speak, more than two) things at the same time, or hosting consciousness either. **C19**

211 **Quantum Duality, Theory of Mind and Personality Assessment Applied to Social Meta-Diagnosis: The Case of Cognitive Mapping for Diagnosing the Safety Issue in Rio de Janeiro** Marcos Estellita Lins, Luis Eduardo Madeiro Guedes; Milena Estanislau Diniz <estellita@pep.ufrj.br> (Production Engineering/ OR, Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil)

One of the main achievements of quantum physics is the duality particle-wave, where a particle presents local properties that we assign to material objects, while a wave features non local spread attributes. In 1927 Clinton Davidson and Lester Germer fired a beam of electrons at a piece of nickel crystal trough a barrier with two slits. Despite being a particle, the electron presented an interference pattern, characteristic of waves. Now it is widely accepted that matter does not present location properties until it interacts. Before and after it is a distributed wave. A simple look at a dictionary shows that language is completely contaminated by ambiguity. Mathematical language is an exception. However, when it is applied to physics to help dealing and understanding reality, duality arises at the very essence of physics: the measurements in experiments. As Brian Greene puts on: "Since the wave is spread uniformly throughout space, there is no way for us to say the electron is here or there. When measured it really could be found anywhere". Though we cannot see the electromagnetic fields, except when an interaction produces a material yield, the assumption helps in developing broadcasting, mobile networks and brain scanners. Because of the practical results we see, we accept that something exists that we call electromagnetic fields. Now consider human interaction. Until the instant of interaction there is no definite manifestation of personality. We can be just an observer. However, as soon as we interact, we are demanded to manifest a position, to assume an attitude. And we materialize it as if personalities were the real thing. We express emotions through face and body, we impose our power. After interaction we come back to our "not having to take a party anymore" state. There is a saying "My decision is MAYBE. And that is FINAL!" that reflects the opposite state of mind, and refers back to the question: is there anything else besides personality? That is the big issue that refers us back to the Uroborus. Being aware of yourself lies beyond personality, connects to non-located phenomena that, again, can be materialized through interaction with other people. This work proposes that quantum philosophy can be applied to Theory of Mind as we incorporate personalities when interaction occurs. This is dealt through a case study of safety diagnosis in Rio de Janeiro municipality. We use cognitive mapping to represent different perspectives of the problem. The proposed innovation is that the congregate map can be obtained after the analysts are provided with tools for self assessing, i.e., information about how their preferences regarding personality traits can lead to specific conclusions about the diagnosis of the problem. The result is a method for implementing Theory of Mind that can improve the perception of the Self, help negotiating different perspectives of a social problem and ease convergence of strategies for policy making. **P10**

212 **Quantized Instability Fluctuations Satisfy David Chalmer's Conditions for Non-Reductive Models of Information Spaces of Consciousness** Alex Hankey <alexhankey@gmail.com> (Physical Science, SVYASA, Bangalore, Karnataka, India)

At instability points the infinite range of correlations strongly couples whole systems; their infinite specific heats indicate that, as temperature is lowered, a special ordering is being established. Both together make a system non-reductive, but only under these special conditions. Can such a non-reductive system fulfil David Chalmers's quest? We suggest that in the special case of far-from-equilibrium instabilities in biosystems they can. Quantum fields of order parameter instability fluctuations represent a new departure in physical theory, a major gap in theoretical physics. This paper shows why they can represent consciousness itself. To demonstrate this we start with the renormalized quantized fluctuation field (as opposed to the underlying order parameter quantum field). The field's unrenormalized form represents the uncertainty in field values. Such fields therefore find their origin in the commutation relations of their underlying field. They are fundamental and universal. Energy throughput at far-from-equilibrium instabilities, such as occur in

feedback regulation of biological systems, permits the feedback to induce self-observation of the order parameter quantum field. In general, quantum fields represent the observer's knowledge of the system rather than the system itself. The quantum field of a system undergoing self-observation therefore represents a system with self-knowledge. i.e. some possible aspect of consciousness, since consciousness may be defined by the property of having self knowledge (the usual dictionary definition in days before doctrines of embodiment became dominant). Regarded as an information space, the Banach space of quantized instability fluctuations now satisfies Chalmers's dual aspect condition: it can be both an objective information space (like any other space of quantum states), and a phenomenal information space (because of its associated property of self-knowledge). Similarly, Chalmers's other conditions may also be shown to hold. e.g. non-reductive as explained above. Quantized fluctuations represent a possible solution to the mind-matter problem: they represent mind, while ordinary quantum fields represent matter. The solution is both dualistic, because of the difference in mathematical structure, yet unitive, because both are representations of the same _underlying_ field concept. **P4**

213 **Concerning Spin as Mind-pixel: How Mind Interacts with the Brain through Electric Spin Effects** Huping Hu, Maoxin Wu <hupinghu@quantumbrain.org> (Biophysics Consulting Group, Stony Brook, New York)

We first explore, within the framework of spin-mediated consciousness theory, how mind influences the brain through proactive spin processes. Our thoughts are that the manifestation of free will is intrinsically associated with the nuclear and/or electron spin processes inside the varying high electric voltage environment of the neural membranes and proteins which likely enable the said spin processes to be proactive, that is, being able to utilize non-local energy/potential and quantum information to influence brain activities in defiance of the second law of thermodynamics. Since classical brain activities are largely electric, we next explore a more specific model of mind-brain interaction in which electric spin effects in the varying high-voltage electric fields inside neural membranes and proteins mediate mind-brain input and output processes. Electric spin effects are effects of electric fields on the dynamics/motions of nuclear/electron spins and related phenomena. We suggest that the input processes in said electric fields are possibly mediated by Dirac-Hestenes electric dipoles and/or spin transverse forces both of which are associated with the nuclear/electronic spin processes. We then suggest that the output processes, that is, the proactive spin processes, in said electric fields possibly also involve Dirac-Hestenes electric dipole interactions in said electric fields and Dirac negative energy extraction processes, as shown by Dan Solomon, of nuclei/electrons besides non-local processes driven by quantum information suggested by us previously. We propose that these output processes modulate the action potentials, thus influencing the brain, by affecting the cross-membrane electric voltages and currents directly and/or indirectly through changing the capacitance, conductance and/or battery in the Hudgkin-Huxley model. These propositions are based on our own experimental findings, further theoretical considerations, and studies reported by others in the fields of spintronics, high-energy physics and alternative energy research. **P4**

214 **The SubQuantum Foundations for the Informational Essence of all Consciousness-Related Phenomena.** Adrian Klein, Dr. Robert Neil Boyd, PhD <Adrian10@bezeqint.net> (ISARTOP, Bat Yam, Israel)

The SubQuantum Information Transport perspective is capable of accomodating all sentience and consciousness studies, and importantly, all Psi phenomena. At the same time, this new understanding arrives as a self-consistent and experimentally provable new perspective. External stimuli-modulated broad Quantum structures in Hypocampal, and connected cortical areas, are identifiable as specific, multistructurally extended connection patterns, which arise across the Brain . These connection patterns are encoded in the SubQuantum as subsets of various complexities in the information fields, per Bohm's implicate order, wherefrom they are retrievable by higher order functions of the Self Conscious Structure (SCS) – such as attention, emotional triggers and intention. This recall effect results in a replication of the Brain's quantum map, into the neural structures by the Information field corresponding to them. Contextually sensitive interpretations of perceptual modalities as supported by Garret Stanley's experimental results get deterministic primacy over integrated patterns of neural network activity. Conscious integration is controlled by selective neocortically top-down modulated neuronal responses, as suggested by Alex Meier's recent experimental results, which are consistent with observations of proactive determinism which ambient and inherent Information fields impose on neural correlates in conscious systems. It is the underlying SubQuantum control, which brings about the observed selective, sentient, and deterministic Quantum dynamics in neural structures. Informational presets, as residing in the

quantum potential, are stored in the hyperspace inherent to each infinitesimal, which presets are actualized, according to the additive quantum phase state conditions. These Information controlled availabilities then become operative in Quantum phase-state transitions. This model is similar to Lothar Schafer's recent model, which similarly suggests that such preselections involve "virtual states". The Informational aspects of the SQ regime are translated into quantum processes which are subsequently operating in neural systems, thus ontologically different structures such as Information and energy become dynamically interactive patterns via a hyperdimensional transduction process by means of a bidirectional Quantum efficiency vector, which links the organizing Information fields to their physically energetic equivalents, which subsequently arise in the Brain. We defend a seemingly paradoxical monistic dualism by emphasizing the hyperdimensional attributes of the Subquantum structures as the common denominator for both Informational and Energetic matrices, while between these ontologically distinct domains, there arises an assymetrical dualistic interaction, wherein, energetic processes run under Information control. This view implies that Information fields have a deterministic, and proactive effect on the Quantum-energy processes in the Brain, which in turn, provide the originations of neurological basis. Given the axiomatic extension of Subquantum structures into hyperdimensional (transcendental) Information fields, we describe SubQuantum structures of various complexity exhibiting an inherent Time function that conveys to them an Information carrier function operative in an infinite range of velocities according to Information-related deterministic data. We can safely describe Information/Energy interplay, in terms of Bohmian implication orders of reality. From this perspective, subjective experience is not defined in epiphenomenological terms, rather, subjective experience is related to neuroquantic correlates by the reversed epistemologic causality we suggest. **P10**

215 **The Interconnectedness of Consciousness and Activities Performed Explained by Quantum Physics** Prasanna Kumar , N. Suresh Kumar, R. Vijay <prasanna_naresh1@yahoo.co.in> (Chennai, India, Chennai, India)

This paper tries to extend the bell theorem which establish that the whole world is interconnected.This concept is extended and a profound relation and interconnectedness is spotted between the mind (consciousness) and the brain (which defines the activities an individual performs). By establishing the interconnectedness between the mind and our activities we are eliminating the randomness from the perception of the mind and all our activities controlled by are mind are probabilistic and not random, the above said statements can be established by using quantum physics. Relating the Mind and Quantum Physics The basic entity of quantum theory is called a qubit(refer comments for the basics of quantum theory) Any state a qubit can take is denoted in a sphere is represented as a|0> + b} 1> Where a and b denote the probability that the state decomposes to either |0> or to |1> respectively Now this system is entirely analogous to the mind – brain system based on which we act. Now under any circumstance, the way we act which was considered random is not actually random. Like in the system discussed above the entities of the brain have a infinite rather finite(but a large) number of states (choices) and our mind defines which state it must settle to. Generally when we encounter a situation, our reaction or the way in which we can act can be expressed as the different states as explained by the analogy above. Now each of the possibility can again be expressed as the superposition of two basis states with a probability co-efficient The values of the probability co-efficient are fixed by our consciousness. The speeds with which these actions are performed are faster than the speed of light as in quantum teleportation. As in the system above the final state of the ion is determined by the probability co-efficients. The final act is based on the probability fixed by the mind. . Thus the above discussion cements the fact that there exist a strong interconnectedness between the mind and brain and that the mind is not a illusion but a probabilistic system with the activities given a priority and the final outcome is based on the priority. Now does that mean the system is a static one and does not update. Negative! The system is dynamic system which keeps updating based on the new experiences the mind gains. When a situation is reached with has no past analogies then a entirely new act is performed and the success rate of this act is measured and a probability higher or lower than a similar act is fixed and it is added to the system. As in the Bloch sphere, the number of stated in the mind is infinite and the new act always has a place in the system. This interconnectedness between the mind and brain is similar the QUANTUM ENTANGLEMENT that exists among two spatially separated quantum bits. **P10**

216 **A Grand Unified Theory of Consciousness? Why Understanding and Explaining Consciousness Will Inevitably Lead To One** Perry Justin, Justin S. A. Perry <perryju@email.uc.edu> (Psychology (Cog. Neuroscience Lab); Neurology (Neuroimmunology), University of Cincinnati, Cincinnati, OH)

The current struggle of understanding consciousness is worse than the chicken or the egg prob-

lem; it's a problem of the chicken and the egg. Similar to the problem negotiating the relationship of relativity and quantum theory (or harder yet, negotiating the math unifying electromagnetism, the weak and strong nuclear forces, and hardest of all, gravity, into a unified field theory) consciousness researchers and philosophers are burdened with the task of explaining the easy and the hard problems of consciousness. For centuries (and an increasing interest since Chalmers' discussion on the subject) researchers and philosophers have segregated in their efforts to explain one or the other problem. This discussion suggests that understanding consciousness will inevitably result in a Grand Unified Theory (GUT) of the easy and the hard problems of consciousness. Specifically, I conjecture that a consciousness GUT will incorporate the cognitive, behavioral, and cellular/molecular neuroscience evidence as well as incorporate an underlying quantum mechanical framework, a space-time theory, and/or a mathematical explanation of access consciousness. An ultimate understanding will bridge the divide of a computational explanation and a physical explanation. I argue that the "explanatory gap" is not of a dualistic notion but rather a dual-physical notion. Lastly, I give an idea of the direction necessary for current and future researchers and philosophers to building a GUT. **P4**

217 **What If This Universe Were The Only One!** Edward Ray <eray@stx.rr.com> (Kerrville, TX)

Scientific American (SA) (Dec 2007) reported the history of Hugh Everett's Multiverse interpretation of Quantum Mechanics (QM). Were he living now, William James (1842-1910) would apply the method of philosophical Pragmatism to compare Everett's interpretation to the Niels Bohr (Copenhagen) interpretation. I suspect that James would ask, "What pragmatic differences would choosing one or the other make?" One difference I imagine that James might suggest is the vast difference (i.e. ALL existence "something" being infinitely many REAL universes vs. just one real One) introduced in posing the fundamental metaphysical question (FMQ), "Why is there 'something' instead of nothing?". James would probably add that Everett's proposal, itself, adds meaning to the FMQ. James would also likely ask what difference belief in the QM Multiverse made in Everett's life and, sadly SA reported, he led a tragic solipsistic life ending in depression and alcoholism. Actually, William James, coined the term "Multiverse", but he used it to refer, one at a time, to "possible", not "real" multiple universes. In his 1907 book Pragmatism, James, gives many insightful hints as to how he might have Pragmatically analyzed 21st century multiverse theories. Using familiarity with recent science and mathematics, and Pragmatism, I sought to "resurrect" William James for a "look see" at the three multiverse theories sketched here.I summarized the listed three multiverse theories with pragmatism, optimism, humanism, and pluralism kept in mind. 1) Digital-Nick Bostrom,http://www.simulation-argument.com/simulation.html 2) Mathematical-Max Tegmark, Google keywords {[multiverse; wikipedia]}, {[tegmark;mathematical;perimeter]} 3) Ray's "Turing Universe" Theory, described in the paper. **P10**

218 **Quantum Theory, Reality, the Dream Metaphor and the Subjective Reduction of the Wave Function** Thomas Schumann <tschuman@calpoly.edu> (Physics, California Polytechnic State University , San Luis Obispo, California)

We begin by reviewing our previous discussions. We have argued that physical events produce mental effects and from quantum physics and from the evolution of emotions we have argued that mental events produce physical effects. From this we argued for the unification of the mental and physical worlds and hence for the dream metaphor and the fundamental nature of the stream of consciousness. As Siamese twins or multiplets joined at the brain may share many but not all aspects of their streams of consciousness so the many individual streams of consciousness share some aspects of the metabrain which produces them and thus all individuals may agree on the basic nature of an apparent external world while differing in their individual experiences. We have also derived some aspects of quantum physics (non-commutation of observables and disturbance of systems by observation, even without apparent physical disturbance) from this model. We also showed that, at least under some circumstances the wave function and its reduction (or "collapse") is subjective. In one region of space-time it has not been reduced according to one observer but it has been reduced according to another. This is consistent with the conventional interpretation of probability. If a deck of cards is shuffled you can only know the probability that the top card is, say, the ten of diamonds. But someone who has peeked at the card knows what it is. For that person the probability has "collapsed" or the wave function has "collapsed". For you it has not. The "collapse" has nothing to do with the size of the observed system and gravity plays no special role, in sharp contrast to the Penrose-Hameroff view. Each wave function is just related to the probability of a particular unfolding of the stream of each consciousness. There is no problem with Schroedinger's cat (the "dream" of the non-observing scientist does not include the cat and he can describe it as a superpo-

sition for purposes of prediction) and no problem with a Von Neumann cut. There is no separation between observer and observed; there is just a stream of consciousness which includes sensations of one's body and thoughts as well as sensations of other observed entities. We note that in this view there is no "wave function of the universe". A wave function can be used by each individual to predict with various probabilities dependent on his/her observable environment, how his/her stream of consciousness will unfold. As no individual can observe the entire universe, there is no wave function for the entire universe. In quantum physics the Hamiltonian depends on the observable environment; it is used in simple cases to calculate the wave function. The manner in which the wave function is reduced is not predictable because it depends on the non-observable metabrain. The unitary/reduction dichotomy in quantum physics parallels the conscious/unconscious dichotomy of the metabrain. (Probabilities change as one's knowledge or awareness changes/one is unaware of what makes the reduction to one value rather than another.) We use quantum statistics as further evidence for our model as well as the tunneling phenomenon and discuss briefly the quantized nature of fundamental particles.We also discuss the anthropic principle in connection with our model. We show a rather trivial circuit to show that a "circuit" in the (non-observable) metabrain could translate to an observable two slit quantum interference phenomenon in the "dream world". In the analogy, observation of a particle in the "dream world" at a point on the screen corresponds to the existence of an electric current in a part of the circuit. It is then reasonable to imagine that more complex "circuits" of the metabrain could translate to more realistic quantum phenomena in the various streams of consciousness, including interference and phase difference effects. **P4**

219 **A quantum theory of consciousness** Gao Shan <rg@mail.ie.ac.cn> (The Scientists Work Team of Electro-Magnetic Wave Velocity, Chinese Institute of Electronics, Beijing, China)

The relationship between quantum collapse and consciousness has been debated since the founding of quantum mechanics. There are two main viewpoints which assert that quantum collapse and consciousness are essentially connected. The first view holds that consciousness causes quantum collapse (von Neumann 1955; Wigner 1967; Stapp 1996). The second view holds that quantum collapse generates consciousness (Hameroff and Penrose 1996). It can be seen that these two contrary views are two extremes concerning the relationship between quantum collapse and consciousness. It seems more natural and reasonable that quantum collapse and consciousness are essentially independent with each other. In fact, this point of view is held by most physicists. But does this mean that quantum collapse and consciousness have no connection? The answer may be negative. We reconsider the relationship between quantum collapse and consciousness under the assumption that quantum collapse is an objective dynamical process. Although the origin of quantum collapse is irrelevant to consciousness, the conscious observer can have a distinct role from the physical measuring device during the quantum collapse owing to the intrinsic nature of consciousness (Gao 2004, 2006). A conscious observer is able to be conscious of his own state, while the state of a physical measuring device can only be measured by another measuring system. As a result, the conscious observer can know whether he is in a definite state or a quantum superposition of definite states, while the physical measuring device cannot "know". This then results in the existence of a definite nonlinear evolution element in the complete quantum evolution of matter state, which is introduced by consciousness and relates to the conscious content. The definite nonlinear evolution can generate some quantum effects of consciousness, for example, the distinguishability of nonorthogonal states, nonlocal communication, and consciousness influencing random process etc. The existence of the definite nonlinear evolution introduced by consciousness, if it is confirmed by experiment, will help to solve the hard problems of quantum collapse and consciousness, and have some profound implications for physics (including quantum theory and relativity), the science of consciousness and the research of the so-called psi phenomena. First, it implies the actual existence of objective quantum collapse, and will help to complete the existing quantum theory. Besides, its resulting nonlocal communication will reveal the limits of the principle of relativity. Next, it implies that consciousness has basic causal efficacies in the physical world. As thus, consciousness is not reducible or emergent, but a new fundamental property of matter. This will establish a quantum basis for panpsychism, and make it be a promising solution to the hard problem of consciousness. Lastly, it might provide a possible scientific explanation for the psi phenomena. This will help to mitigate the enmity between the scientists with different viewpoints, and further facilitate the study of the nature of consciousness. References Gao S. (2004), 'Quantum collapse, consciousness and superluminal communication', Found. Phys. Lett, 17(2), pp.167-182. Gao S. (2006) Quantum Motion: Unveiling the Mysterious Quantum World (UK: Arima Publishing). **P10**

220 **Quantum Brain or classic brain, a review** Ximena Velásquez, Edgar Emir Gonzalez Javeriana University Bogotá – Colombia and John Forero Distrital University, Bogotá Colombia <velasquez.ximena@gmail.com> (Physics, Distrital University, Bogotá, Colombia)

Physics approaches nature from two point of views, classic and quantic. Conversion from world's classic to a quantic conception has developed expectative and questions about world's reality. Science advancement has played an important role in brain's interpretation from classic and quantic side. This has enriched a growing debate over information science, computation and cognivite sciences consequences. This work reviews possible approaches from classic and quantic physics to description and modeling of the brain, especifically from Rodolfo Llinas, Roger Penrose, John Eccles, Henry Stapp, y Stuart Hameroff points views, allowing to establish enough criteria about how the world and classic and quantic physics are seen. **P10**

221 **Aspect-oriented quantum monism and the hard problem** Erick Von Schweber, Erick Von Schweber <erick@neological.com> (NeoLogical, Foster City, CA)

Reductive explanation traditionally begins by at best ignoring, and at worst discarding, the mental and phenomenal aspects of the world, subsequently proceeding to reduce what remains – complex high-level physical phenomena – to simpler lower-level physical phenomena. We revise reductive explanation, taking the world as it comes in all its aspects, and immediately proceed to reduce high-level multi-aspect phenomena to low-level multi-aspect phenomena. A reductive, quasi-functional (relational) theory of phenomenal consciousness becomes possible if we accept that the most fundamental element of the world, Plank's quantum of action (h bar), presents not only a physical aspect but also a phenomenal aspect, and is more precisely termed the *quantum of observed interaction*. We first review evidence from quantum physics, e.g., consideration of the measurement problem, that supports the position that quantum theory is *about* phenomenal experience and knowledge. We borrow concepts and terminology from aspect-orientation, the more dynamic and agile outgrowth of object-oriented software design. We also abstract and redeploy a relationship, proposed independently by Formal Concept Analysis and Objectivist epistemology, that holds between a concept and its units. Next we explore the scale or scales, from subatomic to human and beyond, at which the quantum of observed interaction applies. We then argue that advances in psycho-neurobiology, particularly quantum brain theories, e.g., Penrose-Hameroff Orch OR, provide means by which the quantum of observed interaction is modulated by a brain so as to form the rich and varied phenomenal manifold of our conscious experience, including all manner and variety of qualia, the impression of world and of self. Lastly we present the beginnings of a formal approach to framing the relationship between the physical and phenomenal aspects of the quantum of observed interaction, e.g., a Galois connection between these aspects, between quanta and qualia, and the lattice structure of "quacepts" so constituted. **P4**

222 **Quantum Interrogation, the McTaggart A Series, and the Many Bubble Interpretation** John Yates <uv@busi8.freeserve.co.uk> (London U.K., London, United Kingdom)

The 'Many Bubble Interpretatation" appears in a model of the McTaggart A series. Without being intiially sidetracked into the fascinating coherentist theories of epistemic justification, we simply loosely define A series bubbles for present purposes as being entities inside which a person, persons or whatever are for the moment severally confined, each at some personal present (which we know from as far back as the work of Kleinhuber, Libet, etc., is not readily defined as a single point in time, but more usually is taken by psychologists and others to have at least some ongoing 'duration'}, and with a past, a present and a future, in accord with the spirit of the McTaggart A series. The work of LePoidevin, Quentin Smith, Dean Zimmerman and many others is borne in mind. And as Dyke has said, we may not be forced to countenance plurality of further worlds in such circumstances -although we can. The A series is treated as a large category, intrinsically unmappable one to one onto the B series. There is also a B series and this can often be represented by a quantum mechanical description of the universe. I start with a brief explanation of the idea of quantum interrogation as clearly the relevance of quantum theory to the mind has great relevance. This fact was noted at a very early date in the so-called 'Schrodinger Cat Paradox'. I attempt to retain the 'Cat paradox' here, in my new Many Bubble Approach, but in a way that is helpful and warning in a kindly way, rather than minatory and implying the possibility of immediate muddle and paradox – a use for which the 'Cat paradox' seems to have been frequently historically put.. It transpires that when used with the MBI, that according to Kwiat's interpretation of his work on quantum optics, for the purposes of computing by a quantum computer, it should be possible to almost noninvasively study the human mind, probably in a way at least as nonivasive as fMRI scans. In explaining this, the illustration given by Dean Carroll about measuring the presence of a sleeping puppy without waking him up is considered, as well as other aspects of the quantum interrogation

matter. Further, there are other useful applications of the MBI, in particular for dream research and perhaps many varied psychological experiments such as near death experiences and synaesthesia. Work is proceeding at the Institute for Fundamental Studies, Vasai, near Mumbai, India. The dream research experiments are not construed as precognition but as an application of an advanced Stickgold effect. With this approach we can concentrate on obtaining new biophysics results as for example on http://ttjohn.blogspot.com/ entries on 4th July 2007, 22nd September and 4th October, 2007 , as well as pursuing the important philosophical discourses involved. **P10**

*See also:*

249 **Universe as Computation, Modern Aether Theory, and the Funda-Mentalistic Mind**
28 **A Postmodern Physicalism That Can Accommodate Experience**
268 **Toward a Gene-Expressed Basis of Consciousness**
225 **A Universal Approach to the Problems of Consciousness & Mind**
215 **The Interconnectedness of Consciousness and Activities Performed Explained by Quantum Physics**

## 4.2 Space and time

223 **Modeling Connectedness in Complex Spacetime using Minkowski Norm and Split-complex Numbers.** Anatoly Goldstein <anatoly.goldstein@mgh.harvard.edu> (Voice Center, Massachusetts General Hospital, Swampscott, MA )

It is suggested to use split-complex Minkowski space for modeling non-local consciousness effects such as extra-sensory perception. Considerable laboratory evidence has been accumulated in the field of experimental psychology confirming reality of non-local consciousness effects like remote viewing, telepathy, and precognition. The reality of these effects of extra-sensory perception or ESP is illustrated in great detail in the books by Dean Radin, "The Conscious Universe" (1997), and "Entangled Minds" (2006) based on meta-analysis of hundreds of published controlled lab experiments. The current work is an attempt to suggest an approach alternative to a known mathematical model of ESP developed by Rauscher & Targ (2001), which is based on complexified Minkowski spacetime. The current author considered 8D spacetime constructed by complexification of Minkowski space by means of split-complex numbers instead of ordinary complex numbers used by Rauscher & Targ. The resulting split-complex Minkowski spacetime is characterized by connections of zero distance between points, separated from each other in real coordinates. The suggested approach is based on calculation of Minkowski norm of a vector of separation between two points in split-complex Minkowski spacetime. A split-complex number is one of the form $z = x + jy$, where x and y are real numbers and the quantity j satisfies $j*j = +1$, however j is not equal $\pm 1$, so j is not a real number. The equation of zero separation between two points in split-complex Minkowski spacetime is expressed in terms of Minkowski norm based on split-complex numbers. The current model of zero separation seemingly explains availability of non-local information to every individual unconscious mind. Part of the mentioned non-local information may be represented by Jung's collective unconscious. However based on ideas of B. Josephson (2003) one can conclude that individual consciousness would be overwhelmed if the whole potentially unlimited amount of non-local information would become available to it in an instant, and this would likely distract the individual consciousness from its main goal, survival. The current author assumes that only selected fragments of non-local information scanned by unconscious mind are occasionally becoming available to consciousness that is more probable if this information is relevant to survival of the given individual or her loved ones. Low efficiency of ESP follows from difficulty of filtering out irrelevant "noise", however according to D. Radin (2006) meditation can help to focus attention on a topic of interest. **P4**

224 **Consciousness and the Physics of Time** Daniel Sheehan <dsheehan@sandiego.edu> (Physics, University of San Diego, San Diego, California)

The passage of time is inextricably linked to conscious experience, yet most physical laws are time symmetric in their formalism; that is, their physical equations admit both time-forward and time-reversed solutions. In principle, then, it is not only the past that 'causes' the present; the future should have an equal say. Why the past seems solely to determine the present remains a central question in physics. Over the last 35 years, theory and laboratory experiments have begun to explore the possibility that the future might have 'retrocausal' effects extending significantly backward in time. It is well known, for instance, that both time-forward and time-reversed Feynman diagrams must be considered to properly account for reality in the sub-atomic domain. Recent laboratory studies in the macroscopic regime involving entangled photons (Wheeler delayed choice ex-

periment) indicate that decisions in the present can 'revise' a system's past by tens of nanoseconds, in essence, 'rewrite history.' More sophisticated versions (e.g. by Cramer) are attempting similar feats into the microsecond realm. Experiments by Libet, Klintman/Stroop, Radin, Bierman, May, Schmidt, and others suggest that humans might have the capacity to interact subtly with systems from milliseconds to months into the future. This talk will explore the basic theory and experimental results of reversed-time processes, the state of current research, and prospects for future understanding. Particular emphasis will be given to Libet's celebrated 500 millisecond 'backward time referral' of subjective experience in the brain, whether it could be a true retrocausal effect, and what the consequences of this might be for volition and free will. **PL2**

225 **A Universal Approach to the Problems of Consciousness & Mind** Avtar Singh <avsingh@alum.mit.edu> (Cupertino, CA)

A multi-disciplinary and universal approach to consciousness is presented. Consciousness issues within the context of modern neuroscience and related problems in contemporary physics are addressed. Current theories of consciousness look towards information theory, information integration theory, complexity theory, neural Darwinism, reentrant neural networks, quantum holism etc. to provide some hints. These theories fall short of the rigors and quantitative measures that are normally required of a scientific theory. The most perplexing philosophical conundrums of the "hard problem" and "qualia" that afflict modern neuroscience can be resolved by a deeper understanding of the physics of the very small (below Planck scale) and very large (at the boundaries of the universe) scales. The modern philosophy of mind proposes that consciousness is a higher-order mental state that monitors the first or base state possibly generated by the brain. This paper builds upon the early approaches to consciousness wherein it was proposed that the state of self-consciousness is not a separate, higher-order consciousness of a conscious experience, but represents a continuum of the lower order states generated by the brain experience. In such a larger context, many of the mysteries of physics and neuroscience can be explained with an integrated model. This paper proposes such an integrated model that provides a direct relationship between the physics concepts of space, time, mass, and energy, and the consciousness concepts of spontaneity and awareness. The observed spontaneity in natural phenomena, which include human mind, is modeled as the higher order or universal consciousness. The integrated model explains the recent observations of the universe and demonstrates that the higher order consciousness is a universal rather than a biologically induced phenomenon. The neurobiological mind is shown to represent a subset of the complimentary states of the prevailing higher order universal consciousness in the form of the continuum of space-time-mass-energy. The proposed approach integrates spontaneity or consciousness into the existing and widely-accepted theories of science to provide a cohesive model of the universe as one wholesome continuum. The model represents the essential reality of different levels and dimensions of experience, both implicit and explicit, consciousness and matter, to be seen as equivalent and complimentary states of the same mass-energy known as the zero-point energy. The universal consciousness is shown to represent the spontaneous kinetic energy of the extreme kind, which is the ultimate complimentary state wherein everything in the universe is experienced as the zero-point energy field in a fully dilated space and time continuum. **P10**

226 **Consciousness in Engineering Units** Paul Storey <paulstorey@live.com> (DMEA, Citrus Heights, CA)

The purpose of this paper is to formulate a definition of consciousness based upon physical dimensions, in engineering units which can be quantized. Consciousness is primarily a phenomenon of energy. The units of energy are ergs. Consciousness is also a phenomenon of information. Shannon 1948 formulated a theorem that gave units to information, entropy and probabilities of correct transmission over noisy communication channels. The units of information are bits. The units of consciousness are now described within the dimensions of energy and information. A field of engineering and computer science deals with real time in which the right answer late is wrong. This is information with time constraints. The units of consciousness are now narrowed to energy information in real time. Additionally, consciousness is all about the self, with perspective transformations to a self-centered coordinate system. So the units of consciousness are further constrained within the dimensions of energy, information, real-time constraints and self-centeredness. Control theory, as in simple thermostat controlled furnaces, to early systems like a WWII radar based anti aircraft artillery, is now applied to the consciousness units. A hierarchical control system of a robot controlled factory was described in detail by James Albus 1980. Control loops of this nature are essential to allow an insect or a robot to walk. Principles of control theory are now applied to complex systems, allowing a further refinement of the units of consciousness to include self state variables, multi-dimensionality such as position, velocity, acceleration, trajectory, posture and levels of ab-

straction like fear, anger and goals, purpose and intent. Input processing loops can determine size, shape, danger, color, smell, taste, feeling, etc. Output processing loops generate actions with increasing spatial and temporal resolution toward the bottom of the hierarchy. World models act between the signal processors and behavior generators at each level of the hierarchy, allowing memory, goal selection, prediction, evaluation and learning. Baars 1998 suggested coherence forming a global workspace. Edelman and Tononi 2000 described metrics of integration, rapid reentrant neural interactions, and complexity. Artificial intelligence techniques including model based reasoning can be used to describe models of the inanimate world in simple animal brains, then to models of prey, predators, and potential mates, leading to potentials of awareness and self-awareness. Dimensions of control, coherence, differentiation, integration, complexity, intelligence would now be added to the units of consciousness. In summary, units of consciousness derived from the fields of physics, statistical information theory, control theory, artificial intelligence and neuroscience are described, which can highly characterize the phenomenon of consciousness. These are derived from well known and understood scientific disciplines, are measurable, perhaps some measurements are derived via simulation today, but more accurate measurements are foreseeable in the future, quantifiable, repeatable and independently verifiable. Rather than the oft repeated, subjective term “Qualia”, addressing the units of consciousness with dimensions described herein, specifically “self-centered pixels of abstract kontrol loop energy”, (with the terms coherent, complexity, information, integration and intelligence omitted), otherwise abbreviated as ”SPARKLE" units, would be much more appropriate for any scientific discussion. **P10**

*See also:*

292 **Vortex based mathematics as a clue to understanding the zero point field?**

## 4.3 Integrative models

227 **Consciousness: New Definition** Amna Alfaki <amna1952@hotmail.com> (Paediartic, University of Khartoum-Umdorman Islamic University, Khartoum, Sudan)

Introduction and Hypothesis: Up-to-date, no accepted scientific definition is provided for consciousness. The conventional definition of the central nervous system as composed of brain and spinal cord is not sufficient enough to explain the phenomenon of consciousness. The hypothesis: A new hypothesis (my hypothesis). Postulates: a)The heart is a sense organ that percepts like the cerebral cortex. The neural heart, the conductive system, the sinoatrial node (S.A.N.). the atrio-ventricule node (A. V. N), the bundle branch, and Purkenje fibres are all arise from the neural crest at embryonic live, this is derived from the ectoderm from which the brain is developed. (Grays anatomy) So the neural heart and the brain developed from the same origin, and possibly could share the same function as perception. To me the heart acts as a substrate for the emergence of a conscious state. In my hypothesis the brain and heart constitute the mind. So in this paper the mind refer to the brain and the heart together. b)All the neurocenters in the mind together with the complex neuronal inter connection between them are modulated and mediated by neurotransmission. The neural heart contain, neurotransmitter which are cholinergic, adrenlig and peptidenergic. (Grays anatomy). • The neurotransmitter in the brain could be global or selective: ?Chemical ?Neurchemical ?Dopamenergic ?Cholinergic ?Ionic The neurotransmitter could be global to all neurocentre in the mind or selective to certain neurocentres. Definition: Higher consciousness in human and primary consciousness in animal exists in two states: 1 ) Conscious state 2) An analogue reciprocal altered conscious state. Conscious state is the state of mind where all neuronal centres in the brain and heart are well co-ordinated and integrated to carry simultaneously and synergistically best of their function if stimulated. The resultant product _ of neuronal stimulations activities and consequently the cortical interpretati0I:ls and perceptions, belongs strictly to specific unit of time, of that conscious state. For every conscious state there is an analogue reciprocal altered conscious state. Both states are mediated and modulated by neurotransmission process, which is endogenous to brain and heart. Consciousness is a universal* phenomenon found in primate (man and animal) who have higher and primary level of consciousness. The universe is conscious but differ qualitatively and quantitatively from human consciousness. Foot note: • Universe: The living and non-living inanimate. **P4**

228 **The Comalogical Theory: The Philosophy of The New Relativity Theory Theory** Azzam AlMosallami <almosallami@scsrs.org> (Physics and Philosophy, The Science Center for Studies and Research, Gaza, P.A.)

The name, comalogy is derived from ‘co’ which means consciousness and ‘ma’, which means matter. Therefore, comalogy is a theory that studies the relationship between consciousness and

matter as a result of the unification between Quantum theory (Copenhagen school) and Einstein's relativity theory (General and Special) in concepts, principles, and laws. The Comalogical theory considers consciousness as primary and matter as secondary and that consciousness creates matter, not vice versa. Comalogy agrees with the concepts, principles and laws of Quantum theory (Copenhagen school), and changes its abstractions, to be descriptive, imaginative, and cognizable data. Also, Comalogy refuses the concepts of determinism, causality, and continuity in the laws of nature, and affirms that the material world is controlled by the concepts of non-determinism, non-causality, and discontinuity. Also, our theory refuses the objective existence of phenomena, in that, it considers the observer is directly involved in the formation of phenomena as in the Copenhagen school. The concepts, principles, and laws of Quantum theory is applied to the micro world of the atom, whereas the macro is controlled by the laws of classical physics. This creates a contradiction in nature. In our theory (Comalogy) we unify the concepts, principles and laws which control the macro world with those of the micro world. **P10**

229 **U N I C E** Michael E. Arth <michaelearth@earthlink.net> (Golden Apples Media Inc. , DeLand, FL)

UNICE is an acronym for Universal Network of Intelligent Conscious Entities. I coined the term in the 1990s to describe the transformation of our species that might be the result of a new form of intelligent life developed from a hive-like interaction of computers, humans, and future forms of the Internet. A local form of UNICE (Earth + UNICE = EUNICE) could envelope Earth and then, unbounded by biological limitations, spread out from the planet. UNICE also refers to a cosmic Internet, or cosmic consciousness, that might already exist. If this turns out to be the case, then EUNICE, with the help of emerging technologies, could eventually join up with a galactic, or even universal UNICE. The likelihood of this being universal vastly increases if faster-than-light communication is found to be possible. If UNICE already exists, and quantum entanglement, quantum teleportation, transportable wormholes, or some other physical process allows instantaneous communication, then certain mystical states or spiritual practices (such as meditation or the use of psychedelics) might currently allow for fleeting glimpses of UNICE. The apprehension of UNICE, from non-ordinary states of consciousness by different people, might be compared to the story of blind men who differently describe an elephant from touch. Applied science has demonstrated that we are able to observe and amplify extremely subtle effects for various purposes. The use of telescopes, combined with specialized computers, for example, allows us to observe celestial events that happened billions of years ago. Assuming the continued evolution of technology, it may be possible to elucidate the subtleties of human consciousness in order to enhance and evolve more advanced states of consciousness, as well as create new forms of intelligent life. The existing Internet, in combination with humans and their computers, could already be seen as UNICE (or EUNICE) in its nascent form. UNICE might develop first in a single supercomputer, or in virtual reality through distributed computing. Eventually it could propagate through cyberspace, as a kind of self-aware Internet, with growing numbers of conscious nodes that may include enhanced humans, their avatars, and intelligent entities that can exist in both cyberspace, and as protean forms in physical space. There could also evolve hierarchies of consciousness – individual, group, planetary, and universal – each one nested within the other like a cosmic Matryoshka doll. These levels could be experienced by all at various times or even simultaneously. Important decisions that govern all aspects of life could eventually be made almost automatically, without the involvement of physical bodies. The potential changes to all human enterprises are incalculable, whether we think of UNICE as something already existing that we will connect to, or as something that we will develop. I think of the transformation of our species as being like that of a caterpillar transforming into a butterfly. What will emerge from the chrysalis of our technology may be as radically different from our present form as a butterfly is from a caterpillar. **P4**

230 **On Conscious Development of Mind** Adam Atkin <adam.atkin@yahoo.com> (Ophthalmology , The Mount Sinai School of Medicine , New York , NY )

Though both unconscious and conscious actions are the play of mechanisms, the "continual creation" metatheory ("CC metatheory," Atkin 2007) says consciousness is self-organizing transformation, therefore identical to development. In this non-mechanical theory, consciousness enters when activated mechanisms are at that moment undergoing essential structural modifications that alter their laws of operation. It further proposes that (at least in humans and other vertebrates) the main inner structure that is undergoing self-organizing transformation is the organism's dynamic (predictive) internal model of itself-in-its-world: an evolving virtual machine that is ongoing product of brain's neural networks. This dynamic map (called the organism's "Anticipating self-world model" or A[sw]) anticipates the organism's actions and predictively generates control-

ling feedback ("virtual feedback") derived from simulation of the activity and effects of the organism's own action systems. This A[sw] (which alternatively may be labeled "mind") remains mostly beneath our awareness since at any moment only very little of it is undergoing self-organizing transformation. And since CC metatheory implies that our concrete experiencing is the necessary source of nearly all our mental structure – including our capacities for abstraction and other secondary cognitive techniques (e.g. see Piaget) – 'hard' problem vanishes. It's through our awareness that we bring fundamental changes to ourselves, our lives, our world. Now to see more specifically how consciousness can develop progressively, consider David Bohm's contrast between literal and participatory thought-modes. Literal thought treats "everything as a separate object, including other people" – so people are "used … as means to an end." But "Participatory thought sees that everything partakes of everything" (Bohm 1996, p. 87). If I'm functioning in the literal mode, then I and the other are separate entities, so either I act upon you or you act upon me; however if alternatively I'm functioning in the participatory mode then all is flowing together – a happy unity (with practical accomplishments not a main aim). So finally here (in brief) is my understanding of how consciousness commonly develops: (1) In the beginning (babyhood), my world-experiencing and my ways of thought are entirely participatory ('by default'). (2) Then (moving through childhood into adulthood) my predominant thought-processes become more and more literal, so that self and other are two separate objects. Sometimes I may slip into a more participatory mode (e.g., during intoxication!), but am then losing touch with literal thought. Thus it's either or: Either literal or participatory. However, (3) ultimately I may transcend both of these dualities, so that I can experience the separate and the fused (the discontinuous and the continuous) together. Then all these people – I and those around me – are separate objects and also at the same time totally interconnected, embedded beings: Two simplified ways of knowing that now can be appreciated together as parts of a larger knowing. Thus consciousness does develop! It is always changing mind, so that mind as substrate and delimiter and director of consciousness is always new. As mind develops (through consciousness) it brings conscious experiences that are unprecedented. **P4**

231 **Naturolism: Seeing organizing principles of life and consciousness at the depth core of nature – rather than what's robotic/mechanical/mathematical.** Nathan Batalion <batalionn@earthlink.net> (Philosophy Interpretation and Culture, Binghamton University, Oneonta , NY)

In "God created Adam," Michelangelo paints two universes touching each other – the human/divine. We similarly can imagine a human/robotic handshake. Could it be wrong to reduce all of nature to one side of that handshake, the mechanical. Mechanical Vision: Imagine that a careful analysis of math symbols indicates that the primary ones are universal symbols for how to s-e-p-a-r-a-t-e all elements of consciousness. This creates a deep bias in the navigation of consciousness. And our modern culture has thus favored an understanding of nature captured by the image of a grand clock, or what moves tick-tock, representing s-e-p-a-r-a-t-e time steps. Also s-e-p-a-r-a-t-e billiard balls moving mechanically relates to Galileo's movement mechanics. Four hundred years ago, Descartes further depicted space as comprised of numbered "point" coordinates. A "point" is the universal abstraction for a s-e-p-a-r-a-t-e distinction of all spatial consciousness. Descartes' schemata vitally underlies the formulas for the atomic bomb – super-powerful means to pull apart space physically. Dramatic explosions involve the most consciousness-separative patterns in nature. While we can intuit dangerous potentials in applying such things too far, it is more challenging to outline an oppositely connective vision. Non-Mechanical Vision Where do life and consciousness fit into our vision of nature? Naturolism sees consciousness panpsychically as "nature's universal experience and source of connection." This begins a very different understanding of nature almost opposite to the whole mechanical, robotic or mathematical view. **P4**

232 **Tunneling – a Phenomenon in the Brain of an Observer of Physical Objects** Matti Bergstrom, Pia Ikonen <juliasbrain@kolumbus.fi> (Helsinki University, Helsinki, Finland)

In a series of publications in special Conference issues of Journal of Consciousness Studies (2001 – 2006) we have presented an empirically founded model of the limbic Self in the human brain:Our model of brain´s Neuro-mental Self being a complex number space is based on the finding that whereas suprathreshold experiences corresponded to real number quantities of physical stimuli, sub-threshold experiences had to be described with imaginary number quantities (Bergström 1964).The Neuromental space consequently is a complex number space with a real number dimension (r) describing the physical environment, and an imaginary number dimension (i) describing the mental content of an observer.Applying to this Mandelbrot type complex space (i,r) of the Self the Julia equation, the iteration of the space vector can be considered as describing the thinking of the observer in an observation situation. Hereby the non-local effect of the imagi-

nary, subconscious mental content of the observer affects the local behaviour of the physical object. In the vector mind and matter are same ! This can be considered as being conform with Bohm´s theory of mind and matter, where the mind, Schrödinger´s wave function (our i-effect) acts on matter, the particles (our r-objects), the effect being "non-local". This explaines the "dance" of the observed particles being caused by the thinking (Heisenberg´s "Questioning" causing time reversal) in the act of a physical observation (see Bergström 2007).In this kind of a brain system conscious contents of cortical origin, that are of real number type, may disappear in that they are transfered to subconscious contents of brain stem, that are of imaginary number type. This may happen in situations when difficult real number problems can not be solved with the usual real number logics (mathematics). In such cases, it is known, that falling asleep might help in solving the process in question. Sleep is a subconscious state where an imaginary number thinking prevails. It is apparent that this correspoinds to what in physics (and engineering!) is called TUNNELING (see ms Pia Ikonen at this Conference).. Tunneling is as we know the quantum mechanical process by which a particle can penetrate a classically forbidden region of space, like thinking of two separate points without passing through intermediate points Bypassing the unusual route the particle in travelling between points creates a short "tunnel" for itself. Tunneling time through a barrier uses the "Tempus Operator", that the imaginary part of the complex tunneling time is nonnegative, and it is thus interpreted as the physical tunneling time. The real part of the tunneling time then gives a negative value which remains a llittle bit unclear. It is thought that tunneling is somewhat abstrct and far removed from reality, but tunneling is actually a basic and important process of nature as we can explain from the view of human brain. It is obvious that the origin of the tunneling phenomenon is in the human brain. It is used in difficult situations of a "forbidden zone" in the environment. **P4**

233 **The Top Down Consciousness-Mind-Matter Ontology** R. W. Boyer <boyer@lisco.com> (Institute for Advanced Research, Fairfield, IA)

The consensus cosmological theory of the origin of the universe holds that it emerged in a big bang 13.7 billion years ago, apparently from literally nothing. There were no initial conditions, inherent nature, order, purpose, design, or underlying non-physical existence from which the big bang emerged. In pre-inflationary theory, nothing instantaneously became fundamentally random, inherently dynamic quantized gravity and Higgs fields subject to invariant laws of nature. As the story continues, four fundamental particle-force fields emerged through spontaneous symmetry breaking and congealed into stars, planets, organic molecules, living cellular organisms possibly with proto-conscious mentality, and later into humans with complex enough nervous systems to generate higher-order conscious behavior. This fragmented, reductive view is associated with a bottom up matter-mind-consciousness ontology. In this view, consciousness is an emergent property of random bits of matter/energy that bind together from lower-order physical processes into higher-order, unitary biological organisms which then develop apparent causal influence on their parts. How the closed chain of cause and effect could unlink itself and insert a conscious observer with causal efficacy in the physical is utterly mysterious. In this view, consciousness must be a powerless epiphenomenon, or be non-existent, and thus a fundamental misperception in humans that begs explanation. This view is characteristic of reasoning and sensory experience in the ordinary waking state of consciousness, in which there is a fundamental fragmentation of experience into the outer objective world and inner subjectivity that the reductive physicalist paradigm cannot reconcile. In contrast, the holistic view in Vedic science is a top down consciousness-mind-matter ontology, in which everything in nature progressively emerges within the perfectly orderly unified field, Atma or pure Being. All phenomenal existence remains within the unified field and condenses through sequential symmetry breaking into manifest creation, from higher-order holistic processes to lower-order inert parts. That view is systematically unfolded in Rik Veda, and extensively described in Vedic literature such as Vedanta, Sankhya, and Ayurveda. It is consistent with developing unified field theories, spontaneous sequential symmetry breaking, quantum decoherence, the 'arrow of time,' and the 2nd law of thermodynamics that imply the universe emerged from the lowest entropy, super-symmetric unified state. From that view, the origin of the universe can be characterized as a 'Big Condensation' rather than 'Big Bang,' because all phenomenal existence remains within the unified field, rather than blasting out from nothing to create everything including space-time. These contrasting reductive and holistic views are reconciled in the natural development of higher states of consciousness beyond the ordinary waking state. The Vedic science of Yoga provides systematic means to validate the consciousness-mind-matter ontology through direct empirical experience of gross and subtle diversified fields of nature and the transcendent unified field that underlies and permeates them. **P4**

234 **Mind Particles: See it by Physical Instruments.** Sanjay Ghosh, Papia Ghosh <yogainstruments@yahoo.co.in> (NA, Spectrum Consultants, Howrah, West Bengal, India)

MIND PARTICLES: SEE IT BY PHYSICAL INSTRUMENTS Sanjay Ghosh and Papia Ghosh Spectrum Consultants,India E-mail: yogainstruments@yahoo.co.in Welcome learned audience – – – -here we will show you how the "Mind Particles" look like.These particles act as the joining link in between our Mental and Physical plane.According to Indian Philosophy,particles have been divided into two major Categories,so far its grossness and fineness are concerned.It is claimed that our Bio-physiological gross systems are made with Non-purified particles and the particles by which our Mind is composed those are Purified particles(Tanmatra). Further in terms of shape and exact nature of such particles,those have been classified by three types – -anu ,danu and trasharenu.These said three divisions represent as one ,two and three dimentional fuctionality. Upon joining together in juxtaposition,these particles form various Finer and Causal Nerves,the which are responsible to sense(transduce)our all major sensation including the sensations ,like,pain and pleasure,birth and death,hot and cold etc.The ultimate sensation(realization)of Trance or Superconsciousness is not excluded from the methodology of workings of Causal Nerves.Since complete enlightenment or samadhi is nothing but a state of conditional mind. The more we do uplift towards higher sphere of Consciousness,the more in number the finer set of nerves to be seen are getting reduced.Upon dissection of our physical body,the Finer nerves will not at all be visible,because,those are mostly of Transparent and Effulgent in nature.The out-of-body experience has got a great relation with this sort of nerves since these are spreaded all over the Universe in the form of a supercomplex net.We will show you Finer Nerves by our Instrument. We propose to demonostrate in the Conference,a set of Three Major Instruments out of a Complete Package of 237 Instruments. The Instruments are: 1. Visualization of Atoms and Finer Nerves Instrument – – The exact shape of Mind Particles and the the Composition of Finer Nerves to be seen by this Instrument. 2. Formation takes place by Power of Inter-Attraction of Atoms shows Instrument – -The joining of Mind Particles (juxtaposition)to be visible by this Instrument. 3. Single and Two Dimentional Instrument – This Instrument will show you the nature of Construction of Single and Two Dimentional Particles. We strongly believe that in Study and Research on Consciousness with Special emphasis to Mind,our Instruments will show a New Direction to all concerned. **P4**

235 **Eccles's Psychons Can Be Zero-Energy Tachyons** Syamala Hari <murty_hari@yahoo.com> (Lucent Technologies, South Plainfield, New Jersey)

It is suggested here that mental units called psychons by Eccles could be tachyons defined theoretically by physicists sometime ago. Although experiments to detect faster-than-light particles have not been successful so far, recently, there has been renewed interest in tachyon theories in various branches of physics. In this paper, we suggest that tachyon theories may be applicable to brain physics. Eccles proposed an association between psychons and what he called dendrons which are dendrite trees and basic anatomical units of the neocortex for reception. We show that a zero-energy tachyon could act as a trigger for exocytosis (modeled by Beck and Eccles as a quantum tunneling process), not merely at a single presynaptic terminal but at all selected terminals in the interacting dendron, by momentarily transferring momentum to vesicles, thereby decreasing the effective barrier potential and increasing the probability of exocytosis at all the selected terminals at the same time. This is consistent with the tachyon characteristic that it is a nonlocal phenomenon produced and absorbed instantaneously and nonlocally by detectors acting in a coherent and cooperative way. **P4**

236 **Does the Brain Produce Conscious Experience or Merely Enhance and/or Articulate It?** Christopher Holvenstot <cholvenstot@yahoo.com> (NYC, NY)

The assumption that only brained creatures experience their environment predetermines a definition of consciousness that excludes lower grades of awareness displayed by all living organisms. The development of a science of consciousness is hampered by this assumption as it disallows an evolutionary narrative of consciousness from these lower forms of environmental awareness to the complexities of human experience. The quest to determine the neural correlates of consciousness becomes a fool's errand once one admits that even the simplest unbrained life-forms display fundamental features of consciousness such as: awareness of self-boundary; volitional capabilities; mastery of environmental parameters; participation in causal formats; and a willfulness that is the hallmark and foundation of organic success. **P4**

237 **Resonant Emergent Identity: Choreography of the Cosmic Human** Kala Perkins, D. Kala Perkins <quasar9@mac.com> (Metanexus , Los Altos, California)

The entire scope of reality is generated as infinite infinities of interactive fields, iterated and reiterated over cosmic and global histories, continuously convergence and interact. At the meeting of each converging set of arcs of infinity, points are generated. Complex convergences become causally significant, acting as foci, or tension vortices, for the emergence of subtler or more complex dimensions of consciousness, identity and awareness. The individual consciousness interacting holographically with the structure and inherent nature of cosmos generates its emergent forms and characteristics through harmonic resonance. Observing the acoustic vibrations from the early universe, out of which all subsequent cosmic structure have emerged, we become aware of cosmos as a wave form propagating as, generating, what we call space-time. In cosmology we are discerning suffusive magnetic fields being generated throughout space. It is these, interacting with the multitude of diverse spatial phenomenology, dark matter and dark energy, in both random and deterministic ways that literally utter the unfoldment of space-time, worlds and all living organisms. The Chinese medical system has evolved out of and in conjunction with ages of profound wisdom and insight from its philosophical foundations. Its basis integrates knowledge only now emerging on the forefront of the quantum and life sciences. Our most ancient philosophies and sciences discourse upon the profound interrelationship between the cosmos and the complex human organism. Our new sciences are demonstrating these realities in remarkable clarity. This paper explores these correlations such as the nature of the heart, and surging rhythms of polarized plasma in the orb of our sun and other stars. The entire history of the universe may be traced through each and every particle. Rays of light and energy from the first instants of cosmogenesis surge through our bodies incessantly, along with that from countless stars and galaxies in a multitude of frequencies. The gravitational direction of the local galaxy clusters move our moments. Cosmos, it is now being proposed at the edge of modern astronomy, may in fact be a self-aware, incessantly emerging fractal; perhaps there are countless cosmoi. In harmony with these insights from modern science we may begin to understand the profound integrity of the human life system, its biorhythms, the correlations between organs, senses and environment, and the integral nexus of meridians, points and interactive quantum field dynamics. In Hwa Yen Buddhism the human is actually said to be transposed through the process and stages of evolution, into a foundational support for the entire cosmic life expressions in all their dimensionality, all diversification from non-differentiation essentially consciousness itself. The entire universe, incalculable infinite infinities of universes, are literally the fabric of our emergent cosmic identity. On the human stage the seeds of all these unfolding worlds are said to be the centers, organs, glands, systems and charkas of the human being. **P4**

238 **Embryology and Vascular Correlates of Consciousness. From Quanta to Qualia, From Semiotics to Semantics.** Jean Ratte <jean.ratte@holoener.com> (Montreal, Quebec, Canada)

Neuroimaging gives vascular as well as neural correlates of Cs. But the measuring device selects only a small part of the whole process. A complex process such as Cs can be measured only by a more complex and subtle filter. Our claim is that the cardiovascular network Manifold is such a filter with a Riemann Complex Hypergeometry (1) allowing Harmonic Resonance between all levels of complexity from the most basic physical principles to the most subtle aspects of the human body, from quanta to qualia, from semiotics to semantics or Consciousness.. . These research programs stem out of the clinical use of Vascular Semantic Resonance, an in vivo real time biochemical bioassay based on the vascular resonance of pigments filters with intracellular pigments, catalysts of life process. Without pigments, there is no life, no memory and no Cs.(www.holoener.com) The vascular system is a Multiplexing wave guide carrying not only epicritic transversal blood pulse sine waves but also protopathic longitudinal parietal cosine waves. Epicritic transversal or superficial sine waves are ectodermic nervous system waves. Protopathic or deep longitudinal cosine waves are mediated by the mesodermic vascular system, motor and connector Manifold . These longitudinal mesodermic parietal waves act as amplifier of longitudinal waves of the microtubular network manifold that is sensible to 4 fundamental interactions and their harmonics from the atomic level to the Consciousness level, from the semiotic to the semantic level. The vibratory equivalence between pigments and geometric operators, between pigments and hieroglyphics or written Hebraic and Sanskrit ideograms shows a biological embodiment of Eidetic Resonance, bypassing ectodermic sensory visual and auditory perception, giving some clues to Semiotics, based on the Body Schema. The mesodermic perception of written language allows a direct perception of the Meaning. Pigments are the first form of memory (3). They are micro-oscillators dynamic systems. Ideograms are also dynamic systems, memory of the action. Meaning is resonance between map and territory. The mesodermic manifolds, microtubular or cardiovascular, show the entanglement between map and territory, between function and graphic curve. The mesoderm resonates to

the approach of the graph, memory of the function. Semiotics or Syntax is unconscious process like breaking of symmetry in vector particles. Semantic is like gauge symmetry before it is broken and is the vibratory equivalent of the Conscious Process. Semiotics is of the order of vectors and tensors. Semantic is of the order of spinors and twistors. (1) The more complex level allows the understanding of the less complex. Semiotics is constituted by the equatorial plane of the spherical ontological dynamic structure of Abéllio that has an important heuristic value (2). Semantics is constituted by the orthogonal vertical axis of this ontological Riemann Sphere at all levels of complexity. This rapid overview suggests that vascular semantic resonance is a solution to the"hard problem "in Cs studies, that quanta and qualia are 2 orthogonal aspects of the same biological phenomenon. It is the ectodermic Euclidian logic of non contradiction that creates this so called "hard problem" which disappears with the mesodermic logic of crossed double contradiction (2). 1 Roger Penrose; Road to Reality, chapter 8. Vintage Books, 2004. 2 Raymond Abéllio ; La Structure Absolue. Gallimard. 1964. 3 Harold J Morowitz; Beginnings of cellular life; Metabolism recapitulates Biogenesis. Yale University Press.1992 **P10**

239 **A Theory of Consciousness Based on the Concepts of Force Carrier Particles and Superposition, and Electromagnetic Fields Generated by Neural Networks** Richard Shank <richardshank@comcast.net> (Blue Bell, PA)

This theory draws upon concepts from the Standard Model of particle physics, neuroscience, and Emanuel Swedenborg. A key hypothesis is the existence of a class of particles, termed mentons, which are postulated mediate energy transfer interactions in a manner analogous to photons and other force carrier particles (see http://CPEPweb.org). However, rather than merging with fundamental matter particles, mentons are postulated to merge with recipient (matched) electromagnetic fields generated by specific types of neural networks within the brain, and thereby form transient 'superposition' states that confer consciousness, emotional experience, or mental content (e.g., meaning and value). Mentons are postulated to interact only with electromagnetic fields generated by certain types of neural networks. According to this theory, conscious experiences, perceptions and cognition impact the brain in a manner somewhat like that of the sense organs, whereas the brain functions as an information processing (e.g., receiving, organizing, storing) and distributing (e.g., motor, and endocrine control) organ. The theory implies that the brain and mind are bi-directionally interactive. Also, according to this theory, creative thinking such as planning and theorizing take place during a sequential series of superposition states that alter a neural network or establish new ones. This theory fits into the realm of dualism, but is materialistic, as mentons are postulated to be particles. A hypothetical source of mentons is an 'invisible' celestial body referred to as the "spiritual sun" by Swedenborg. **P4**

240 **Primitive element transformed and reflected method in consciousness** Sugiyama Shigeki <sugiyama@softopia.or.jp> (IT Research Center, Softopia Japan, Ogaki City, Gifu Prefecture, Japan)

It is said that we are facing "Century of Brain". Knowledge of brain mechanism definitely will give us much progress in technology and science fields with a mega class of advancement. This knowledge of use will be related with Artificial Intelligence, knowledge base, control, semantic process, system integration, and many others' fields that will be able to be closely linked with today's core technologies. However, the knowledge of brain mechanism today is not ready enough to enhance itself into today's technologies, because of its poor maturity. In order to make the knowledge mechanism richly matured, it needs to have a dynamic knowledge behaviour that can understand "what a system of the knowledge itself is doing", which is much concerned with how human understands and recognizes a thing. So a core issue for this matter is strongly related with understanding and recognition by Consciousness. We are now beginning to recognize that a human consciousness phenomenon is something related with brain activities, that is to say, the brain activities are fundamentally neurons' activities and neurons are fundamental elements for brain activities. There is not any magic about the brain activities. And through these activities, a consciousness will come up to as an existence of its entity. But, at present, nobody knows of its mechanism, its system structure, its inside behaviour, and even the definition, in detail exactly and clearly. However, as a fact that we know, it is true to say that human consciousness grows in a baby age towards an adult age. And this happens inside the brain and a capacity of consciousness expands according to the quantity of knowledge that the brain has taken from the outer world, which means that the consciousness is raised and grows inside the brain by the brain activities of neurons. This is very rough and crucial analysis but these are the facts what we are able to see on this matter. And we now know that things that we see are different from things that brain sees. Inside brain, an information is deformed into primitive stage of neuron data hierarchically from one tire to another that consists of

multiple tiers, that is to say, a brain consists of the primitive element of tiers as a whole knowledge. From these facts, here introduces two basic conjectures (Primitive Element Transformed Method and Reflection Method), which will lead to a simple model of Consciousness. KEYWORDS consciousness, neural network, reflection, primitive element, attention, AI, knowledge base, dynamic behaviour. **P10**

*See also:*

275 **Image-based Information About Consciousness: Choosing Models for Effective Diagnosis and Therapy**
214 **The SubQuantum Foundations for the Informational Essence of all Consciousness-Related Phenomena.**
209 **The SubQuantum Foundations for the Informational Essence of all Consciousness-Related Phenomena.**
235 **Eccles's Psychons Can Be Zero-Energy Tachyons**
294 **Minds form a Discrete Degree, in the Same Way that the Physical has Discrete Degrees**

## 4.4 Emergent and hierarchical systems

241 **Organic Reasoning Systems** Carlos Acosta <cacosta@jobhunt.org> (Nipomo, California)

This paper proposes that a single framework is utilized by organic reasoning systems to order, arrange, and process basic information into more complex thought and knowledge. It is argued that multiple incremental permutations of this single format eventually give rise to all abstract thought. Specifically, consciousness may be generated within a chaotic system, i.e., within a hierarchical series of iterated and interlocking frames of reference and their accompanying schematic systems of knowledge. Relying on the detailed research of Jean Piaget (Piaget: The Origins of Intelligence in Children, 1963), it further proposes that the schematic reasoning systems – the systems within which abstract meaning, language, and mathematics ultimately develop – emerge via a higher order isomorphic process. The paper more closely examines the formal operational stage of mental development and the sensorimotor interactions that take place between the fundamental properties of existence and the genetically-derived physical and emotional behaviours that even the lowliest cognitive organisms are born with, and which they automatically express as they struggle to exist within an ever-changing and often hostile environment. The main argument is supported by a three-part investigation into the remarkable relationship between abstract mathematics and language in relation to physical phenomena. First, an analogous examination of the foundations of mathematics in relation to the underlying core structure of all games – and by extension to all physical reality – is put forward (http://eprints.assc.caltech.edu/383/). The initial treatise is followed by an analysis of the meta-mathematical reasons why the brain misconstrues elemental mathematical information. The latter inquiry specifically puts forth an alternative physiological explanation for the generation of Russell's paradox and the Barber paradox, and concludes that antinomies are abstract versions of bistable perceptual phenomena. The third study examines the analogous subconscious structure presumed to underlie language and the emergence of meaning. Cumulatively, the three studies establish that the brain processes abstract information in much the same manner that it manipulates all other data. Moreover, this conclusion inductively supports the hard physiological research of the German neuroscientist Otto Creutzfeldt, (Creutzfeldt, 1977, pp. 507-517) and the American neurophysiologist Vernon Mountcastle, (Mountcastle, MIT Press, 1978) that a common cortical algorithm seems to be functioning everywhere throughout both hemispheres of the neocortex. **P4**

242 **Reentrant Emergence** Steven Brown <ravettb@mac.com> (Neurology, University of Rochester, Rochester, NY)

As long as a system (i.e., a dynamic ensemble of interacting components) interacts as a singular, unitary entity, its properties cannot be ascribed to, nor reduced to, those of any putative components. If emergent systems interact with other systems such that their properties are not reducible to the properties of more fundamental systems or entities, they are the equivalents of single entities in those interactions. A precise, yet general, description of the structural parameters necessary to unify a physical system into a singular entity is thus necessary in order to establish the basis for considering that system emergent. I provide that description, in terms of the temporal structure of systems and their external interactions. Given the conception of an emergent structure which I will present, I will show that the emphasis in discovering such systems should shift from identifying

new or unpredictable properties or causal powers to searching for systems with generally similar structures. **P4**

243 **The Nested Hierarchy Theory of Consciousness (NHTC)** Todd E. Feinberg <tfeinberg@bethisraelny.org> (Psychiatry and Neurology, New York, N. Y.)

There are at least four reasons why the scientific reduction of mind to brain and the solution to the "hard problem" remain so elusive. First, while we experience a unified consciousness, there appears to be an ontological difference between the unified mind/self and the divisible brain. This is known as the grain problem, or the problem of the mental unity. Second, if we accept there is a unified mind, we do not know which structures are necessary for its creation, the problem of the localization of consciousness. Third, it appears that any explanation of the working of the brain "leaves something out," namely how something feels. This is the explanatory gap, the problem of ontological subjectivity, or the qualia problem. Fourth, there is the projection of neural states, why one's own brain is not normally objectively observed but rather subjectively experiences the objects of consciousness. I propose that the Nested Hierarchy Theory of Consciousness(NHTC)helps explain these enigmas. In a non-nested hierarchy, lower and higher levels are independent entities in which the top of the hierarchy is not physically composed of the bottom. In an organic nested hierarchy, lower levels of the hierarchy are nested within higher levels to create increasingly complex wholes. Traditional accounts of the neural hierarchy view the mind as a non-nested hierarchy, a pyramidal model in which sensory consciousness and intentional action "emerge" at the summit. The NHTC proposes that the brain is subjectively experienced as a global nested hierarchy in which lower order features combine in consciousness as "part of" – or nested within – higher order features. Elements that are bound to other elements in awareness are represented dependently and nested together permitting neurons at both lower and higher hierarchical levels contribute to sensory consciousness and intentional action. Mental unification of sensory consciousness is possible because the highest level of meaning provides the "top-down" constraint required for the nesting of lower relative to higher perceptual levels, while the highest level of purpose provides the top-down constraint that unifies volitional action. Since distributed neural levels contribute to the nested hierarchy of consciousness, consciousness cannot be narrowly localized. The robustly interconnected nested neural hierarchy creates qualia via the interaction of hierarchical levels. It appears that all conscious things have this structure and function, all things with this structure/function possess consciousness, and no things without this structure/function are conscious. Finally, as qualia are created via the neural hierarchy the experiencer – the inner "I" – never experiences objective neurons but rather the meaning conveyed by those neurons. What is experienced as mentally projected is the meaning created within the nested hierarchy. The NHTC model helps explain some enigmatic features of consciousness and the "hard problems" encountered by conventional scientific reduction. It is consistent with the general principles of hierarchy theory as applied to complex systems, previously proposed microstructural models of hierarchical organization, and is supported by recent fMRI data indicating wide scale top down and bottom up neural operations contributing to consciousness. It may also provide a neural model for some "higher order" theories of consciousness. **C11**

244 **Emotion: The Building Block of Panpsychism** Daniel Krieglstein <dkriegls@yahoo.com> (Psychology, Illinois Institute of Technology, Chicago, IL)

The mitochondria replicate themselves with their own separate DNA and produce their own energy, yet we do not walk around thinking that this huge part of our cellular structure is a distinctly separate entity from us. Rather, it is considered part of us. When James Lovelock pondered such uncertainties of microbiology he expanded this logic and asked: how is my role on this planet any different then the mitochondria's role in my anatomy? In the 1970's he began publishing his essays on Gaia Theory and started to conduct scientific experiments aimed at demonstrating how the earth is one giant organism. The theories of Panpsychism have come to similar conclusions regarding the multi-level properties of consciousness. However, biology kindly provides us with measurable means by which one level of organism interacts and becomes a part of the more complex organism. The unique nature of consciousness has yet to provide us with such traits. Studying the methods by which Gaia biologists relate microbiology to macro-biology, it appears that Panpsychism might borrow from the macro science of Social Psychology and reverse the insight to the micro level. Emotion is an often overlooked qualia of consciousness that requires a lot more scientific inquiry. Social psychologists have found that in group settings, a single emotional state can appear to take over the individuals of that group. With little convincing or forcefulness, individuals in a group have been shown to engage in all kinds of behavior that no one member of the group would do alone. Many sociological factors are known to contribute to this phenomenon, but little is under-

stood about the rapid adoption of unified emotion in a group. Perhaps emotion has reductive properties. A cell may not feel glee or distress, but it may have pleasure and pain states based on its inherent survival instinct. Collective communication of these states may allow for group action in the form of unified behavior. In my paper, I present methods by which reductive emotion can develop complexity as it achieves higher states. The following is a logic formula I developed to describe the move from individual states to shared states with unique properties. Xp + XoN + E = XpoN In that, X is a given phenomena, Xp is the experience of that phenomena by a single (p)erceiver, XoN is one or more (o)ther points of perception for that phenomena, and E is an error term. The result is XpoN which is a truth about the given phenomena that is shared by the (p)erceiver and the (o)thers, but transcends the limited perception of either, to become a higher order experience with unique properties. In my paper I give macro and micro examples of how this might play out. I do not assume this to be an answer for the dilemmas faced by Panpsychism, but rather as a litmus test model in the spirit of the unconscious zombie. **P10**

245 **Inference at the Mercy of the Selection of the Implying** Francis Schwanauer <franz@usm.maine.edu> (Philosophy, Univeristy of Southern Maine, Portland, ME)

As is variously suspected – a transition of the unconscious into the conscious or positive into negative entropy [and vice versa] presupposes a translation of latent quanta of energy into cogent characteristics by way of some representational apparatus (RA) such as the brain. Where now the presence of a brain in a gravitational field betokens the super-positional status of its inertial frame as a 'chooser in charge' involved in the distinction of divergent synthetic possibilities, it should imply the mathematical whereabouts of some consciousness. Unfortunately, however, all of our logical and mathematical representational connectives by way of an RA, such as 'if … then…', '… equal …', etc., fail, because in responding to common and distinguishing characteristics of members of a set they are merely symbolic and abstract parallels of inference to real causation, whereas consciousness – if it is to be significant or meaningful – must cover both the symbol and the symbolized or the abstract and the concrete at one and the same time. Thus, unless we find some common denominator between symbolic information and its corresponding symbolized experience within a quantum of consciousness, science will be short of a mathematical grip on a precious if not most important of its theories. A closer look at the pivotally central, though still not quite explained latency between waning and waxing synthesis or vanishing and emerging characteristics respectively, however, reveals it in the tight grip of representational information in the RA. This portrays our kinetic potential of energy as a triadic manifold of implication, with positive entropy as conscious buffer between the dusk and dawn of negative entropy. The presence of such a hiatus or moment of uncertainty (cp. Heisenberg's h/2p) in the midst of relative chaos, density, and collapse proves the otherwise rigidly deterministic life cycle of a quantum of energy malleable or flexible enough to allow for or even enhance synthetic interference by a parent particle which, in spanning the entire scope of a latent quantum of energy, is not just responsible for storing and stored information, but conscious enough to associate symbolic information and its possible symbolized experience, and hence free enough to make use of it. Thus positive entropy comes laced with a decision procedure as based on cogent information which not only precedes (cp. Plato's Parmenides and Kant's Critique of Pure Reason) and survives (cp. Preskill and Hawking's own mathematical deliberations), but also addresses (cp. Bell's ideas on Schrödinger's wave function in Speakable and Unspeakable in Quantum Mechanics) this kinetic potential – not as neutrally as one might expect, but with a relative tilt (or attitude) in favor of its inferentially supervening consciousness in charge. This seems to be underscored by those who do not consider the unconscious and its anesthetic applications as an exclusive alternative to the conscious but as an expertly induced passing moment of instrumental latency (cp. Leibniz) which – still in concordance with nature – conveniently allows for and fittingly implies what it infers as a reasonable conclusion, a speedy recovery and regaining of consciousness. ( As I show in my paper, the emergent at the threshold of negative entropy comes across as distinguishing characteristics ready for conscious synthesis.) **P4**

*See also:*

345 **Framing a Philosophical, Cosmological, and Theological Anthropology of Consciousness (as seen by the Philosopher-Coach)**
199 **The Role of Phenomenal Time in the Emergence of Consciousness**
202 **Emergence and Collective Creativity**
251 **A Systems Engineering Approach to Perception**
115 **Our eyeballs – dual vibration / vision sensors**
32 **Emergence in the Global Neuronal Workspace Model:A Neurocognitive Hypothesis of Qualia**

## 4.5 Nonlinear dynamics

246 **Non-Linear Energy Field Pupillary Response** Carol Davis, Carol E. Davis, M.D. <ceingd@gmail.com> (Ophthalmology, Santa Monica, CA)

Introduction: In the study of human consciousness, it is generally assumed that consciousness is a product of neuronal functioning. It has been elusive as to how and where the neuronal connections are wired to initiate a thought process or to have an intuitive experience. An idea has been advanced that a nonlinear field of energy, the consciousness field, is the driving agent in these conscious awareness processes, while the human organism is the receiver wherein these processes occur. It is further postulated that all things in visible solid form or invisible non-form such as thoughts, ideas, and intentions exist as energy. These energies are not conventionally measurable, i.e., non-linear, but the human organism is capable of responding to this non-linear energy field. Like the frequency spectrum of electromagnetic energy, visible or invisible, non-linear field energy has a spectrum of frequencies making up the infinite spectrum of thoughts and intentions. It is postulated that the organism processes non-linear energies through the autonomic nervous system. Positive energies is supportive of life processes helping to maintain homeostasis, and stimulate the parasympathetic nervous system. Negative energies are detrimental to life, trigger the fight-or-flight response and stimulate the sympathetic nervous system. This study supports these ideas by demonstrating a direct response of the human nervous system, the pupillary response, to the non-linear field of energy. Positive energies lead to pupillary constriction, negative energies leads to pupillary dilation. Methodology: Eight subjects were presented with stimuli which were hidden or masked so no visualization was possible. The subjects were directed toward pictures occluded by opaque black foam board. A high speed video camera filming at 60 fps was focused on the subjects' pupils. At the start of the presentation of each the masked image, the subject was instructed to "hold in mind, the energy of, this picture." The pupils were filmed for approximately three seconds for each masked image. The masked images were selected to be either positive image or negative image, i.e. Mahatma Gandhi, Helen Keller, Mother Teresa for positive energies, and Osama Bin Laden, Pol Pot, and Robert Hanssen for negative energies. The six images and one blank control were placed in a random sequence and presented in a slide style presentation from a laptop computer. A second high speed camera recorded the sequential presentation of images behind an opaque foam board occlude. The cameras were time-synced. The pupillary area change was analyzed using the ProAnalyst contouring program. Results: Sixty-one percent of the responses were constriction to positive images, while 22% were dilation to positive images. Fifty-two percent of the responses were dilation to negative images, while 17% were constrictions to negative images. Seventeen percent of responses to the positive images were flat or inconclusive in its character of response. Thirty percent of the responses to negative images were flat or indeterminate. The pupillary responses occurred from immediate response to over 480 msec after the appearance of the image slide on the computer monitor. The overall pupillary response latency was 78 msec. The response pattern to the blank image was 33% flat, 50% constriction, 17% indeterminate. **C21**

247 **Does the brain implement some form of delay coordinate embedding?** Vikas Shah <vikas.shah.1976@gmail.com> (Dept. of Internal Medicine, Banner Good Samaritan Medical Center, Phoenix, AZ)

A fundamental question about how the brain works is how it is able to perform such a wide variety of tasks with high degrees of accuracy, reproducibility, adaptability, and plasticity. Apart from characterization of how some fairly simple visual processing tasks are implemented, very little is known about how neuronal firing translates into the processing of information. I develop here a hypothesis that neuronal circuitry implements some form of delay coordinate embedding (DCE) to process information. DCE is a relatively recent mathematical advancement that allows characterization and prediction of the behavior of chaotic systems. Though there is no hard evidence supporting this hypothesis, there are several reasons to pursue it. First, predictions based on DCE are essentially heuristic in nature, and increasing amounts of previously collected data about the behavior of a chaotic system allows progressively better prediction of the future behavior of the system; such tasks are performed commonly and easily by the brain. Second, DCE based predictions do not require antecedent knowledge about the number of state variables governing the behavior of the system, only that DCE be performed in an appropriately high number of dimensions. Though DCE provides no guarantee as to the accuracy of prediction, for relatively simple systems such an approach provides a highly efficient method for developing an accurate characterization of the behavior of a dynamical chaotic system taking advantage of a relatively small number of known state variables. One possible advantage of neuronal modules performing DCE is that the approach is ge-

neric and reproducible; such modules could be copied across several different systems to provide analysis of sound, motion, arithmetic/mathematics, language, proprioception, muscular movement and coordination, possibly even psychological analysis/prediction of the behavior of other actors. Additionally, such a approach would allow (teleologically speaking) neuronal systems to quickly learn "the rules of reality" without positing the need for centrally hardwired rules and the accompanying difficulties in positing a mechanism for genetic specification of the ontogenetic configuration required to implement these rules. Finally, re-entrant processing has recently become a focus of attention as an important mechanism underlying information processing and possibly consciousness itself; it is possible to envision that re-entrant firing could represent information transfer necessary for DCE analysis as implemented by the brain. **P10**

248 **The dissipative many-body model and vortices in brain waves** Giuseppe Vitiello, Walter J. Freeman, Department of Molecular & Cell Biology, Division of Neurobiology, Donner 101,University of California at Berkeley, Berkeley CA 94720-3206 USA <vitiello@sa.infn.it> (Dipartimento di Matematica e Informatica, Physics "E.R.Caianiello", University of Salerno, Italy, Baronissi, Salerno, Italy)

The dissipative quantum model of brain predicts two main features of the neurophysiological data [1]: the coexistence of physically distinct amplitude modulated (AM) and phase modulated (PM) patterns (wave packets) correlated with categories of conditioned stimuli and the remarkably rapid onset of AM patterns into irreversible sequences that resemble cinematographic frames. Each AM pattern is described to be consequent to spontaneous breakdown of symmetry triggered by external stimulus and is associated with one of the quantum field theory unitarily inequivalent ground states. Their sequencing is associated to the non-unitary time evolution implied by dissipation. A crucial mechanism observed in laboratory experiences consists in the fact that the event that initiates a perceptual phase transition is an abrupt decrease in the analytic power of the background activity to near zero, depicted as a null spike. The reduction in the amplitude of the spontaneous background activity induces a brief state of indeterminacy in which the significant pass band of the ECoG is near to zero and phase of ECoG is undefined. The cortex can be driven across the phase transition process to a new AM pattern by the stimulus arriving at or just before this state. Between the null spikes the cortical dynamics is stationary. This is called a frame. In this report we focus our attention on such a mechanism and describe [2], in the formalism of the dissipative model, the observed occurrence of phase cones and the dynamic formation of vortices in brain waves. The phase cone is a spatial phase gradient that is imposed on the carrier wave of the wave packet in a frame by the propagation velocity of the largest axons having the highest velocity in a distribution. The location of the apex is a random variable across frames that is determined by the accidents of where the null spike is lowest and the background input is highest. The null spike has rotational energy at the geometric mean frequency of the pass band, so it is called a vortex. The vortex occupies the whole area of the phase-locked neural activity of the cortex for a point in time. The description of the phase transitions including the singularities implied by the vortices turns out to be crucial in the understanding of the nature of the engagement of the subject with the environment in the action-perception cycle. By the continual updating of the meanings of the flows of information exchanged in its relation with the environment, the brain proceeds from information to knowledge in its own world as it is known by itself that we describe as its Double [3]. [1] Walter J.Freeman and Giuseppe Vitiello, Physics of Life Reviews 3, 93-118 (2006) [2] Walter J.Freeman and Giuseppe Vitiello, Vortex in brain waves, in preparation [3] Giuseppe Vitiello, My Double unveiled, Benjamins Pub. Co., Amsterdam 2001 **C19**

*See also:*

255 **Mind Uploading and Resurrection of Human Consciousness Is There a Place for Physics and Computer Science?**
142 **Toward Hierarchical Models of Perceptual Dynamics of Cerebral Cortex**
241 **Organic Reasoning Systems**

## *4.6 Logic and computational theory*

249 **Universe as Computation, Modern Aether Theory, and the Funda-Mentalistic Mind** Jim Nystrom <nystroj@ferris.edu> (Mathematics, Ferris State University, Big Rapids, MI)

In contemplating Universe as Computation, a dualist needs ponder both on how nature computes, and on how it is that Mind "stuff" interacts with nature. Here I elaborate on a Universe as Computation powered by a reality flux. Reality flux is the ensembles of virtual photons and

anti-particles (some of which seemingly pass in and out of existence) that connects physical Universe (nature) with Negative Universe. Negative Universe (a R. Buckminster Fuller term) is a non-spatio-temporal (a Richard Rorty term) abode which – as we conjecture below – provides sanctuary for the things of the reality flux and for Mental forms associated with thought. Herein we also find the germane suggestion that the quantum nature of (physical) mental processes requires that brain interact directly with Universe in total – via Negative Universe; thus consciousness has a necessary global essence (and attributes that snuggle well with the Penrose-Hameroff Orch OR model). The modern computer requires power source and ground available throughout the circuitry. The Universe as Computation likewise requires reality flux throughout, thus serving – in electrical terms – as both a source and ground for Universe as Computation. Universe as Computation is not a Von Neumann type computation where representations of physical events are brought into a central processing area for calculation, from whence the results of the physical event would be "written" back (into some holographic representation?). In Universe as Computation, both data (the physical things – e.g., stuff of the standard model) and instructions (e.g., physical laws) co-exist within an active background lattice system in a similar fashion to computation techniques involving FPGA; where data is imbedded in the Field Programmable Gate Array with the circuits that perform the calculations. In Universe as Computation, the lattice background is a dynamic substratum which co-evolves with the "things" that live therein. Pre-geometry rules framed by R. Buckminster Fuller's synergetic geometry considerations provide geometrical constraints on the events that evolve within the lattice substrate, and constraints on the substratum itself. Further, in Universe as Computation, the background substratum grows/expands from witheverywhere [sic] due to a jitterbug action at all locations in the substratum where physical events occur. The reality flux (required in modern quantum mechanical theories of the quantum vacuum for all physical events) drives the lattice substratum jitterbugging growth. The combination of reality flux, the dynamic substratum, and Negative Universe form a modern aether upon/wherein/wherefrom all "things" occur and all physical law is/are manifest(ed). For the dualist, reality flux serves as a communication channel whereupon Mental forms (related to thought) in Negative Universe interact with brain (in physical Universe) through Penrose-Hameroff Orch OR type events. (Similar to Penrose's view that mind interacts with fundamental levels of space-time.) This dualist model, wherein all Mental forms reside in Negative Universe, gives in fact a global aspect to consciousness; to wit, the single Negative Universe connects to all "places" in physical Universe via the communication channel that is reality flux (allowing then also for – among other things – quantum non-locality realizations and a Divine Mind). **P4**

*See also:*

172 **The Consumption Analysis Loop in the Ouroboros Model, Basis for the Allocation of Attention and for the Emergence of Consciousness**
244 **Emotion: The Building Block of Panpsychism**
127 **Update on Recurrent Fractal Neural Networks: From Anesthesia to Quantum Zeno Effect in Single Neuron Consciousness**

## 4.7 Bioelectromagnetics/resonance effects

*See:*

237 **Resonant Emergent Identity: Choreography of the Cosmic Human**
250 **Systemic Properties of Biophotonic (ultra-weak photon) Emission in Biological Systems: Eevidence of Interactions with the Human Biofield**

## 4.8 Biophysics and living processes

250 **Systemic Properties of Biophotonic (ultra-weak photon) Emission in Biological Systems: Eevidence of Interactions with the Human Biofield** Katherine Creath <kcreath@ieee.org> (Optical Sciences, Tucson, AZ)

Recent research presented by Van Wijk and Van Wijk suggests there are systemic properties related to "biophotonic" emission (an ultra-weak photonic emission UPE) from humans.[1] They showed that emission from the hands of subjects increased after a red filter was placed in front of the photomultiplier detector and then removed when compared to emission before the filter was applied. They then showed a similar result when the detector was placed on the other side of the hand from where the filter was placed. At first glance this seems contradictory. How can an optical filter placed near a human in total darkness change the emission at another part of the body? What kind of

systemic information can there be? The properties of the UPE light seem to be a key in understanding what is happening. One question often posed is "isn't this blackbody radiation?" Assuming the human body as a blackbody does not account for the amount of photons measured from human subjects, or would it account for the variation seen between subjects or from different points on a dark-adapted body. Nor does it explain the photon statistics measured by many researchers showing that this emission has coherent properties similar to squeezed states. In experiments performed by myself and colleagues, we have repeatedly seen clumping of light in our photographs which suggests a speckle type process involving the interference of light. For this to happen there must be coherence properties to the light, at least on a small scale. Furthermore when objects are placed close to one another this speckling appears in between the objects where it doesn't appear around edges not adjacent to another object. As stated in past work these data have suggested there is some sort of systematic means by which fields around objects are interacting. This paper addresses possible systemic explanations for these results. First, we will explore what the photon statistics mean in terms of the properties of the light and how these properties might arise from biochemical processes within the body or any biological system drawing from a vast pool of past research on bioluminescence. Comparisons will be made to other types of photon statistics that can be explained relative to other sources of light such as blackbodies. Results of ongoing experiments capturing biophoton images of human hands taken from different subjects and other biological systems taken under different types of consciously intentional conditions will be presented that corroborate the results shown by other researchers describing the properties of this ultra-weak photon emission. [1] Roeland Van Wijk and Eduard P. A. Van Wijk, "Studies on the mechanism for low-light effects utilizing color filters in the human ultra-weak photon emission field." **P4**

251 **A Systems Engineering Approach to Perception** Tony De Luca, Tony De Lucaa & Richard Gordonb Departments of aBiosystems Engineering, bRadiology, bComputer Science and bElectrical Engineering University of Manitoba E-mail: umdeluc4@cc.umanitoba.ca <umdeluc4@cc.umanitoba.ca> (Biosystems Engineering, University of Manitoba, Winnipeg, Manitoba, Canada)

What is perception? The answer depends on the perspectives of the one asking the question and that of the person replying to it. Possible viewpoints include the perspectives of cognitive psychology, philosophy, neurology, or biology. In this paper, we examine this question from a systems engineering view of the biological nature of perception. The engineering approach to the study of systems is to first determine the relevant variables within the system. Second, to determine the nature of these variables. Third, to determine the inter-relationships of these variables. Fourth, determine how these variables work together to produce the characteristics of the system. One of the sine qua non of an organism that has life is to actively maintain its homeostasis through exchanging (i.e., taking and giving) parts of itself with its surrounding environment. The most primitive of the functions that an organic entity has to perform is to have built-in processes to: a) extract from its environment special components, which serve to develop, grow and sustain its life; b) recognize its own kind for reproduction; and c) recognize and avoid entities, which would destroy its own biochemical integrity (its life). The result of these actions; eat, reproduce, avoid being eaten, is what we call "perception". These perceptual acts can be found in the simplest organisms. Thus, we will examine two examples in bacteria: chemotaxis in Escherichia coli and quorum sensing in Vibrio Fischeri. Chemotaxis may be described from a systems engineering point of view at two levels: construction and operation. Perception involves the latter, and may be looked upon in a novel way not seen in the biological literature as input (chemical sensing of the environment, internal variables or stochastic fluctuations), process (maps between the sensor and the motor state) and output (change in state of the flagella – motor: clockwise, counterclockwise, or stall). Quorum sensing as a system is similar to chemotaxis. It has an input consisting of infusing of peptides from the environment, released by the cells themselves, such as autoinducer protein and others used as a feedback mechanism. The process causes the inputted autoinducer to combine with internal produced proteins. The output of this system is the making or not of proteins, which emit light. Our understanding will be enhanced when we approach the study of perception from an engineering perspective. We believe that in this paper we are providing a new standpoint wherefrom the approach is biased by the "If I were to design something called perception, how would I do it" premise. Key Words: Perception, awareness, consciousness, autoinducer, transaction activator. **P10**

252 **DNA: Consciousness to Unconsciousness Memory** Richard Steiner <steinerrw@yahoo.com> (Columbia, SC)

The topic of my abstract deals with the possibility of consciousness being thought of as a gene being passed down from one generation to another from as far back as the brain could record.

Thinking if the brain, like a hard drive on a computer purchased from a local store has the operating system and other software pre-loaded. If we convert the methodology of the way data is stored on a hard drive using electricity to the brain which uses electro-chemical stimulus, through DNA our brain is pre-loaded with memories which are just as real as the genetic characteristics. Can multiple people have shared a similar past, déjà vue, with the same DNA structure and at some moment send a signal when crossed. There may be something which may have been locked in the collective consciousness of someone in a past just waiting to be unlocked or triggered at a specific moment, smell or some other chemical-electrical change. It seems like a vivid dream superimposing itself in a reality which is perceived to be real, traces of an image which reappears itself in real time, but is part of ones unconsciousness that was passed from unconsciousness to consciousness. Can the ability of a conscious person be unable to distinguish between the two and dreams/nightmares become reality. Can a person seem insane be perfectly normal within the range of normalcy but in reality be stuck in time which has crossed from your unconscious to conscious just like updating an application on your computer. In reality we as human beings design objects which we know and understand such as hard drive – brain. It's a mechanical version of how we think our brain functioned when the hard drive was designed. It has bad sectors, it has data which can be recovered which was thought to have been erased, and it has data which can be altered, is our brain any different. Our brain being no different than any other organ in our body is made up from the DNA which is used to pass information from our parents to ourselves. Our DNA passed defects and deceases, features and patterns from one generation to another so would it be possible within the DNA structure to exist the chemical and electrical information that builds our brain and loads it with data. What we are learning about DNA can change our view of conscience just like we can view the color of our eyes or shape of our nose and relate them back to an ancestor in our past. It can give credence to any feeling, images, experiences which are unexplained phenomena from our past, which just happened to be contained within the DNA when then unconscious memories pass through the membrane of unconsciousness to consciousness, if just for a moment. DNA part of the operating system which is passed from one generation when formed and is passed on from one generation at conception, this is the premise which I am conveying as a theory. **P4**

253 **The Nature of Consciousness and the Meaning of Life** Mike Vandeman <mjvande@pacbell.net> (World Without Cars, San Ramon, CA)

The laws of physics that apply within living organisms are identical to the laws that hold outside them. But this implies that there is nothing "special" about life – nor about consciousness! And it implies that anything that can happen inside a living organism can also happen outside living things (if a distinction between living things and nonliving things even makes sense) – including consciousness. The fall of Newton's deterministic physics, and the triumph of "probabilistic" quantum mechanics, implies that our behavior is neither predetermined nor predictable. Since it is apparently decided at a molecular (hence quantum) level, the Heisenberg uncertainty principle prevents us from ever knowing causation for certain. In other words, we probably don't have free will, but we have no way of ever knowing for sure, and we feel that we have free will. In spite of centuries of thought and research into human-, animal, and plant behavior we still don't know why people commit murder – or much else. **P10**

*See also:*

280 **Communicating with the Consciousness of Cancer**
207 **Two Meanings of "Unity of Consciousness" in Relation to Quantum Mechanics.**
220 **Quantum Brain or classic brain, a review**

## *4.9 Evolution of consciousness*

254 **A General Model of Human Consciousness (Global Cultural Evolution)** Marcus Abundis <marcus@cruzio.com> (Stanford Business School (GFTP), Santa Cruz, CA)

This paper presents a general model for human consciousness using Earth's geologic history of mass-extinction & recovery (evolutionary dynamics). Five Earthly dynamics trigger within humanity's adaptive psychology an "adverse relationship" with environment – a Paradox that sparks human consciousness with intellectual and spiritual questions of unity vs. diversity (Earth/Mother vs. humanity). Humanity adaptively mirrors Earth's five evolutionary dynamics with five gender-based archetypes (bio-cultural dynamic) that unfold in a mythologizing of natural adversity as foundation for all human knowledge. The intellectual lineage used to develop this model includes: – Evolutionary biology and Earth systems science to establish an overarching context for this study – an answer to the "hard question," – Paleoanthropology defines the circumstance of humanity's

emergence from Gaia, – Psychology then monitors humanity's shift from animal-self to modern creative-self, using work of Hegel > Freud > Jung > Joseph Campbell > Arnold & Amy Mindell as foundation to a new structural psychology, – Fractal geometry then offers a holographic/mathematical design for modeling consciousness, – Memetics, finally, presents a tool for measurement of man's conscious traits, with a variation of the Hall-Tonna inventory. This work is presented as a "general hypothesizing model" for human consciousness, in attempting a science of consciousness. **P10**

255 **Mind Uploading and Resurrection of Human Consciousness Is There a Place for Physics and Computer Science?** Vadim Astakhov, V. Astakhov <vadim_astakhov@hotmail.com> (University of California – San Diego UCSD, San Diego, )

I would like to discuss "resurrection" concept from the stand point of physics and bio-chemical science. Presentation will cover "Boltzmann brain" model and Tipler's cosmological model of resurrection as well as its extension for the new "big rip" cosmological model. That model should compete with quark gluon confinement later in the universe time, which might lead to bootstrap and entangled among wave function of those particles. The bootstrap process can create a set of conditions equivalent to the one proposed by Tippler. Also, I will discuss the "Big Wow" model (Paola Zizzi) and its extensions for the tunneling wave function of the universe (based on A. Vilenkin model). Mathematical formalism of the statistical/information geometry is suggested. It will let us formulate the "Toy mind" model to simulate several hypothetical scenarios. The simulated "toy mind" brain has a body of 10^15 cells. Environment was simulated by in input parameters for the 5% of neurons. A single neuron was modeled by 5 parameters which are sensitive to measurement procedure. Then, local network circuitry was simulated for each 1000 neurons. And finally, the global neural network architecture was modeled based on the data extracted from diffusion tensor brain tomography image of the human brain. Strategy 1"Teleportation" One simulated beam of entangled photons is set to interact with the "toy brain" while another one is send to a "clone body". We suggest that measurements of a parameter should affect 10^5 molecular elements in the cell. This affect is modeled as an energy flux dE for each molecular structure. Taking in consideration dxdp~h we can see that dE will be enough to change molecular thermal spectrum that will result in modification of the system parameters. A measurement with precision 0.1% will affect the whole system 10^5*0.1=1000% by 10 times of it original state. That probably will destroy any organized systems. Thus, the ideal physical copy is impossible, due to measurement problem. The original will be irreversibly altered-destroyed but the clone get to the state which is indistinguishable from the original. Strategy II "Holographic representation" This strategy is based on the idea of holography. The complex network of interactions can be represented in terms on entropy and energy fluxes. A statistical manifold is defined to treat "Toy brain" as dynamic system. System migration within the environment can be seen as an entropy flow which conserves all causal relation. Such flow is renormalization group-flow and provides holographic representation for the original host. We can say that the "mind" of our "toy brain" will survive the brain desolation and continue to run on the artificial environment that will become its new delocalized body. Strategy III "Resurrection" Finally, we will consider "resurrection strategy". This is a strategy, where resurrection can be seen as a holographic reconstruction. A difference from an optical holography is that "resurrection" will destroy holographic representation due to the process of interaction. So we still are going to have one copy of our "toy mind". Simulations provided some answers: 1. Based on Landay principle (kTln(2) ~1bit), we can not have complete information about complex system like a human brain. Measurements will require of enormous amount of thermodynamic energy to encode everything in bit. 2. Detail copy of the complex physical system is impossible due to the fact that measurements will chaotically affect the original and eventually destroy it. 3. It will be demonstrated that the processes of "information holography" (recording and reconstruction) can be seen as a resurrection, even without complete "knowledge" about the system. 4. Holography as renormalization group flow on statistical manifolds provides constraints for hypothetical processes of mind uploading. **P4**

256 **The Origin of Life – Multilevel Creation Fields Generating the Evolution of Consciousness** Carl Johan Calleman <carljohan.calleman@gmail.com> (Stockholm, Sweden)

The Mayan calendar has been shown to describe an overall time plan for evolution (Calleman, CJ, The Mayan Calendar and the Transformation of Consciousness, Bear and Co 2004) including, but not limited to, biological. This calendar is based on the charting of pulses emanating from the world tree existing at different levels of the universe, from the cosmic to the quantum. Recent studies have confirmed some of its crucial predictions such as the existence of an axis in the microwave radiation in the afterglow of the Big Bang (see Cho, A., Science 317, pp 1848-1850, 2007) and the

verification (Rhode, RA and Muller, RA, Nature, 434, pp 208-210, 2005) of the previously discovered (Calleman, CJ, Solving the greatest mystery of our time: The Mayan Calendar, Garev 2001) alautun (63.1 MY) based rhythm for biological evolution in the Mammalian Underworld. A mechanism for the evolution of consciousness will be presented based on the Mayan calendar merged with cell biology. In this Theory of Everything, the centriole is the cellular world tree hence partly drawing from Hameroff's work with information transmission through tubulin filaments (see e.g. Hameroff, S.R., Ultimate Computing, Elsevier, 1987). Consciousness is here however redefined as an experience emerging from resonance with the world tree that exists at the edge of the otherworld, meaning that blocking of microtubule transmissions results in the blocking of resonance with this. Evidence will be presented to support the assertion that the centriole indeed is the cellular world tree (responsible among other things for morphogenesis) including that the basic structure of creation, nine Underworlds each made up from thirteen Heavens, is reflected in its structure. Looked upon in this way the evolution of consciousness is the result of a plan transmitted through every cell of all biological species (including especially human beings, who are unique in climbing to the higher Underworlds) tracing its origin back to the first eukaryotes emerging in the Seventh DAY of the Cellular Underworld, starting about 1.3 billion years ago. Brief examples as to how this plan for the evolution of consciousness manifests in the higher Underworlds in the history of art, music, technology and religion will be given to demonstrate that indeed a true Theory of Everything based on a purposeful universe has been formulated. **C20**

257 **Natural Selection and the Design of Consciousness** Steve Cousins <cousins@rikkyo.ne.jp> (Rikkyo University, Mitaka-shi, Tokyo, Japan)

Natural selection creates a fit between organism and environment, but has one limitation: it can't intervene in the span of an individual life. I argue that consciousness evolved as a surrogate of this process; consciousness is natural selection incarnate. Obviously this wouldn't work with a dualistic view of mind and a mechanistic view of natural selection. Instead I find common ground by understanding consciousness as a semiotic process, and natural selection as a process of natural teleology. The two processes are analogously triadic: sign-referent-interpretant in the case of mind, form-function-goal in the case of biological traits. What natural selection creates is adaptedness, which it does by taking forms and relating them to function in terms of the immanent goal of fitness. What consciousness creates is aboutness, by taking signs and relating them to referents in terms of a semiotic analogue of fitness, as embodied in memory-based dispositions. Whereas natural selection enhances fitness by creating a match between form and function, consciousness does so by creating a match between sign and referent. Consciousness thus serves as the built-in orientation to survival commonly known as the self-preservation or survival instinct. **P10**

258 **Mystery of the Hemispheres: An Evolutionary Loop** Lee Frank <leefrank@leefrank.com> (Digital Immortality Institute, Tucson, AZ)

1. While the computer as metaphor for mind has contributed many models to stimulate cognitive science over the past fifty-plus years, it also has produced many misleading suggestions. The concept of memory as mere adjunct to the CPU has been a major impediment to understanding how memory actually functions. We have imposed our own artifact as an interpretive structure, ignoring eons of evolutionary evidence. Our brains, like our DNA, have more in common with our simpler predecessors than with the computer. 2. Yet, a recent sophistication of the personal computer, the dual-core processor, hints at an essential question of evolution: why does the brain need two hemispheres? It is clearly not redundancy as it is for kidneys, lungs, testes, and ovaries. And although the hemispheres are home to various specializations, they are better distinguished by general characteristics: the left differentiates, the right integrates. 3. But before the hemispheres can specialize, they need information. Memory is more than storing and retrieving information. These are computer terms and not descriptive of the actual mechanism of memory. The more associations and the better organized, the more effective the memory and the greater the evolutionary advantage. 4. With enough size, memory associations become hierarchical. These hierarchies organize, if imperfectly, everything the mind knows about the world. This includes representations of the immediate, moment-by-moment experiential world that is being compared constantly to sensory data from the world. Often called pattern recognition, this process is more precisely a continuing loop of pattern seeking and pattern matching. 5. The primary purpose of this reality-comparing loop is survival. However, survival is more than running from the tiger. It also requires making sense of the world, e.g., recognizing tiger tracks. What is the purpose of sensory input if not to make sense of the world? 6. Having many associations demands significant time to add new associations. Direct interaction with the environment does not allow sufficient time. A memory of direct interaction remains small, with few associations, and fewer useful representations. Indirection provides the

delay needed for a large associative memory. 7. How to gain maximum efficiency given the reality-comparing loop (pattern seeking and pattern matching) and the delay of indirection necessary for a large associative memory? Suppose one hemisphere seeks patterns in the represented world, while the other matches these patterns. At the same time one hemisphere identifies incoming data, the other compares the world using the freshest identifications. Simultaneous parallel processing speeds up the reality-comparing loop – evolutionary advantage. 8. This paper suggests the great leap in brain development was two hemispheres. The evolutionary advantage is not redundancy or various specializations but parallel processing. Two hemispheres, coupled with a large associative memory, eventually leads to our kind of consciousness. It also implies lesser forms of consciousness for other species on the two hemispheres continuum. 9. Introducing a number of new ideas, this paper draws conclusions not only for consciousness, but for thought, intelligence, and even wisdom. **P4**

259 **Common Errors in Explanatory Appeals to Evolution** Alex Gamma, Alex Gamma <gamma@bli.unizh.ch> (University Hospital of Psychiatry, Zurich, Switzerland, Zürich, Schweiz)

"Consciousness must have a function, otherwise evolultion wouldn't have bothered the time and effort to come up with it." – "Phenomenal consciousness is not necessary to perform mental functions, they could just as well be performed if no qualia were associated with them – so it is hard to see why evolution should have produced it." – "Schizophrenia is obviously maladaptive, so why didn't natural selection wipe it from the population? It must have some secondary benefit!" Arguments such as these are pervasive, but they all involve a number of tacit assumptions that are false, as they fundamentally misconstrue the nature of the evolutionary process. Among these assumptions are: 1. Every trait is an adaptation, i.e. has an evolutionary function 2. Evolutionary adaptations are optimally designed 3. Natural selection is unconstrained The characteristics of the evolutionary process are quite different, however: 1. Traits of an organism can be the outcome of a variety of processes, not just of direct natural selection. They can be by-products of selected traits; the results of short-term fluctuations in biological and/or environmental context; the outcome of robust generative developmental processes; or the result of developmental noise. 2. Evolutionary outcomes are not necessarily optimal in any sense, because evolution lacks freedom and foresight. Its "solutions" are never "designed" from scratch. It has to work with and build on what is available, which often is highly limited. Evolution is a tinkerer, not a designer. We are much better served by thinking about evolution in terms of the tortuous bizarreness of a Rube Goldberg device than the streamlined perfection of modern automobile design. The peculiar way the vertebrate retina is constructed is a case in point. 3. The variation that fuels evolution is constrained by the availability of developmental resources, which in turn depends on the history of the organism and its lineage. Every type of organism comes equipped with a morphological structure that severely restricts the range of possible directions in which further evolution can proceed. It is also embedded in a physical (and social) environment which can be substantially of its own making and likewise channels its future evolution. 4. Evolution is largely a historical and contingent process. We cannot infer the status of a trait as evolved by natural selection from general considerations ("This trait is so complex, it must be an evolutionary adaptation"; or "Detecting cheaters was certainly important in our ancestors' social environment, so it's likely that our present ability to do so is an evolutionary adaptation"). Rather, showing that a trait is an evolutionary adaptation requires adducing substantial historical evidence, most of which is not available for mental traits that do not fossilize. Explanatory appeals to evolution are tempting because of the simple "design logic" seemingly involved. But design is no part of the evolutionary process, and while evolution certainly played a role in shaping our minds, we must face up to the hard problem of uncovering the exact evolutionary status of mental traits. **C20**

260 **The Theory of Neurobioluminescence in the Evolution of Sensorium Consciousness – A Synopsis of Psyche's Palace: How the Brain Generates the Light of the Soul** David Holmes <DavidHolmes@PsychesPalace.com> (The Library of Consciousness, Sonoma, CA)

At the junction of physics and metaphysics, quantum theorists speak of the inseparability of the observer and the quantum event. The theory of neurobioluminescence in the evolution of sensorium consciousness is likewise predicated upon a single metaphysical postulate – that light itself is aware; awareness itself is light – that the quantum electromagnetic field is brimming with an intrinsic but initially undeveloped proto-awareness, from which our own terrestrial forms of embodied consciousness are fashioned by specific evolutionary processes. Although microscopic in size, neurons within the brains of animals generate inordinately strong electrical voltages when they fire. The conscious mind manifests as an intricately patterned, pixellated quantum field cre-

ated by the coordinated firings of the hundred billion neurons of the cerebral cortex. Countless intricate neurobioluminescent "special effects" produced by vast arrays of cortical columns – which are the pixellating elements – display accurate renditions of all perceptible qualia to consciousness. The sensorium is a consummate simultaneity – experienced by the awareness inherent within the very quantum field that comprises the presentation itself! To elicit appropriate emotional responses from the indwelling conscious entity, the brain links billions of brightly firing neurons together into elaborate circular chains. These complex oscillators combine to form a vibrant, multisensory neural resonance chamber. Its repertoire of rousing rhythms and ominous chord progressions alternately motivate and dissuade the inwardly luminous sentient being – now endowed with a full complement of emotions – toward the desirable and away from the aversive. These transient global chaotic attractors are kept "in tune" by the presence of specific neuropeptides and neuromodulators, thereby providing the animal with a palette of stable and adaptive brain states. The whimsy of Nature has thrown a twist into our evolutionary story – a twist of 180°, to be precise – enough to obscure a host of clear and direct topological correlations between the broadly spherical cortical surface of the brain and the presentational sphere of reality. The self is in large measure an inference drawn from the spherical presentation of the sensorium: "All spheres have a center, therefore I must be the center of what appears to surround me." The two inordinately large half-faces of the sensory homunculus, standing bolt upright beneath the temples, also provide clear-cut topological boundaries to the spatial compass of the self. I conjecture that the self must actually ride the brain backward, for it engages the widescreen world ahead upon a set of incurvate visual cortex "viewscreens" located in the occipital lobe at the very back of the brain. In a similar manner, the auditory cortex for the right ear is found in the left temporal lobe, and vice versa. Indeed every plausible subjective landmark in the brain is inverted and transposed, back to front and left to right. This complete reversal of subjective orientation – forced, presumably, by evolutionary happenstance (the awkward, counterpole positioning of the visual cortex in a preconscious ancestral life form) – neatly accounts for the contralateral organization of the brain, a most conspicuous anomaly of evolution for which no other even remotely plausible explanation has ever been offered. **P10**

261 **Toward a Bio-Cultural Model of Human Consciousness: Nineteen Propositions and an Interdisciplinary Framework** Kerk Kee, Stephen B. W. Roeder. <research@ekerk.com> (Communication Studies, The University of Texas at Austin, Austin, TX)

A neurobiological approach to study human consciousness must acknowledge that consciousness is the product of natural selection in evolution, and it is a biological mechanism that builds on earlier ones. Dennett (1991) argues that a sketch, a model, or a theory of how the brain works "can turn a perplexity into a research program" (p. 41). The purpose of this paper is to synthesize existing theories of consciousness that are based on evolutionary biology, and to sketch a theoretical model of human consciousness. The research question asks: "What are the mechanisms underlying the operation of human consciousness?" Drawing widely from research by Damasio (2000, 2003), Dennett (1991, 2001, 2005), Edelman (2000, 2004), and Jaynes (2000), the authors propose a bio-cultural model of human consciousness. According to this model, human consciousness can be defined as a bio-cultural operation that involves a narrative streams producing multitrack process that contributes to the modulation of subsequent behaviors dictated by a self (i.e. analog 'I' and metaphor 'me') that has episodic memory and feelings in mind-space, in order to promote survival with well-being. The multitrack process excerpts inputs from the internal self and the external environment to form perceptions (i.e. present scenes) and concepts (i.e. linguistic metaphors and cultural memes), which are the bases of the dynamic narrative streams. Rapid neurobiological reentrant paths connect current perceptions, concepts, semantics, language, special value-category memory, and the self with an ongoing story in order to generate dynamic human consciousness. This model shows how human consciousness emerged out of evolution, and is shaped by both its biological bases and cultural environment. This theory shows how the cultural mechanism of human consciousness builds on the biological mechanism. Important implications can be drawn form the synthetic model at four different levels: theoretical, disciplinary, humanistic, and personal. First, the final theory of human consciousness is likely to be an analog of human consciousness. A theory of human consciousness cannot simply be a metaphor of something else for the operation of consciousness, because consciousness is a unique phenomenon like no other operation. Second, interdisciplinarity is key to the study of consciousness. In order to truly understand the complex operation of human consciousness, researchers need to draw widely from neuroscience, neurobiology, imaging studies, artificial intelligence, psychology, philosophy of mind, rhetoric, social sciences, and many other disciplines. Third, consciousness studies can potentially bring the

sciences and the humanities together, which C. P. Snow (1989, first published in1959) calls the "two cultures." A specific issue in consciousness studies that involves this complexity is qualia. The issue of qualia needs scholars from both of the two cultures. At the macro level, collaboration between scholars in the sciences and the humanities can contribute to the emerging 'New Humanism' (Roeder, 2005) and the 'Third Culture' (Brockman, 1996). Finally, the model shows that subjective reality experienced by an individual is largely the results of personal excerptions, narratizations, and conciliations of objective events in the physical-behavioral environment. Therefore, subjective reality can be modified by intentionally altering personal worldview, and changing the theme of the ongoing story in the mind. **P4**

262 **How to Feel and Act Like an Amoeba: Neo-psychism, Self-Organization, and Collective Orchestration** Werner Krieglstein, Werner Krieglstein <krieglsteinw@hotmail.com> (Philosophy, College of DuPage, Glen Ellyn, Il)

To advance scientific discourse the adoption of some form of panpsychism is needed. In my lecture I call for a neopsychist position, the view that all things contain a rudimentary level of awareness. In such a panpsychist universe self-organization appears to be the logical tool by which self-aware entities develop to ever higher levels of complexity. Self-organization, a principle scientifically demonstrated in living things, can now be extended to include the behavior of the smallest quanta such as electrons, atoms and crystals. In their life cycles these quanta produce synchronized line dances, a process I have called Collective Orchestration. As coherent systems, these collectively orchestrated communities may on occasion advance to a higher level. Among living species, such as fireflies, bees, termites, and ultimately among humans synchronized behavior abounds. Here Collective Orchestration is able to explain the controversial process of macro evolution, the development of completely new species. Thus the concept of Collective Orchestration emerges as an important tool in the larger scheme of evolution. I will suggest that the ancient trend among human beings to build communities opens the door to higher organization. Collective Orchestration is the missing link in evolutionary theory. Collectively self-organizing processes, not blind chance, drive the development of our multi-dimensional and highly complex universe. **P4**

263 **Road Rage: An Indicator of Evolutionary Augmentation** Aaron Levisohn, Diane Gromala <alevisoh@sfu.ca> (School of Interactive Arts and Technology (SIAT), Simon Fraser University, Surrey, British Columbia, Canada)

Theorists such as Martin Heidegger and Marshall McLuhan have hypothesized the interconnectedness of humanity and its technology for decades. In his book Orality and Literacy, Walter Ong also explicates the profound effect of one particular technology, writing, on human consciousness and social and cultural development. The question of whether or not technology has had a role in human evolutionary progress has been replaced by the need to identify real-world examples of that process. Unfortunately, it is difficult to identify when a technology has impacted humanity on an evolutionary scale – a qualitative difference between integration and transformation. Evolutionary change is necessarily embodied and precedes any Cartesian mind-body division; a significant modification of the body is purely ornamental without a concomitant fundamental change to the mind. In his book, How the Body Shapes the Mind, cognitive scientist Shaun Gallagher traces the primacy of the body, and in particular its capacity for movement, in human epistemological and ontological development. Artists such as Stelarc, conducting parallel research, work directly with the body, engendering physical augmentations with both biological and hardware-based prostheses. Such temporary transformations, however, are incapable of forging the permanent neural pathways needed to invoke Gallagher's developmental embodiment. There are, however, examples of ubiquitous, non-medical, prosthetic enhancements that have the potential to produce significant neural transformation. One such prosthesis is the automobile. Since Henry Ford began the mass production of the automobile, it has become an inseparable part of modern life, especially in North America. Three factors in particular, though, have enabled the car to move from machine to symbiotic prosthesis: its long-term use, the sensitivity and responsiveness of the controls, and the increases in daily use and commuting times for a large number of people. The first and second factors have allowed the car to evolve as an extension of the body rather than as an accessory to it. The latter factor has provided sufficient time for the automobile to become integrated as an embodied prosthesis. Neither of these reasons alone is sufficient, however, to make the claim for evolutionary, embodied integration. There is an indicator, however, that suggests that the automobile is enabling evolutionary transformation: road rage. In this paper we argue that road rage is inextricably linked to the development of a specific prosthetic augmentation: the automobile. As a successful augmentation of the human body, the automobile permits entirely new modes of embodied action. Just as it is essen-

tial for infants to explore the limits of their biological bodies, so too is there a need to discover our new embodied relations to technological forms and to examine our potential epistemological and ontological development. In addition, there are serious limitations imposed on these new bodies, both legal ones and physical ones. The conflict of the desire to "be" in our new bodies and the limitations imposed on them leads to the condition that has been labeled "road rage." It is this condition that most clearly designates the automobile as more than a mere tool, and rather as an evolutionary augmentation. **P10**

264 **Consciousness Ontogenesis: the Radical-Emergence-versus-Panpsychism Dilemma and its Solution by Means of an Irreducible Field Principle** Michael Lipkind <lipkind@macam.ac.il> (Unit of Molecular Virology, Kimron Veterinary Institute, Bet Dagan, Israel)

The analytical approach to the problem is based on a thought experiment consisting of an imaginary backward (retrospective) ontogenetic evolution. The initial point is the stage of a mature individual's consciousness associated with the functioning brain. The consciousness can be expressed as a continual stream of varied experiences (that depend only partly on the environments) superimposed upon a certain personal "psychic background" that is slowly advancing and changing along with age, and which, in turn, can be identified with the individual's "I" (Self). The consciousness ontogenesis relates to this psychic background. Evidently, such backward evolution must be associated with successive "simplification" of the psychic phenomenology, which is not necessarily linear but is definitely continuous, i.e. with no gap. Analysis of the imaginary backward evolution of consciousness leads to the unequivocal conclusion that it is impossible to indicate the moment of the first appearance (emergence) of the initial conscious phenomenology during the infant's brain development. Likewise, further "backward evolution" analysis including the antenatal brain development cannot show a moment of the consciousness emergence. Moreover, a consecutive and comprehensive retrospective analysis cannot be limited to the developing brain but must be continued deep into earlier ("pre-brain") stages of the developing embryo (before cell differentiation). Such an analysis demonstrates the impossibility to associate the emergence of consciousness with any particular somatic event during the whole ontogenesis. Hence, the inevitable conclusion is that the starting point of the evolving individual's consciousness is the individual's zygote, i.e. a fertilized egg cell. Consequently, the zygote possesses the proposed "proto-consciousness", and elucidation of its essence has been reached by employing the irreducible field principle represented by the theory of the cellular field by A. Gurwitsch. This theory has been applied for the analysis of conscious experience (Lipkind, 1998, 2003, 2005, 2007). Accordingly, the proto-consciousness is designated as a "geometrical sensation", defined as a feeling of the non-congruence between the brain species-specific field-determined abstract geometrical internal microstructure, on one hand, and the physical (molecular) stuff filling this abstract form, on the other hand. The defined proto-consciousness is postulated as a source of the higher forms of consciousness, i.e. primordial (embryonic) consciousness and the human consciousness per se. **P10**

265 **The Cybernetics of Life/Consciousness** Walter Matreyek <mpslpc@pacbell.net> (MPSL Performance Consulting, Redwood City, CA)

In this poster session, I outline a cybernetics-based model of Life/ Consciousness. From many so-far proposed definitions of cybernetics, I extract ten common with four "core" elements. I then explore how these elements may be observed both in the evolution of all Life/ Consciousness and in the development of specific individuals and collectives. I suggest that in both evolution and development, it is possible to recognize the emergences of successively "higher" cybernetic Stages/Levels (SLs). These are primarily based on increasingly transcendently inclusive feedback loops, as well as on concomitant expansions in information structures and processing capabilities involved in the modelings of Self and of Contexts. I also explore how at SL3, i.e. with the emergence of brain structures/ circuitry and POFs enabling Self-Awareness, and of increasingly meme-based environments, the emergences of various "spiritual" practices such as Mindfulness meditation, may have represented especially useful (though not the only) mechanisms to foster the attainment of successively higher Levels/ Types. For example, at SL3, we become able to "semi-consciously" post-reflect on and real-time monitor and consequently change/ improve specific elements of our existence/ performances. Through Mindfulness or similar meditation practices, we may begin to attain SL4 abilities to more clearly, consistently, systematically, etc. reflect on and monitor and consequently change/ improve not just our existence/ performances, but also our SL3 reflections and monitorings, leading to changes/ improvements in how and how well we change/ improve. A major strength of such a cybernetics-based model is that it recognizes and explores the evolution of core

commonalities and continuities through all Life/ Consciousness, while also recognizing and exploring the bases of differentiations, competitive/comparative advantages, and natural and eventually intentional selection. A major practical implication of the model is that it provides a basis for the modeling and understanding of natural and intentionally-implemented changes and improvements. A related practical application is in the design of instructional, therapeutic, and corrective change/ improvement interventions, both in our own and others' lives/ consciousnesses. **P4**

266 **Solving The "Human Problem": The Frontal Feedback Model** Raymond Noack <cmsresearch2000@yahoo.com> (CMS Research, Seattle, WA)

What is it specifically that distinguishes the human animal and the human mind from that of all other animals? Is it the human's capacity for speech? For reason? For creativity? For the capacity to be self-aware? Perhaps it is the capacity for sentient experience that distinguishes humans from other animals. The answer to this question is a resounding "all the above." Even so, research in the consciousness community seems to focus almost exclusively on the last human capacity in the list, sentient experience, or the so-called "hard problem" of consciousness. While it is agreed that the hard problem is an interesting and important component of the human mystery, it should be realized that the phenomenon of sentient experience accompanies a panoply of mental faculties unique to the human brain and cannot be separated from the other faculties. Therefore, in order to solve the hard problem of consciousness, it is argued here that one must tackle the more general challenge of solving the "human problem." The human problem simply seeks an explanation for what it was that happened to the human species during the relatively short period of hominid evolution that could account, seemingly suddenly and simultaneously, for the emergence of the entire panoply of unique mental faculties mentioned in the beginning of this passage. The frontal feedback model offers a solution to the human problem. In fact, the story of what happened to the human species is remarkably simple: At some point during the evolution of the hominid brain, the simple linear enlargement of the primate prefrontal motor cortex relative to posterior sensory cortices effectively reversed the preferred direction of information flow in the cortex from a caudo-rostral bias to a rostro-caudal bias. It was just that simple reversal that produced the entire panoply of mental faculties that many consider to be uniquely human, including cognition, symbolic thought, self-awareness, language, and, of course, sentient experience. The model of physiological processes that yields these mental faculties in humans I have named the frontal feedback model. The general model is not new as it was introduced in published format well over a decade ago, and its basic features have been discussed previously at Tucson VI and VII. What is new and what will be discussed at Tucson VIII is the recent spate of neuroimaging studies coming from the labs of Ishai, Machelli, Van Essen, Friston, Malach, and others, which continue to support and define the basic foundational principles of the frontal feedback model, a model that is asserted here to currently be the only relatively complete account of how the evolution of the hominid brain yielded the complex human mind. **P10**

267 **The Psychophysical Conversion of "Consciousness" Into Physical Reality. The Philosophical Difference Between the Metaphysics of Consciousness and the Physics of Physical Reality.** Alan Rosen, David B. Rosen <arosen@mcon.org> (Machine Consciousness Inc., Redondo Beach, California)

The basic assumption underlying this presentation is that the human brain and the "consciousness and emotional" characteristics associated with it, is an organic Darwinian adaptation. The "consciousness" part of this adaptation is sometimes referred to as a Neuronal Correlate of Consciousness (NCC)-circuit in the brain. It is a neuronal circuit that is genetically designed with "conscious and emotional drives" so as to statistically enhance the survival of the human specie in its environmental niche. In a series of publications, published in the peer reviewed scientific literature, the authors reverse engineered the neural connectivity of the NCC-circuit in the humans brain, and showed that a NCC-circuit is a sensation generating mechanism that may generate all the sensations of consciousness and emotions. See http://eprints.assc.caltech.edu/195/ http://ieeexplore/ieee.org/Xplore/login.jsp?url=/ie5/11216/36115/0176106.pdf?tp=&arnumber=36115 Depending on the amount of time allocated to this presentation, the authors shall cover the following topics: 1) Distinction between the variables that are members of the consciousness domain and the physical reality domain. See http://eprints.assc.caltech.edu/285/ These published papers present answers to questions such as a) The structure in the physical reality domain of a 3D-illusion in the "consciousness" domain, See: http://mcon.org/tjsum02.html b) To what extent does "consciousness" effect the physical reality domain, c) the local and global effects of consciousness? 2) Darwinian constraints applied to the design of "emotions" into a computer: An autonomous multi-tasking robot that uses emotions to guide its behavior See

http://mcon.org/tjsum06.html These published papers present answers to questions such as a) is consciousness distinct From attention?, b) Mathematical approaches to the NCC, and c) How emotions control our behavior. 3. The design of "conscious" audition and sound generation: comprehension, verbalization, conceptualization and declarative memory. See http://mcon.org/tjsum07.html These published papers present answers to questions such as a) What is humanoid intelligence and b) how do you program it into a computer vs. how you teach it to humans, and c) Is there an evolutionary case for the development of language? and d) is there a genetic adaptation in humans for a "universal language." 4) A philosophical solution to the mind body problem-by closing the functional loop between the hedonic motivational system in the brain and the autonomic and somatic motor systems. (http://mcon.org/howbrain.html) (http://mcon.org/wic.html These published papers present answers to questions such as a) The relationship between the mind and the brain, b) How the mind effects the body, and c) the sociobiological effects of the mind on civilization. **P10**

268 **Toward a Gene-Expressed Basis of Consciousness** George Schoenfelder <george_schoenfelder@yahoo.com> (Naperville, IL, Naperville, IL)

The non-conscious mind and conscious brain are proposed to have evolved from two different methods of molecular learning. At the level of DNA, the unconscious type of mind is suggested to stem from what I define as DNA learning. In contrast, the conscious type of mind is suggested to have evolved from associative learning that, while also based in gene-expressed proteins, is accomplished in one lifetime rather than over the course of innumerable generations. I spell this type of protein associative learning "associative leårning." Rather than neural nets that function as banks of logic switches being responsible for associative learning, it is argued that associative leårning evolved based on exaptations of molecular eukaryote growth processes. Happening at about the time of C. elegans, this was a major turning point in the evolutionary psychology of our ancestors. This major turning point allows behavioral modifications in only one lifetime, rather than mutations over innumerable life spans. It is also argued that for the adult brain to grow associatively, associative growth via associative leårning must be gene-expressed. In this model the necessary cybernetic plasticity of associative leårning can rely on a three billion year legacy of gene-expression as its bases of mutation. This is shown in stark contrast to the non-existent legacy of neurons as logic switches by the time of C. elegans. It is therefore proposed that there must be a gene-expressed protein means to determine what action, such as chemotaxis and muscle movement in general, was bad (away from survival) and what action was good (toward survival) so that an organism has a meaningful feedback method. An analogy is provided in that a rocket's navigational system its servos are provided feedback by a gyroscope that is the standard of direction for its directional goal. Likewise, associations at the molecular level effectively need a gene-expressed "gyroscope" to provide feedback that an association is toward the goal of survival or not. It is further proposed that the conscious brain results from gene-expressed proteins and that a gene-expressed "gyroscope" would functionally help in any simulations in the Craikian sense. In this gene-expressed way, pain and pleasure would have an atomic basis. One relevancy of this is that any explanation of qualia is closer to a quantum explanation when based on proteins, because clearly the elements of the periodic table and thus proteins must be capable of conducting quantum mechanics. As such, DNA learning is suggested to be the basis of embryo-self-governing-assembly, and the subconscious mind as "nature." In contrast, associative leårning at the level of gene-expressed proteins is suggested to be the basis of "nurture" and the conscious mind as a simulator that has a gene-expressed "gyroscope" to help point the way toward survival by providing moment-to-moment feedback to specific actions. Thus, our two types of mind as 1) DNA learning evolved the molecular non-conscious mind of "nature" and 2) associative leårning on a grand scale evolved into a gene-expressed conscious mind of "nurture" that function as a molecular simulator of the molecular environment. **P4**

269 **Recent changes in the structure of consciousness?** Jan Sleutels <mail@dassein.com> (Philosophy, Leiden University, Leiden, Netherlands)

Consciousness is generally seen as an indigenous asset of the mind/brain that is responsive to pressures on an evolutionary time scale, but that is largely unaffected by cultural history. Substantial changes in recent history are ruled out apriori. A typical example of this bias is Block's dismissal of Jaynes's theory that consciousness emerged late in the second millennium BC (Block 1995). In an earlier paper (Sleutels 2006) I argued against Block that there is reason to believe that cultures like that of the early Greeks in fact did not have so-called A-consciousness, i.e., they did not have access to discrete mental representations poised for use in reasoning and rational control of action. Taking this argument one step further, I discuss a change in the structure of conscious ex-

perience that is likely to have occurred in Western society mere centuries ago. I start from the premise that conscious experience crucially involves a conceptual framework, an idea that has proved exceptionally fecund since its codification by Kant in 1781. In contrast, pre-modern accounts of consciousness and cognition consistently did not use the concept of a framework. From a modern point of view, the most straightforward explanation of this contrast is that pre-modern thinking was based on a different framework that lacked the conceptual resources available to us today. Call this the standard account: earlier minds had frameworks, but not the concept of a framework. Unlike earlier critics of conceptual frameworks such as Davidson (1984) and Rorty (1972), I take the framework view to be basically correct as an account of modern experience. Drawing on an analogy with Block's argument against Jaynes, however, I argue that the standard account of pre-modern experience should be rejected. A better way to understand the nature of our ancestors' conscious experience is to assume that it was in fact frameless, as has also been suggested by Heidegger. I discuss three arguments for my claim. First I show that the standard account's explanatory value is highly doubtful. I then argue that historical changes in folk psychology are prima facie evidence of changes in mental structure, and I consider examples of such changes. Finally, with reference to the extended mind approach, I argue that modern frame-based experience is best seen as an internalization of new communications technologies developed in the late Middle Ages and early modern period as a result of the rise of manuscript industry and the invention of the printing press. References Block, N., (1995). On a confusion about a function of consciousness. Behavioral and Brain Sciences, 18, pp. 227-247. Davidson, D., (1984). On the very idea of a conceptual scheme. In: Inquiries into truth and interpretation. Clarendon Press, Oxford, pp. 183-198. Rorty, R. (1972). The world well lost. Journal of Philosophy 69, pp. 649-665. Sleutels, J. (2006). Greek Zombies. Philosophical Psychology 19, pp. 177-197. **C20**

270 **The potential future development of consciousness** John Stewart <jes999@tpg.com.au> (The Evolution, Complexity and Cognition (ECCO) Research Group, Free University of Brussels, Melbourne, Victoria, Australia)

Functionally, consciousness has the potential to improve the adaptation of any domain it is applied to. However, this potential has not yet been realized to any extent for the key processes that constitute consciousness itself – in general, we do not consciously and deliberatively adapt and enhance the functioning of our consciousness. For example, although our goals are critically important in determining where consciousness is directed and what tasks it serves, generally we do not consciously and deliberatively adapt the processes that determine our goals, such as our desires, motivations, and emotional responses. We do not choose our likes and dislikes. The paper explores the potential for our adaptability to be enhanced by the conscious adaptation of our conscious processes, and identifies how this potential might be realized. It draws on the practices of a number of contemplative and spiritual traditions to identify how we might train the capacity to consciously adapt the functioning of consciousness. The paper considers the evolutionary significance of the development of such a capacity. In particular, it shows how the conscious adaptation of our goal systems could free us somewhat from the dictates of our evolutionary past, and enable us to pursue goals that are more consistent with the needs of our evolutionary future. **C20**

271 **"Phylogenetic" Amnesia – Precondition of Self-consciousness?** Gottfried Suessenbacher <gottfried.suessenbacher@uni-klu.ac.at> (Institute of Psychology, University of Klagenfurt, Klagenfurt, Carinthia, Austria)

Resuming H. Blumenbergs designation of fire usage as the central "differentia specifica" (1981) this paper hypothesizes that fire usage was an adaption to the recurrent environmental condition "fire" during transitions from australopithecine to early human species: This adaption evolved as an increasing interplay between the following developments: (a) the necessary control of affects, (b) a multitude of gradually collaborating cognitive abilities and (c) the development of sufficient communication/ interaction. The related evolution of the (pre)human brain may have led from functional to quantitative alterations of certain parts, especially of the prefrontal cortex. The central process of these modifications may have been caused by the contribution of mesostriatal and mesolimbocortical dopaminergic processes. Thus, a dilemma of the interference between an evolving "neocortical" and an presumed archaic "subneocortical locus of control" (c.f. Panksepp, 2005) arose – causing a permanent system perturbation (c.f. Rudrauf, & Damasio, 2005) which were (and is) experienced by human individuals as self-consciousness. However, relating the competences achieved in the unfolding mastery of fire usage to some epistemological characteristics of Evolutionary Theory one may consider, firstly, certain feedback loops between the increasing mastery of fire and the evolution of culture, and secondly, why the factors which determined the evolution of our species became unrecognizable and lost their function (c.f. Blumenberg, p. 182). Reference

Suessenbacher, G. (2006). Evolutionaere Psychologie, praehistorischer Feuergebrauch und die Genese von Selbst-Bewusstsein. In: B. Gula, R. Alexandrowicz, S. Strauß, E. Brunner, B. Jenull-Schiefer & O. Vitouch (Hrsg.), Perspektiven psychologischer Forschung in Oesterreich. Proceedings zur 7. Wissenschaftlichen Tagung der Oesterreichischen Gesellschaft für Psychologie (S. 114-119). Berlin: Pabst Science Publishers. **P10**

272 **Parietal Cortex Expansion, Working Memory, and the Emergence of Consciousness** Rex Welshon, Rex Welshon <rwelshon@uccs.edu> (Philosophy, University of Colorado at Colorado Springs, Colorado Springs, Colorado)

Human consciousness has properties found in the consciousness of no other species, even in that of our closest primate relatives, bonobos and chimps. If the human form of consciousness evolved from that found in the last common ancestor for humans and chimps, and if chimps lack some of the conscious properties we have, and if these properties are identical to or emergent from inherited neural phenotypes, then neural changes subsequent to the split from the last common ancestor have occurred. Recent work by Bruner, Wynn, and Coolidge (among others) in paleoneurology and cognitive archaeology suggests that one candidate is the disproportional expansion of parietal cortex, first detected in H. Heidelbergensis and H. Neanderthalis, and the development of working memory and attentional capacities correlated with it. This paper proposes that parallel arguments can be deployed for the role of expanded parietal cortex and developments in (i) synchronic unity, (ii) diachronic identity, and (iii) intentionality, hallmark properties of our form of consciousness. Limitations to the proposal are noted. Qualitative character of experience, in particular, appears not to be correlated with expanding parietal cortex. However, qualitative character is correlated with brain regions – insular and orbitofrontal cortex – that were probably already in place in the last common ancestor. Hence, qualitative character can probably be attributed to species at least as phylogenetically old as chimps and bonobos. **C20**

273 **Determining how best to study the evolutionary function of consciousness** Juliane C. Wilcke <juliane.wilcke@pg.canterbury.ac.nz> (Psychology, University of Canterbury, Christchurch, New Zealand)

How can we best study the evolutionary function of consciousness? While many hypotheses for an evolutionary function of consciousness, or one of its aspects, have been advanced, an analysis of the literature on this topic shows that there are several methodological problems. To give some examples, the method of investigation is frequently not specified, and many hypotheses seem to be based exclusively on the author's introspection of his or her subjective feelings, which may not be appropriate for answering evolutionary questions. The majority of hypotheses lack empirical and theoretical support, and they are often not developed further once they have been put forward. In addition, the strategies and methods that have been used to generate and support hypotheses for a function of consciousness differ widely in their usefulness for providing an evolutionary explanation of consciousness. In order to be able to concentrate research efforts on the most promising strategies and methods, this paper suggests an evaluation scheme for establishing which of them are most worth pursuing. The first step in assessing the promise of a strategy or method is to determine its aim. The strategy or method's validity is then appraised using empirical evidence and plausible arguments which show whether the strategy or method promotes its aim. The next step consists of an analysis of how the strategy or method's aim relates to the research objective of finding the best evolutionary explanation of consciousness. Here it is helpful to group the specific aims of the strategies and methods into five general approaches for studying the evolutionary function of consciousness, which have the following goals: showing that consciousness has a function and identifying its current function, along with the evolutionary equivalents of showing that consciousness is an adaptation and identifying its adaptive significance, and discovering the origin and history of consciousness in evolution. In the fourth step of the evaluation scheme, the strategy or method's strengths and weaknesses are examined, which can relate, for example, to the strategy or method's assumptions, rules and required resources. The paper exemplifies the four evaluation steps with strategies and methods used to study the function of consciousness. In conclusion, the suggested evaluation scheme serves to determine which strategies and methods are most promising for making progress toward an evolutionary explanation of consciousness. It can also help to solve the other aforementioned methodological problems in research on the evolutionary function of consciousness. In addition, the method evaluation scheme could be tested for usefulness in other areas of consciousness studies. **P4**

*See also:*

346 **The Lost Voice of God: Julian Jaynes and Neurotheology**

## 4.10 Medicine and healing

274 **Relaxation and Mental Effort Self-Monitoring for Rehabilitation** Ann Baldwin, Becky Farley;Gary E. Schwartz <abaldwin@u.arizona.edu> (Physiology, College of Medicine, Tucson, AZ)

The purpose of this study was to develop a technique to explore how the ability of people with Parkinson's disease to self-monitor and control their level of mental relaxation or mental effort, may improve their fine motor performance and cognitive skills. The technique involves the following steps: (1) Have subject complete consent form, medical history, mini-mental state examination and Beck's depression test. (2) Attach heart-rate (HR) sensor and skin conductor (SC) sensors on subject's non-dominant hand and connect to Biograph Infiniti system (Thought Technology, Ltd.). (3) Short practice of memory game (Simon Trickster, Hasbro) involving memorizing sequences of lights and sounds of increasing length and pushing buttons to match the sequence, and Operation skill game (Milton Bradley) involving use of tweezers to extract small plastic body parts from cavities as fast as possible. (4) Baseline measures of HR, SC and heart rate variability (HRV – standard deviation of interbeat interval). (5) Three attempts at Simon game or Operation game, recording longest sequence remembered (Simon game) or time of completion (Operation), while monitoring HR, SC and HRV. (6) Have subject participate in mental relaxation or mental effort for 15 minutes using Heart Rhythms computer game (Wild Divine). Control procedure is talking to investigator about neutral topics. (7) Repeat attempts at Simon game or Operation game to determine whether performance is improved and/or HR, SC and HRV are less perturbed by the second attempt at the games, following mental relaxation or mental effort, compared to the first attempts. Preliminary results suggest that exertion of mental effort between practices of the games was more effective than relaxation in improving game performance by the one Parkinson's patient, but both relaxation and mental effort worked equally well for the two healthy control subjects. Just talking between practices did not affect the performance of the Operation game and improved performance of the Simon game only very slightly. Performance of both games greatly increased SC, HR and HRV in all subjects. For the Simon game the changes in HR and HRV were smaller when performance of the game was preceded by 15 min. mental effort. For the Operation game, the changes in SC and HR were smaller when the game was preceded by 15 min. mental effort. These results support continued research into self-monitoring and altering the level of mental effort as a tool to improve fine motor performance and cognitive skills. **P10**

275 **Image-based Information About Consciousness: Choosing Models for Effective Diagnosis and Therapy** James Beran <jimberan@earthlink.net> (conscioucavity.com, Richmond, Virginia)

Brain imaging techniques such as functional magnetic resonance imaging (fMRI) are valuable in the study of neurological diseases and other conditions that affect consciousness; in addition, pharmacological fMRI (phMRI) is being used to study effects of pharmacological agents on brain function, suggesting application of fMRI to drug discovery and testing. [1] Furthermore, evidence is accumulating from many sources that a human's conscious experiences correlate with brain activity patterns as imaged, for example, with fMRI. This work examines alternative ways of extracting information about contents and conditions of consciousness from raw activity data produced by fMRI or the like, and shows how different approaches are supported by different models of consciousness: For example, extended neural clique models of episodic memory [2] and conscious

cavity models [3] are two types of models that do not support all the same information extraction approaches. We compare approaches supported by different models to find differences in effectiveness. By further developing promising models, we may also discover improved diagnostic and therapeutic techniques for diseases and other conditions detrimental to consciousness. [1] Dickerson, B.C., "Advances in Functional Magnetic Resonance Imaging: Technology and Clinical Applications", Neurotherapeutics, Vol. 4, Issue 3, July 2007, pp. 360-370. [2] Tsien, J.Z., "The Memory Code", Scientific American, July 2007, pp. 52-59. [3] Beran, J.T., "Disambiguation in Conscious Cavities", Quantum Mind 2007 Conference Abstracts, Salzburg, Austria, July 2007, p. 30; see also www.conscioucavity.com. **P4**

276 **Experimental Demonstration of the Pathogenesis of the Coma, Through the Unified Synaptic Channel Collapse. Physiological – Clinical and Quantum-Electrodynamics Considerations.** Massimo and Manuele Bondì <masbond@libero.it;manubond@libero.it> (Trevignano Romano, Italy)

Through a careful revision of the bibliography of quantum electrodynamics (QED) and its application to the biochemical structure of the unified synaptic channel (USC), a model of consciousness identification is proposed. The model entails a channel running in loops all along the labyrinthic structure of the cerebral cortex and constituting an anatomical-histological structure on its own along which the flow of molecular (and ionic) particles as neurotransmitters determines a sort of constant low-noise effect. The possibility of artificial Coma induction through the total aspiration of the cerebrospinal fluid is also accounted for. Physiological, Clinical and Quantum-electrodynamics considerations about traumatic Coma are taken into account. All such considerations are examined in view of their stringent clinical-therapeutic application in the avoidance and prevention of all – or most – cases of so-called Brain Death occurrence: "ninety minutes for saving the Brain" could become an effective slogan promoting checked medical procedures (especially the early drainage of the haemorrhagic trauma) to be adopted in all cases of traumatic Coma. **P10**

277 **The Relationship Between Unconscious Abandonment Issues and Mental, Emotional, and Physical Health** Michael Brill <michael@awakener.com> (Just BE! Institute, Santa Fe, New Mexico)

Quantum Numbers are a powerful tool that can be used to map out the human personality. Using Quantum Numbers, I intend to demonstrate how numeric strings can identify behavior patterns that are the catalysts for our illnesses, diseases, and physical injuries. Furthermore, when these numeric strings are arranged in a vertical hierarchy, one can easily see how portions of each string are reproduced in many aspects of a personality. These overlapping patterns can explain how/why we behave the way we do with family, friends, co-workers, partners, and the world at large. Abandonment issues are reflected in our daily behavior patterns. In order to avoid the sense of being abandoned, most everyone interacts with others to either be loved or to maintain control. Human behavior patterns can be divided into two broad behavior groups: one group tries to maintain control of situations or relationships by doing for or not doing for others, while not allowing others to do for them (then getting agitated that no one ever "does" for them.) The other group revolves around issues of co-dependency. This group can be divided into three subgroups: clingers, enablers, and doers. All of us go back and forth between these two extremes until we rediscover our connection with the source energy and resolve the abandonment issue connected with the severing of our umbilical cord. The stronger the feeling of abandonment, the greater the probability of contracting an illness, disease, or physical injury. Addictions can develop from feelings of inadequacy and control issues. Colitis can be associated with behaviors related to unrealistic expectations of themselves and/or others. Alzheimer's disease can be rooted in control issues associated with domination and retaliation for being dominated. A torn rotator cuff can be the result of trying to do it alone rather than asking for help. All of these patterns are the outward manifestation of conscious or unconscious abandonment issues. Numeric strings of Quantum Numbers can identify these patterns and provide numeric based solutions. I believe: we have "unremembered" who we are, why we are here, and what we are to do; this can create the illusion of being alone, forgotten, abandoned. This loss of memory becomes the seed of our abandonment issues, behavior patterns, and health issues (mental, emotional, physical.) Combining the sciences of numerology and quantum physics with the concepts of reincarnation and gamatria, Quantum Numbers can help identify personality patterns as well as the patterns of creation. (I define creation as the manifestation of potential.) **P10**

278 **A Clinical Medicine based on the Holistic Proprioceptive Nature of Symptoms** Bruce Carruthers <bcarruth@telus.net> (Vancouver, BC Canada, Vancouver, B.C., Canada)

The clinical situation ( from klinikos -bed Gk.) has existed from time immemorial. Perceptible symptoms have always played an essential part in clinical practice, but etymology suggests an original more holistic meaning for symtoms, that of "falling together", or "coinciding " (Gk) rather than the particularized subjective feelings (as against objective signs), that they connote in modern medicine under the influence of Cartesian type dualism and the scientific method. In the Anglo-American world, following the supposed demise of introspectionism and the advent of behaviourism, with its subsequent evolution into a cognitivism based on the computer model of mind, the place of symptoms and illness experience in clinical medicine has had a trying and uncertain time with a tendency to diminish the assumed accuracy and authority of symptoms with their deictic explanation as a result of an emphasis on mechanistic disease models considered separate from Cartesian psychology with its apo-deictic explanations. The concurrent development of European Husserlian phenomenology and its evolution into the post-phenomenology of Heidegger, Merleau-Ponty, Potocka and Pylkko, as well as the ageless practice of Buddhist mindfulness, has not seemed to make much difference. However the recent evolution of classical cognitive science into embedded/embodied models of mind/body suggests a possible reprieval with a return to a more Hippocratic deictic explanatory framework (see Borgmann) for clinical medicine. The key on-line dynamical practices of clinical medicine consist of an observational-knowledge group consisting of diagnosis, prognosis and disability assessment (severity of illness), and an action group which includes therapy, prevention and rehabilitation. Here the bedside observation of a sick person is regarded as the core clinical situation, and this can be regarded primarily as a second person relationship between a professional observer/healer and a sentient being who as patient is describing the proprioceptive feelings arising in her/himself in a nondual, pre-subject/object split situation as they arise connected together and interactive (holistic) in an undivided person. Thus these symptoms do not arise as separated subjective qualia to be observed in a situation that is named by Heidegger as Vorhandenheit, occurrentness or presence-at-hand (the dualistic subject/object observational context that is presupposed by introspectionism, behaviourism, classical cognitivism and much of modern medicine). But symptoms are first observed on-line in the nondual self-observational context of patient propioception, where the subject is reversibly identical to the object. Key clinical terms will change their meaning in this non-Cartesian context- e.g. dis-ease becomes deviation from ease, and dis-ability becomes deviation from ability, diagnosis becomes (Gk.) knowing separately or explicitly and therapy ( Gk.) medical attendance. These are dependent on the direct dynamical observation of the individual patient in real time, using deictic explanatory coordinates which will include identifying, quantifying and keeping track of relevant and salient variables which travel together in time( form a syn-drome (Gk.-travel together along a track) without distinguishing whether they are subjective or objective until later, during the confirmation stage. The latter of course may include Cartesian explanatory coordinates leading to more objective certainty (apo-deixis) within the context of occurrentness. **P4**

279 **Psychedelic Facilitated Altered State of Consciousness as a Therapeutic Intervention: A Case History of a 54-year-old Woman Treated with Psilocybin for Cancer-Related Anxiety** Gurpreet Chopra, Alicia Danforth <gurpreet.chopra@ucsf.edu> (Psychiatry, UCSF School of Medicine, San Francisco, CA)

Hallucinogenic compounds, or psychedelics, have long been recognized for their ability to catalyze profound mystical and transpersonal states of consciousness. While relatively safe physiologically, when used inappropriately, psychedelics may leave severe psychological scars in vulnerable individuals. Seeking to better understand such powerful chemical technologies, many of which have been derived from shamanic plant medicine traditions, contemporary consciousness researchers are collaborating with physicians in order to provide relief for individuals suffering from treatment refractory conditions. In June 2004, a Phase I trial evaluating psilocybin, a psychedelic alkaloid of the tryptamine family, for the treatment of anxiety associated with a terminal cancer diagnosis began at Los Angeles County Harbor-UCLA Medical Center. Drawing from the model of psychedelic therapy developed for this study, the authors (who include the Co-Investigator and Research Coordinator) will discuss how psychedelics may be administered safely in a therapeutic context. While it is premature for data analysis, the eleven participants thus far enrolled and treated have all had positive experiences with no negative effects reported. The authors will include a case report of a 54-year-old woman with a history of metastatic breast cancer, with recurrence in the abdomen after mastectomy. Hoping to improve her quality of life while coping with a life-threatening illness, she was also motivated to take part in the trial to alleviate OCD symptoms that began at age 20. This participant claimed no prior hallucinogenic substance use. She participated in one placebo (niacin) and one active treatment session (psilocybin 0.2 mg/kg) five weeks

apart, both lasting approximately six hours. She reported tolerating each session well, and she has not experienced any adverse events related to treatment. Feeling no altered or novel sensations during the first session, she assumed she had received the niacin placebo. She described a "healing" feeling that was new to her during the second session. Upon the first monthly follow-up, she had noticed small changes in her OCD symptoms and reported being more "relaxed" about them. Additional data collection will continue for six months following treatment and will be reported. **C12**

280 **Communicating with the Consciousness of Cancer** Karen Gilbert <wandsqueen@earthlink.net> (New York, NY)

Cancer exists as a non-physical information system as well as a physically manifested entity within the human body. The informational aspect of cancer can be considered to be "conscious," or to have "mind;" certainly to have affect and intention. Cancer does not "think" as humans do, but cancerous cells respond to evolutionary pressure. It seems possible that "communication" could be effected between the human host and the informational aspect of cancer. The mutually destructive parasitic relationship may be a perversion of an earlier symbiotic relationship. An original symbiotic role of cancer was to de-differentiate the cell back to a "blank slate" so that it could be reformatted constructively; specifically, the ability of some forms of life to re-generate limbs. Cancer sends out "runners" or "scout cells" that form a network of extensive colonies. Cancer – by its ontological nature – exists in an "open" system, and when placed in a "closed" system becomes pathologic. The twin historical, evolutionary "traumas" that switched cancer from its symbiotic function to its parasitic one were the closing and the pollution of its environment. Environmentalists are dealing with the pollution, and this paper should be read in conjunction with theirs. Humans were once an open system energetically or psychically, being historically skin-bounded individual selves. Telepathy is an innate human ability. When humans were linked with an open telepathic channel this was the open environment in which cancer could helpfully function as the de-definer that undid the structural stratifications of specific cells, returning them to a smooth status where regeneration happened. While the physical aspect of cancer did this somatic work, possibly the informational aspect of cancer performed a complementary function – channel clearing or maintenance of the psychic (energetic) telepathic channel. Telepathic ability is much degraded but still exists and can be re-actualized – behaviorally or somatically manifest. Environmentalists would have to help humankind change the level of toxic pollution. Once the cancer returned to its open environment, and the meta-environment was no longer toxic, cancer could re-evolve to a symbiotic role. **P4**

281 **Mind-Body Medicine as Internal Persuasion: The Structural Coherence of Emotional Coloring and Phenomenal Tint** Marianthe Karanikas <karanikas@missouristate.edu> (English, Missouri State University, Springfield, MO)

The concept of internal persuasion provides a focus for a systematic integration of third-person and first person data in the study of mind-body medicine. Internal persuasion, a rhetorical concept, borrows from the Aristotelian tradition. For public speech, Aristotle defines rhetoric as the "faculty of discovering the possible means of persuasion with respect to any subject" (The "Art" of Rhetoric, 1355b). The possible means of persuasion, or pisteis, (appeals), are ethos or the ethical appeal, pathos or the emotional appeal, and logos or the logical appeal. Internal persuasion, meanwhile, occurs when ethical, emotional, logical, or mythical belief structures change the psychophysical reaction to the tint of experience. In this inquiry, "psychophysical reaction" refers to the psychological and physiological mechanisms associated with the craving, aversion, or inattention toward the awareness of the pleasantness, unpleasantness, or neutrality of experience. The psycholinguist Steven Pinker (1997) calls this awareness, "emotional coloring," a feature of access-consciousness (Pinker, 1997; Block, 1995). Access-consciousness corresponds roughly to the philosopher David J. Chalmers' definition of "psychological awareness" (Chalmers, 1996). But what of the quality of pleasantness, unpleasantness, or neutrality of experience itself? I refer to this quality as the "tint" of experience or "phenomenal tint." If Chalmers' hypothesis of structural coherence holds, then emotional coloring, a feature of the structure of psychological awareness, may cohere with tint, a property of the structure of experience. The hypothesis of structural coherence states that there exists a coherence between the structure of psychological awareness and the structure of experience. Psychological awareness is a high-level notion; therefore, structural coherence lies at the wrong level to constitute a fundamental law in a theory of consciousness (Chalmers 1996, 2006, 2007). Tint, however, may be a basic property of experience. Is tint a phenomenal quality or a physical property? Perhaps tint is a fundamental property, which will help us explain conscious experience in naturalistic terms as electric charge helps us explain electricity. Note: My use of the term "phenom-

enal tint" differs from that of the philosopher P.D. Ouspensky. In the Tertium Organum (1945), Ouspensky attacks Science for viewing the Universe as Energy that receives a phenomenal tint from our sensory organs. In this inquiry, I seek naturalistic explanations and applaud the work of scientists. **P4**

282 **Mind, Movement and Health as Emergent Properties of Patterns in the Neural Net** Monica Michalski <mind_movement@yahoo.com> (Mind Movement Sciences, Naples, FL)

The intended purpose is to explore the relationship between health and consciousness. It is proposed that mind and movement is the result of the underlying structure and function of the neural net. As the neural net is the one system that connects and coordinates all cells of the body, the brain-body state that is produced from the patterns in the neural net is reflected in the functional elements of the mind (behavior, emotions and thought)and movement (alignment, breath and motor control). Cognitive Neurophysics describes a technology called Mind Imaging that can be used to precisely measure, influence and predict the recognized characteristics of health. Probabilities of emotional states are calculated, state-bound behaviors are represented and organization illustrated. It is concluded that when recommendations are given for directing health, an individual's model of present level of health must be depicted before compliance, competence and carryover is possible. **P4**

283 **The dynamics of imaginary energy states in the human hair shaft, modelled on the neurone in consciousness, as they relate to changes in health and disease.** Alan Oliver, Bevan Reid MD <cr.alan.oliver@bigpond.com> (Research, Analogue Wave Applications P/L, Helensvale, Queensland, Australia)

We have had significant advances in the experiment which indicate a viable method of movement from a disease state to a healthy state. **P10**

284 **Neuroethical Concerns Raised by Religious Experiences in Epilepsy Management** Aaron Pearl, Paul J. Ford – The Cleveland Clinic Foundation & CCF Lerner College of Medicine of Case Western Reserve University; Joseph P. DeMarco – Cleveland State University <a.pearl@csuohio.edu> (Philosophy / Psychology, Cleveland State University, Cleveland, Ohio)

Medical interventions involving the brain present unique challenges in that both the disorder and the treatment may have a profound impact on the anatomical locus of a patient's beliefs and values. Owing to the high degree of subjective significance, these challenges are further complicated in the case of religious experiences, as brought out in the epilepsy literature. At present, the epilepsy literature provides the richest source of data for investigating correlations between the brain and religious experience, though studies suggest similar findings in healthy subjects. The same limbic structures involved in temporal lobe epilepsy have been implicated in the neural substrate of religious experience by neurotheological researchers Newberg and D'Aquili. Dr. Michael Persinger has successfully induced mystical states in healthy individuals by stimulating the temporal lobes. Reviewing the scattered data on religious experience in both patient populations and normal subjects, Saver and Rabin have proposed a limbic-marker hypothesis according to which the limbic system marks the valence and salience of certain experiences. Suppose then that a patient has a seizure with a temporal lobe focus leading to a hallucinatory experience. The paroxysmal nature of the seizure, and by extension the hallucination, lends itself well to religious interpretation. For the patient, the brain has made this experience real and highly salient. As the suggestion of an epileptic etiology for this experience may be viewed as a threat and thereby explicitly denied by the patient, achieving authentic informed consent may be difficult. /P There appears to be strong evidence for a mutually amplifying effect between ictal religious experience and inter-ictal hyperreligiosity. In several of the studies looked at, ictal experiences ceased to occur after temporal lobectomy, but hyperreligiosity persisted. As successful surgical intervention will, by design, have little to no effect on the valence and salience of past memories, it is easy to see how losing the capacity for mystical experience in a patient for whom hyperreligiosity persists can lead to depression and feelings of abandonment. In the overall picture of disability in epilepsy, psychiatric comorbidities may be of greater significance than the seizures themselves. Substantial follow-up care that extends beyond surgical considerations is therefore critical in meeting the goals of treatment. /P Whereas it is beyond doubt that comprehensive presurgical assessment is invaluable to predicting outcomes and to setting reasonable expectations, it may be that the current battery of tests is not comprehensive enough. Saver and Rabin point to a 1965 study in which "Patients given LSD before and after temporal lobectomy showed reduced richness of induced perceptual experience after temporal lobe resection." Though perhaps a bit disturbing by today's standards, this study suggests the possibility

that the fullness of a patient's mental life may be reduced following successful surgery. This naturally raises the question, exactly what aspects of normal consciousness might be unknowingly sacrificed? Considering the ethical challenges brought to light by this phenomenon, it seems clear that properly managed cases of epilepsy will both depend on and contribute to a theory of the interplay of consciousness, experience, and brain anatomy. **P4**

285 **Colors of Healing: Spectral color as a non-local agent of transformation in localized human consciousness** Susan W. Schwartz <ssbaraca@meganet.net> (Sturbridge, MA)

Come forth into the light of things, Let nature be your Teacher. William Wordsworth The interplay of color on conscious and unconscious planes within humans has been consciously employed by humans, across cultures worldwide, to affect states of being and becoming. Within a vast array of societal contexts, healing being one, color has historically been granted power to arouse, subdue, and nuance individuals' perceptions, physically and experientially. But do these rays of light have consciousness? Is there a non-local, non-human intentionality operant when color interacts on human consciousness? It is suggested here that spectral colors are not, in themselves, conscious akin to the awareness of humans in so-called ordinary reality. Rather, this form of light is deemed kindred by virtue of being Nature's or Spirit's materia medica. As such, it embodies Cosmic Consciousness intended to imbue diversely manifest entities with life and, where necessary, to promote healing. The scientific perspective on light and color prototypically speaks to physical constructs. The electromagnetic energy of solar light appears as white or colorless to the human eye, in ordinary reality. This energy, vibrating at different frequencies, likewise produces differing wavelengths that manifest as colors visible to the human eye. In the latter third of the 17th century, several theories on the nature of light developed. During that time, Sir Isaac Newton passed sunlight through prisms, and demonstrated not only that it visibly differentiated into the spectral colors familiar to us in the rainbow, but also that it maintained as discrete rays. In metaphysical perspectives, solar light has been considered a masculine, positive, initiating force, suggestive of the yang attributes in Chinese philosophy, with spectral colors deemed feminine and negative, in the sense of gently receptive yin qualities. In terms of healing, either as white light (subsuming all colors), or as specific rays, chromotherapy (color healing) is viewed as a therapeutic force that energizes and re-balances that which has become disordered. Spectral light is postulated to accomplish this transformation through a person's etheric body – that being an energy field that exactly replicates the physical body. It is via the seven primary chakras (centers of force) within the etheric that the non-local consciousness of colors nurtures humans' localized physical and subtle energy planes of consciousness. While current-day biomedicine has used color to treat such dysfunctions as seasonal affective disorders (SAD) and neonatal jaundice – with cure more than healing as the goal – there is a relative dearth of rigorous scientific research on chromotherapy, albeit a literature is developing. This poster presents an assortment of theoretical, anecdotal, and clinical data on chromotherapy, with the work of several pioneers in the field highlighted. **P4**

*See also:*

316 **A Boolean Algebra of Ego Mechanisms of Defense**
311 **Hypnosis And Anthroposophical Medicine**
278 **A Clinical Medicine based on the Holistic Proprioceptive Nature of Symptoms**
285 **Colors of Healing: Spectral color as a non-local agent of transformation in localized human consciousness**

## 4.11 Miscellaneous

286 **What Could Possibly Count as a Physical Explanation of Consciousness?** Uzi Awret <uawret@cox.net> (Center for Quantum Computation, George Mason University, Falls Church, Va.)

The biggest problem in trying to furnish a physical explanation of consciousness is not so much the irreducible need to sweep certain crucial issues 'under the carpet', so to speak, (That is true about physical explanations in general.) but rather that we don't even have a 'carpet'. In a way, the trick is to conceive of a 'carpet' that would enable us to justify the suspension of certain crucial questions about consciousness while at the same time providing enough room for a legitimate scientific explanation of consciousness. I will try and create the easiest version of the hard problem that I can without appealing to the physics of the future by stretching physicalism to the limit and than fixing it. Our explanans will consist of physics as we know it (Including theories that are considered to be legitimate possible physical theories.) plus a finite number of speculative auxiliary hypotheses that are logically possible, and compatible with everything we know about physics. To

a physicalism that includes singularities, the Bekenstein Bound and Lee Smolin's 'bounce' (After John Wheeler and Bryce DeWitt.) I will add the next two auxiliary hypotheses: a)The brain can be shown to harbor physical singularities. b)Such singularities can be shown to constitute a minimal NCC. (By 'minimal NCC' I mean the best NCC available to us at any given time and not a 'final' NCC.) Philosophically, the conclusion I will argue for is that assuming a) and b) to be true makes it possible to conceive of a legitimate physical 'explanation' of consciousness. Physically, trying to justify the possibility of a) and b) is difficult but not impossible. I will mention three possibilities involving: a)Penrose/Hameroff Orch, the realistic approach to quantum mechanical superpositions and the Bekenstein bound. b)Hofstadter's 'strange loops', the doubling of the wave function and mirror reflections inside hydrophobic pockets. c)Recent explanation of the Nernst effect in two-dimensional high-Tc Cuprate superconductivity that takes advantage of the ADS-CFT correspondence, or the Anti De-Sitter Space – Conformal Field Theory correspondence. (See Jan Zannen's recent article in Nature 29 august 2007.) **P10**

287 **The Historical Context of Consciousness Studies as a Research Tool** James Beichler <jebco1st@aol.com> (Physics, Division of Natural Science and Mathematics, West Virginia University at Parkersburg, Belpre, Ohio)

The consciousness studies movement needs to be placed within its proper historical context to better understand the cocnept of consciousness. History has a very unique and special role to play in consciousness studies in that it can be an active player in the development of a theory of consciousness rather than a passive recorder of the details of that development. According to the original Cartesian separation of mind and matter, any questions concerning life, mind and consciousness were relegated to religion. So Newtonian science was not at first concerned with consciousness and did not develop any conceptual models of life, mind or consciousness. However, Newtonian physics became so successful by the middle of the nineteenth century that concepts of mind and consciousness were again considered fair game for scientific inquiry. This expansion of the boundaries of science led to the development of psychology as the new science of mind just as the Second Scientific Revolution in physics unfolded. Unfortunately, science was not yet ready to deal directly with mind and consciousness, so a positivistic compromise overwhelmed the new science of psychology: Behaviorism, rather than consciousness, then became the basic theory and guiding principle for psychology. Psychology and science literally lost consciousness after 1913 and did not begin to regain consciousness for several decades. By the 1970s, consciousness had become so relevant to scientific speculations on the ultimate nature of physical reality that consciousness could no longer be ignored and a renewed scientific interest in the subject of consciousness emerged. The new ideas of consciousness that emerged were interdisciplinary and concerned many different academic disciplines, both inside and outside of science. Yet in the new quest for a theory of consciousness, physics has taken a lead. The interest of physicists in consciousness coincides with other problems in physics that seem to be leading to a new Scientific Revolution out of which a definition and theory of consciousness should emerge. Quite simply, the recent advances in consciousness studies are revolutionary. Consciousness has become so important in science that any physical theory of reality that scientists develop must consider the role of consciousness in reality. The history of our attitudes toward consciousness can act as a guide to identify specific properties of consciousness as well as identify new problems in how science interprets consciousness and its role in physical reality. History itself is a primary example of consciousness realizing itself. **P4**

288 **Broadening Inclusive Fitness Theory: The Evolution of Unreciprocated Altruism among Non-Kin Humans.** Igor Dolgov <idolgov@cox.net> (Psychology / AME, Arizona State University, Tempe, AZ)

Modern inclusive fitness theory explains the existence of altruistic behavior in social animals via the evolution of unreciprocated altruism among family members. Unfortunately, due to the assumption that non-kin individuals have a relatedness factor of 0, inclusive fitness theory currently can not account for apparent instances of unreciprocated altruism between non-kin humans, like anonymous donation and random acts of kindness. In contrast, modern population genetics theory and DNA fingerprinting research estimate that all people share between 3 and 7 percent of their coding alleles – making all people relatives in terms of inclusive fitness, however distant. In light of this fact and additional supporting evidence, it is important to broaden inclusive fitness theory to account for unreciprocated altruism among seemingly unrelated individuals, as this theory is still the motivating factor in the gene vs. group selection debate, and still one of the most popular vehicles for teaching evolutionary science. **P10**

289 **A Preliminary Approach to an Alternative Hypothesis of Reality and Consciousness.** Raynal Dunlop <rdunlop@codelco.cl> (Codelco-Chile Corporation, Rancagua, Chile)

Based on the analysis of quantum concepts and its philosophical implications, the French physicist and philosopher Bernard d'Espagnat has investigated the reality concept. Extending his analysis the following presentation describes a hypothetical operational scheme, integrating the two main domains contributing to our reality concept as characterized by D'Espagnat: a human empirical reality, a reality for us, and the reality in itself. The later would include the human self-consciousness capacity. Regarding this Kantian approach, one issue must be emphasized: the human body as a conglomerate of cells, tissues and organs should be considered as an empirical image. Indeed, all scientific developments would be included in this empirical reality. Therefore, any approach to the human empirical reality generation would be located in the reality in itself scenario and it would integrate the human conscience. The presented hypothesis attempts to link the human empirical reality, the human self-consciousness capacity and the reality in itself. The fundamental assumption for the hypothesis is to consider that interactions between human beings as part of the reality in itself and the rest of that reality can take place. According to this statement, an individual empirical reality would be generated after the interaction of the reality in itself human subject with all the reality in itself elements that would be able to modify his structure. The resulting effects from that interaction would be superposed in the human structure in agreement with the assumption of a lack of a reality in itself space-time framework, accordingly to a d'Espagnat's suggestion based on the non-locality quantum concept. The human self-consciousness capacity would turn these effects into empirical images that would be deployed as an specific sequence, integrating spatial and temporal dimensions. Changes in the human empirical reality, particularly human actions, could be interpreted as changes in the sequence deployement. Conceptual representations based on these images could be established in a late stage. In that way, a first approach to an alternative hypothesis concerning a reality model, including the human self-consciousness function has been proposed. **P10**

290 **What's needed to move 'Toward a Science of Consciousness'** Albert Fonda <agfonda@gmail.com> (Fonda Engineering Associates, King of Prussia, PA)

The subjective cannot be approached objectively – or so Kant argued (Gardner, 1985, p. 59). But while Kant would have considered the title of this conference to be oxymoronic, I do not. ~ The "objective" view, observed particulars stripped of the subjective and buttressed by consensus, is the very essence of the scientific method. We often use the same method less formally, in our daily lives. But to avoid Kant's objection we need a simple but workable model of consciousness, useable both formally and informally. This paper offers one such model. ~ While developed quite independently, up to a point the present approach follows both Spinoza and Bissell (http://tinyurl.com/ynnmnf). However, Spinoza's God is superfluous, as others have often noted. Superfluous too is Bissell's intricate non-reductivism because, as per Chrysippus (250 BCE) (see p. 96, Cooper, http://tinyurl.com/2x67yr) as well as Hobbes, the conflict between free will and determinism is just an attitude. Given that, dual-aspect theory becomes a reductive physicalism, and I provide (http://tinyurl.com/ynrhlg), if not quite a new paradigm, at least a simplification of and some new vocabulary for the existing physicalist approach. ~ The model is this: ^the mind is the brain as viewed from within.^ ~ The means, recent research suggests, is ^mirror neurons.^ ~ The philosophy involved I call ^neural nominalism.^ ~ Extrospectively, biomedical investigators routinely examine the outside of any brain, and using brain imaging isolate the neural correlates of many stimuli. Still, no one can experience another brain introspectively. How then should they account for that which they cannot deny, yet fail to observe? ~ The answer? ^Consciousness is known only to the conscious^ – rendering moot the question of whether any AI, "zombie," animal, or other human is or could be conscious. ~ An idea is physically in the brain as a neural display, like the perceived ache of a tooth. Extrospection and introspection, then, merely utilize different sensors and different neural paths. The introspective path utilizes, according to recent studies, ^mirror neurons^ (http://tinyurl.com/2d69gx). But whatever the means, there is no need for dualism (not even property dualism). There is only one, fully physical thing, seen in two ways, equally valid. ~ Plato thus was mistaken, and William of Ocham was correct: there are horses, which we personally come to recognize, but there is no essence of horsiness. Nor does mathematics, or any other idea, exist other than as part of our personal view of our own brain from within. Ideas are, in other words, not "out there," but "in here," being both observable and physical. To postulate a world of ideas in addition to a physical world is to multiply entities beyond necessity. ~ I call this "^neural nominalism^" because it links the empiricism of neurology with the parsimony of nominalism. We need postulate no interaction between the mental and the physical, for the mental is our view of a part of

the physical, the part inside our own heads. ~ With an ethical ramification: beyond self-protection, we are not entitled to quarrel with the views of anyone as to anything. **P4**

291 **Consciousness and the Scheme of Things. A 'New Copernican Revolution.'** Lorna Green <lornagreen@windstream.net> (El Rito, New Mexico, El Rito, New Mexico)

Consciousness is our new frontier. The faith of most scientists is that it can be explained by existing scientific principles. I say it cannot. And that consciousness is to modern science what light was to classical physics: All our fundamental assumptions about the nature of Reality have to change. Modern science is already in deep trouble. At the end of his 1,000 page book, The Road to Reality, Roger Penrose concludes that the whole of physics has failed to find this road and that it does not know what physical reality really is. Now comes consciousness. Most scientists believe that consciousness emerges at the end of evolution, in us and the higher animals, when matter attains 'a certain state of complexity,' And that it is a by-product of brain activity, produced by neurons. As William James put it: The mind is to the brain as the shadow to the runner; it runs beside him but never influences his stride. But so far, no one has shown how the brain produces the mind. All we have is correlation, dualism. The key to disentangling the relationships between mind and brain is the near death experience. (See Pim van Lommel's work): The body in the bed is brain dead, but the patient – consciousness – is alive and well, hovering at the ceiling, watching the doctors working over him below, able to see without eyes, hear without ears, and think and remember without a brain, What does this mean? a. Consciousness is totally separable from the body, the brain. b. All of our real powers, our sense of self, are in consciousness. This phenomenon is the experimentum cruci for modern science. It cannot be explained by any existing scientific principles, it calls all of those principles into question, it is the death knell for every form of materialism. Hence, I propose a 'new Copernican Revolution' of fundamental terms. Evolution makes us continuous with everything else; consciousness would not be in us if it were not in them also. I propose 'the Consciousness Paradigm' – that consciousness, and not matter, is 'first and fundamental' in the universe, it is there from the beginning, everything has it, and all the true explanatory principles of the universe are in it. The implications are staggering: A universe – not chance and necessity, matter/mechanism – conscious, awake, aware, intelligent, inspirited, Answering Roger's question: Physical reality is an expression of consciousness. An Earth, and all her bright beings – not cleverly-wired machines, not board feet, but conscious, intelligent, awake, alive, a living organism, indeed, a divine being, Gaia. Lorna Green, PhD lornagreen@windstream.net **P10**

292 **Vortex based mathematics as a clue to understanding the zero point field?** Sandgren Tim <tim.sandgren@gmail.com> (Gothenburg, Sweden)

A way of arranging numbers in a basic pattern that can be folded into a torus has been proposed by the intuitive mathematician Marko Rodin*. The emerging pattern can be interpreteted as a double vortex motion. The analysis of this pattern thus been called "Vortex based mathematics". Is it possible that an understanding of this Vortex based mathematics could provide us with an epistemological shortcut to understanding the zero point field and indeed holons on all levels? This question may seem outrageously unorthodox, and it is therefore explored carefully using frameworks from philosophy of science and sociology of knowledge. *www.rodinmath.com/ **P10**

293 **The Neurobiology of the Mind's Eye** Ron Shane <JLASKY3441@aol.com> (Psychology, UC San Diego, San Diego, CA)

Humans from a variegated array of cultures have been depicting a meta-phenomenon, which has been referred to as the third eye for many centuries. The yogic tradition describes this aspect of the human meta-physiology as the sixth chakra. Moreover, Taoists likewise have described this aspect of man's consciousness as the upper dantien. The British 19th century poet Coleridge explained this construct when depicting the phenomenon of synesthesia, which involves the blending of the senses into an intriguing esoteric experience. Thus far neuroscientists have not been able to actually locate the neuroanatomy, which corresponds to the mind's eye. However, many philosophers in the nineteenth century have speculated that the pineal gland was somehow involved in man's capacity for intuitive vision. The intent of my lecture is to explicate the meta-phenomenon of the mind's eye or Blake's concept of four-fold vision. This lecture will be based from my recent text entitled "The Etheric Power of the Mental Eye", which is a disposition on the furtive neurobiological basis of man's visionary predilection. It will be argued that the body's chi circulation and salubriousness of the chakras are regulated by particular super circuits of the frontal cortex whose neurological network still remains furtive for neuroscientists. Moreover, when these ubiquitous pathways are activated, they can modulate the body's arcane biological dynamics. For example, an accomplished martial artist is able to down or upregulate chi throughout his body. These

advance practitioners can readily induce states of magnificent ecstasy by incensing what energy masters describe as the body's cryptic meridians of delight. The poet Walt Whitman depicted this experience in his poem, "The Body Electric". The intuitive lucidity of this meta-neurological phenomenon was substantiated in Blake's poem, "The Marriage of Heaven and Hell" as well as Huxley's "Doors of Perception". Man's innate propensity for bodily mystical invigoration is associated with the actualization of the mind's eye or sixth chakra. **P4**

294 **Minds form a Discrete Degree, in the Same Way that the Physical has Discrete Degrees** Ian Thompson <I.Thompson@surrey.ac.uk> (Physics, University of Surrey, Pleasanton, CA)

If we examine the natural structures found by quantum physics, we find that energy operators, quantum-mechanical propensities and outcome-events form a triple set of material 'discrete degrees'. This is in the sense that they simultaneously exist in their own way, without being reduced to another. Furthermore, the energy operators (Hamiltonians) generate the propensities (wave functions), which in turn generate actual outcomes. (Even though we do not yet know the timings of the last step, we have many hypotheses.) I therefore name this triple as of 'discrete degrees', or 'multiple generative levels'. A similar set can be found if we take quantum gravity (pregeometric processes) to generate Lagrangians for virtual processes in spacetime, which in turn generate the triple (sub)degrees of energy/propensity/actual-event. (Even though we do not yet know the details of pregeometric processes, we are forming many hypotheses.) Now, just as the first 'material triple' is the set of sublevels in the final level of a more global 'physical triple', I now hypothesize that the physical triple is again a set of sublevels in the final level of a yet more global triple. This global triple, for reasons to be given, is taken to be composed of two new parts: namely some kind of 'spiritual' processes followed by some kind of mental processes. We assume that the 'recursive nesting' pattern of levels and sublevels is repeated, so we have some guidelines for exploring these new degrees. There is already evidence from stage developmental theories of Erikson, Piaget, Gowan and Commons that the mental degrees have multiple sublevels of affectional and cognitive development of the required kinds. There is further empirical evidence from Swedenborg that the spiritual degrees have similar substructures, and indeed he hypothesizes that this 'multiple generative level' pattern is universal. We therefore need to integrate our knowledges from physics and psychology (and, as necessary, from elsewhere) to ascertain the true nature of the discrete degrees as identified here, and see whether they in fact form a universal dynamical structure of the scope indicated. Then, since reductionism does not work even within physics, we would an effective or 'generalised' dualism of mind and nature, but one according to which they are still constantly related by causal connections of similar kinds to those already discovered in the sciences. Mind and nature, without being reduced to the other, would be both part of a more complicated structure that the scientists have already begun to investigate in detail even though they have not yet seen the whole picture. **C19**

*See also:*

271 **"Phylogenetic" Amnesia – Precondition of Self-consciousness?**
90 **Machines or Sentient Beings: A Panpsychist Manifesto**
276 **Experimental Demonstration of the Pathogenesis of the Coma, Through the Unified Synaptic Channel Collapse. Physiological – Clinical and Quantum-Electrodynamics Considerations.**

# 5. Experiential Approaches

## 5.1 Phenomenology

295 **Sense Symmetry: A Method for Tuning Consciousness's Scope** Whit Blauvelt <whit@closeread.org> (Bellows Falls, VT)

In our present stage of the formation of a science of consciousness, it may be premature to assess advice for improvements in the personal practice of mind; advice which necessarily lacks firm foundations in this nascent science. Still, it is vital to the procedures of any good laboratory to gain skill in tuning its observational instruments. Just as studying electro-magnetism requires using electro-magnetic instruments, we should be surprised to find we can study consciousness well while excluding the first-person approach. By what system may we tune the first-person instrument, in advance of consensus on foundational theory? Considerations of symmetry – a wellspring

for both mathematics and physics – provide a way in. Tuning for symmetry of the senses in prospective-reflective space brings into resolution features of mind eclipsed by our culture's normative tuning, which runs a large portion of "internal" auditions through an asymmetric skew. That a sense-symmetric tuning regimen is practicable and readily replicated constrains the range of viable hypotheses on the nature of our subject. Preliminary results indicate new ways to tap Hutcheson, Emerson and James as sources for tomorrow's science. **P5**

296 **Intentionality, the Peri-personal Space and the Psychotic Experience** Jorge Davila <jcdavila@cable.net.co> (Ciencias Humanas-Filosofia , Universidad Nacional de Colombia, BOGOTA, D.C., COLOMBIA)

In some phenomenological conceptions about embodied experience (Husserl, Varela and Depraz), it is emphasized that the kinesthetic patterns of the subject are always affectively tuned and that they deploy a peculiar peri-personal space which configures a milieu, an in-between, which "surrounds" him and configures his most basic navigational environment. All those elements of experience have to be understood as essential components of intentionality. So, one of the layers of the progressive embodiement of a child, and so will be for the adult, can be conceived as the constitutional "medium" or horizon across which he will experience the world. One important attribute of this dimension of intentionality will be its "ontological transparency", (part of what Merleau-Ponty would call the "Invisible"). A possible neural counterpart of the peri-personal space, as conceived in Phenomenology, can be found among the varieties of functions which have been recently found in the parieto-frontal circuitry. Specially, the VIP-F4 circuit provides a suitable neural locus as far as it encodes space information in a multimodal way, (cfr. the work of Rizzolatti, Gallese et al. at Parma). The peri-personal space (at personal and sub-personal accounts), is also affectively permeated, as are the kinesthetic patterns, giving to objects, persons, atmospheres and horizons a defined emotional "palette" which contribute to establish an important aspect of the non-conceptual meaning of experience. In the same way a difference between Körper and Leib is proposed in the phenomenological account of embodied experience, there will be also a difference between the space as a network of neat geometrical coordinates and the "lived" or "animate" space of human empathy. In this presentation, I will explore the possible relation between some features of the psychotic experience (i.e. schizophrenia) and disruptions or anomalies in the constitution of this basic register of intentionality, including an anomalous peri-personal space, which give rise to a nonconceptual account of the core psychotic symptoms. I will conclude that, without a proper understanding of the disorders of those core aspects of intentionality, the account of more "cognitive" symptoms of psychosis, like delusions, will be insufficient. Finally, some empirical data that support this view will be mentioned. **P11**

297 **The Enactive Torch: Promoting First-Person Phenomenology in the Study of Enactive Perception** Tom Froese, Adam Spiers <t.froese@gmail.com> (COGS, University of Sussex, Brighton, UK)

Since its inception in the early 1990s the enactive approach to perception has been generating an extensive amount of interest and debate in the cognitive sciences. The original idea behind this approach can be summarized by the claim that perceiving is not about the recovery of a perceiver-independent world, but rather consists in perceptually guided, embodied action. More recently, the approach has contributed to perception being conceptualized as a skillful mode of exploring the environment, which draws on bodily know-how of sensorimotor regularities. The enactive approach is empirically supported by research using perceptual supplementation (PS) devices, in particular because it highlights the importance of embodied action for perception. The process of acquiring skillful mastery of a PS device is a valuable case study of the development of perceptual awareness; blind or blindfolded subjects report the constitution of a perceptual modality which discloses objects located in 3D space. One contentious issue in this regard has been how best to characterize this modality. Should it be seen as an extension to an existing modality such as touch or vision, or as an entirely new modality? So far this theoretical debate has only been informed by the behavioral capabilities and verbal reports of experimental participants. This paper argues that the dispute cannot be resolved with the use of such third-person methods alone; it additionally requires the establishment of a phenomenological pragmatics. In particular, it is necessary that those involved in the debate become skillful in the use of PS devices themselves. We designed the Enactive Torch (ET), a PS device which is cheap, non-intrusive and easy to replicate, so as to enable researchers to corroborate reported experiences with their own first-person experience more easily (cf. Froese & Spiers 2007). The ET provides one continuous channel of vibro-tactile feedback to the hand, where the strength of stimulation depends on the distance to the object at which it is pointed. Almost immediately a subject can use the ET to detect obstacles, and after a little training (ca. 10 minutes) has no

problem of locating relatively 'invisible' objects, such as a lamppost, in space. Moreover, after around 1 hour of practice certain salient features of the environment, such as corners and open doors, take on a distinctive perceptual pattern. At this stage the experience of perceiving obstacles can be described as 'touching resistant, viscously permeable objects located "out there"'. However, the experience is unlike touch and more like vision in that it enables a detached scanning of the environment that does not commit the subject to direct interaction with the objects of its perception. More phenomenological research is clearly needed, but our own initial first-person experience indicates that the perceptual modality constituted by mastery of the ET, while similar in some respects to touch and vision, nevertheless constitutes a unique modality which is dependent on the particular sensorimotor affordances of the device. References: Froese, T. & Spiers, A. (2007), "Toward a Phenomenological Pragmatics of Enactive Perception", Cognitive Science Research Paper, 593, COGS, University of Sussex, UK **C21**

298 **How to Explain the Fringes of Consciousness?** Jorge Gonçalves <jgoncalves.ifl@fcsh.unl.pt> (Instituto de Filosofia da Linguagem, New University of Lisbon, Lisbon, Portugal)

How to explain the fringes of consciousness? William James discovered that consciousness isn't only the focus over the external world. Beyond the sensorial focus there are the fringes or a penumbra of consciousness. He studies six kinds of these fringes: familiarity, feeling of knowing, feeling of knowing, feeling of tendency, feeling of relating, and feeling of expectancy. These fringes are non-sensorial (Mangan) in the sense that they don't belong to any of the five senses. But they aren't also pure intellectual phenomena as denotes the fact that James called them "feelings". After James several theories tried to explain the fact of fringes. I don't think there is a general theory that explains all kind of possible fringes. However we can point to the biological reasons that allow understanding why consciousness has this complex composition with the focus and the fringes. My opinion is that we need to recoil information about the external world and at the same time to be conscious of the meaning that this information has to us. Because of the limited capacity of consciousness (Baars) this information must be given in a synthesized form (Mangan) and in an emotional form (Damásio). We must have quick information about the meaning that the exterior stimulus has to us, even if we can't say why, in order to act in due time. The solution that evolution reached was to give to the organism the possibility to access in a vague way to its interior, mostly corporeal, data without losing paying attention to the details of the environment. The information must be emotional for having power in the necessary decisions the organism must have to take, facing the dangers of the world. I exemplify with some fringes in normal and pathological situations. References: Baars, B (1997) In the Theater of Consciousness: The Workspace of the Mind. Damasio, Antonio R. (2000) The Feeling of What Happens. De Sousa, R. (2002) Fringe Consciousness and the Multifariousness of Emotions (Psyche). Galin, D. (1994). The structure of awareness: Contemporary applications of William James' forgotten. concept of ''the fringe (Journal of Mind and Behavior) James, W. (1890) The Principles of Psychology. Mangan, B. (2002) Sensation's Ghost: The Non-Sensory "Fringe" of Consciousness (Psyche). Woody, E. & Szechtman, S. (2002) The Sensation of Making Sense (Psyche). **P5**

299 **Descriptive Experience Sampling of Bulimia Nervosa: A Case Study Illustrating the Importance of Careful Examination of Phenomena** Sharon Jones-Forrester, Dr. Russell T. Hurlburt <jonesfor@unlv.nevada.edu> (Psychology, University of Nevada Las Vegas, Las Vegas , NV)

After nearly 30 years of research, we still know very little about the nature of directly apprehended inner experience in individuals with bulimia nervosa (BN). The current BN literature relies primarily on self-report and clinical interview, both of which carry significant risk of retrospective and other biases. As a way of reducing those biases, we used Descriptive Experience Sampling (DES) to explore the inner experience of 15 individuals with BN. For this paper, we will take a detailed look at "Anne's" experience; Anne's experience is quite representative of the 15. DES participants use a random beeper in their natural environments. The beeper sounds at random intervals, typically 6 times per day. At each beep, the participant pauses ongoing activity and takes notes about the characteristics of the inner experience that was occurring at the moment of the beep. Within 24 hours of sampling, the DES investigator and participant conduct an expositional interview about those six moments of experience. The sample/interview procedure is repeated over approximately 6 days. DES reduces retrospective and other biases, and may produce as faithful a description of inner experience as is currently possible. The literature suggests that inner experience in BN is characterized by negative affect, negative cognitive schemas and cognitive distortions, and preoccupation with weight, shape, and food. When directly examined by DES, we found

inner experience in our 15 individuals with BN to be strikingly different from what the literature suggests. To illustrate, we will describe the inner experience of "Anne." Anne's experience was complex and multiple, and was characterized by a marked difficulty distinguishing between affect and cognition and a distinct, unusual continuation of previous, unrelated phenomena throughout her experiences. The characteristics of Anne's inner experience, and in fact, that of all of the participants with BN that we have examined, significantly challenge the literature's expectations about the inner experience of BN. The discrepancy between the literature and these DES results may be due to the inadequate methods used to explore inner experience in other studies. DES offers an increased understanding of the complex phenomenology potentially affecting BN etiology, course, and maintenance. We argue that careful examination of inner experience is critical if we are ever fully to understand the complex experiential nature of this profoundly disruptive, potentially fatal disorder. **C5**

300 **Empathy and Moral Perception** Joel Krueger <joelk@hum.ku.dk> (Philosophy, Danish National Research Foundation: Center for Subjectivity Research, Copenhagen S, Denmark)

This paper considers the following question: How is interpersonal sensitivity possible in the first place? In it, I discuss the relationship between empathy (i.e. our experience of another person as a cognitive and affective agent) and perceptual consciousness. I argue that empathy is fundamentally, though not exclusively, a bodily practice. That is to say, I argue that our capacity for interpersonal sensitivity connects with the fact of our agency: our ability to perceive and act within the dynamic flow of a continually changing world, including the human social world. This means that a discussion of the "mechanisms" of empathy – the events, processes, and bodily structures enabling interpersonal sensitivity – ought to include the intentional body (in its encounter with other intentional bodies) as its protagonist. However, dominant stories about empathy in current philosophy of mind and cognitive science feature different characters: inner knowledge structures and other mental items (e.g. theories, simulation routines, shared representations, etc.) that purportedly take us out of our own head and, indirectly, into that of another. Against this story, I challenge the internalist orthodoxy of standard accounts of empathy and argue that, to the contrary, empathy is an "extended" bodily-perceptual process. It is enacted within the responsive transactions of bodily subjects – and much of it happens outside of the head. This view of empathy – which I support by drawing upon western phenomenology, Zen Buddhist accounts of moral skillfulness, and empirical studies of Moebius Syndrome and facial recognition – not only challenges orthodox accounts of empathy but, furthermore, has important implications for discussions of moral perception. The paper proceeds in this way. [1] First, I discuss the idea of "folk psychology". I look at how the two dominant models of interpersonal sensitivity, Theory Theory and Simulation Theory, portray the cognitive link between folk psychology and empathy. I make explicit the internalist orthodoxy driving both views: the idea that the relevant mechanisms enabling interpersonal sensitivity are, and in fact must be, inner knowledge structures (e.g. theories, explicit or implicit simulations and shared representations) located inside the head of the subject. [2] Next, I challenge their internalist orthodoxy and offer an alternative "extended" characterization of empathy as a bodily-perceptual practice. Drawing upon Moebius Syndrome cases, I argue that the body's expressive dynamics – gesture, movement, facial expressions, etc. – ensures that some features of other's mental states (e.g. emotions) are present out in the world, directly accessible to other subjects. Empathy is thus enacted within our bodily-perceptual engagement with these "externalized" features. [3] I conclude with a discussion of how a Zen Buddhist "ethics of responsiveness" is helpful for articulating the practical significance of an extended, body-based account of empathy. Building off of Paul Ekman's work on meditation and facial recognition, I argue for the link between empathy and moral perception: the ability or skill to perceive, in a fine-grained manner, the moral significance of encountered situations. **C3**

301 **A Simple Description of Consciousness** Rick Roark <roark@nymc.edu> (Otolaryngology, Neuroscience, New York Medical College, Valhalla, New York)

The study of consciousness would greatly benefit by having descriptions that are simultaneously simple and yet consistent with current observations and experience. We sorely need a "Bohr-model moment" in the investigation of consciousness. The atomic theory of matter has not provided fundamental answers to "what is a proton?" or "why do electrons exhibit quantum behavior?" but the models have served to express matter in terms of constituent particles, explain and predict observations, and guide future study. Planetary models of the atom have since been replaced by more sophisticated descriptions, but they were nevertheless indispensable in their service to science and education. Fortunately, a simple and reliable model of consciousness is possible, beginning with its constituents: In simple terms, consciousness results from the polar interaction of matter and spirit –

the barest ingredients of our universal scheme. Whenever father-spirit and mother-matter unite, consciousness is born and within that union consciousness exists, forming a triple nature. Inasmuch as basic definitions of spirit and matter are problematic, the same is true of their progeny, except to say that consciousness provides the substance for matter and spirit to experience awareness. The emergence of spirit into matter has been occurring since the universe began and is a cosmic phenomenon to which man on Earth is both participant and observer. In response to the emergence of spirit (inspiration), the impulse of evolution is created in turn (aspiration). Plants, animals, and man have, over eons, developed sensory organs to communicate with the environments in which they are immersed and this includes a response to the substance of consciousness. To the extent that sensory organs have been developed that respond to and utilize consciousness, such as the brain of man and the solar plexus of some animals, conscious awareness becomes possible for matter. The notion that consciousness is a creation of the brain is analogous to man's earlier belief that Earth was at the center of the solar system and the sun rotated around us, because that is how the phenomenon first appears from an immersed view. The model of consciousness fits with the philosophy of ancient wisdom, the writings of religious scholars, and the observations of modern science. This presentation discusses how the model relates to recent advances in neuroscience, to the mind, the emotions, conscious awareness, and to man's access to spiritual experience via the conduit of consciousness, for which there is a growing corpus of literature too voluminous for science to ignore. Consciousness is one subject that is best studied within the context of its constituents rather than in isolation. To gain a fuller understanding of consciousness, scientists are encouraged to set dogma aside and begin a careful investigation of spirit, gleaning grain from chaff by applying rigor equal to that given to the study of matter. While we lack basic definitions of matter, spirit, and consciousness, we are not restrained from discovering the many laws and relationships that govern each of their behaviors, with models being indispensable to this process. **P5**

302 **An Experiential Approach to Second Person Inter-Subjective Collaborative Inquiry: The Integral Game** Thomas H. Tower <tom@integralcounseling.com> (Integral Counseling Institute, Portland, OR)

Does cooperative inquiry in novel contexts support a deeper or more effective means of articulating personal or shared social wisdom? Does the sense of self become more fluid when expressed in unfamiliar cognitive-narrative settings? This experiential approach utilizes multiple levels of set and setting to allow participants to develop and explore responses within a variety of conditions and scenarios drawn from diverse sources such as Carl Jung, Star Trek, Neurosciences, Physics, Lost, the I Ching, and Consciousness Studies. The sense of cooperative inquiry in the service of collective wisdom is established by the condition of responding from a personal perspective for the benefit of group understanding. Inquiry is prompted and pursued through dialogue until collective consensus is achieved that the response has been sufficiently explored to advance understanding. **P11**

303 **Intentionality, Attention and Consciousness** Zoltan Veres <veresz@c3.hu> (Social Sciences, College of Dunaujvaros Hungary, Dunaujvaros, Hungary)

My general work is oriented more towards problems of representation, and representational models. However, my aim is to remove the split between different areas, and approaches, and to understand consciousness as a complex, integrated, global phenomenon. Intentionality is usually understood as a directedness of the subject toward a field of experiences. The field itself is organized not only by the experiences themselves, but also by the focus of this experiential field, which is then called 'ego' in the classical tradition. Other forms of understanding of this feature define it as 'for-me-ness' (Uriah Kriegel: Phenom Cogn Sci, 2007/6.) This latter approach deals with the concept of 'internal peripheral awareness'. To deal with the problems of 'for-me-ness' on this basis, although leads to a clearer phenomenological field in research, leaves untouched one important component of the phenomenological constitution of this feature (for-me-ness), ie. the time extent of our experiences. In this sense the unthematic, or rather non-thetic subjective feature tends to be very thematic, a thetic object of a 'natural (phenomenological) attitude'. The same problem appears under different concepts and categories in case of HOT's. The classical understanding of attention splits the experiential field in focus and periphery. The focal experiential field is then understood as a conceptual constitutional field of awareness, or, even more, of self-consciousness. Features which describe this focal field are accessibility, conceptuality, reportability. Theoretical problems appear when attention becomes defined as a source of self-identification information, building up the supposedly key feature of consciousness: self-consciousness (theoretically fuzzy, or deflated versions of it come with the same set of problems, see for instance Kriegel's 'for-me-ness'). In representational theories attention is a special phenomenon where one can easily grasp a peculiar form

of reflection (be it either conceptual, or non-conceptual). The theoretical presumption is that reflection targets back something that accounts for 'subjectivity'. It is only in theoretical approaches dealing with 'embeddedness', or 'enactivism', where there is a chance for re-defining concepts like 'intentionality', 'awareness', 'attention', 'experiental field', 'consciousness', 'self-consiousness'. The main reason for this is that such theories do not understand self-reflection as being a necessary constitutive part of building up our experiential field. One of the best examples of such researches is Ron Chrisley's 'robodogs'. In the further part of my paper I deal with the theoretical and phenomenological outcomes of 'synthetic phenomenology' (Ron Chrisley, Joel Parthemore, Journal of Consciousness Studies, 14, No. 7, 2007). The model worked out by the authors tells about an embedded, integrative, and enactive form of consciousness, lacking the phenomenological reflective features of it, and is promoting the idea of a consciousness actively constituted in the very experiential field. Apart from an enactivist (or action-perception scheme-like) understanding of consciousness, this model offers a chance to solve a classical problem marked by the concept of 'intersubjectivity'. **P11**

*See also:*

67 **Self-Representationalism and the Problems of Subjectivity**
319 **The 'Really Hard Problem' Becomes Even Harder – and More Interesting: Disambiguating Belief, Awareness, Reality, Experience and Neediness in Persons with Aberrant Common Sense**
204 **The Five Most Frequent Phenomena of Inner Experience: Base Rates, Individual Differences and Methodological Considerations**
339 **The Visceral Register: Toward a Phenomenology of the "Second Brain"**
201 **An Intertwinement of Time & Karma: Phenomenology of a High-Speed Racecar Crash**

## 5.2 Meditation,contemplation & mysticism

304 **Realization Process: The Relational Potential of Nondual Awareness An Experiential Workshop** Judith Blackstone, Judith Blackstone, Ph.D. <realizationctr@aol.com> (Institute of Transpersonal Psychology, Woodstock, NY, Ulster)

This is an experiential workshop presenting Realization Process – a series of original exercises developed by Judith Blackstone – for facilitating direct attunement to nondual awareness, and for connecting with another person in this dimension. Nondual awareness, as understood in the Tibetan Buddhist traditions of Dzogchen and Mahamudra, and the Hindu traditions of Advaita Vedanta and Shaiva Siddhanta, is a non-referential, self-knowing, space-like dimension of consciousness that pervades and encompasses all experience. When two people attune to nondual awareness together, they experience a single expanse of awareness pervading them both as a unity. They also experience resonant connection between the qualities of their being, including the qualities of intelligence, love, and physical sensation. This is not merging and loss of identity, but rather a concurrence and a refinement of both self-experience and intersubjectivity. In this work, the radical openness of nondual realization is realized through inward contact with one's own body. Nondual realization thus deepens contact with one's own internal experience, as well as one's empathic attunement to other people. **P5**

305 **The States of Consciousness** Jeffrey Brooks <Jhananda@greatwesternvehicle.org> (Great Western Vehicle, Tucson, AZ)

The historic record of the states of consciousness are examined through key ancient documents, which are: the Discourses of the Buddha, Patanjali's Yoga Sutras, The Interior Castle by Teresa of Avila and the Dark Night of the Soul, by John of the Cross. In this paper the samadhi states of Siddhartha Gotama and Patanjali, the author of the Yoga Sutras, are compared to the description of the religious experiences of key Christian mystics, Teresa of Avila and John of the Cross and key Sufi mystics Kabir and Rumi. This subject is further examined through social research into personal case histories with meditation subjects. Twelve altered states of consciousness are defined through recognizable associated phenomena. A proposed unified theory of the altered states of consciousness is advanced. There are translated portions of the Discourses of the Buddha, and the Yoga sutras, Christian mystics, Teresa of Avila and John of the Cross, as well as the Sufi mystics Kabir and Rumi. The key characteristics underlying each altered states of consciousness are described, as well as a chart organizing the twelve stages of consciousness. **P5**

306 **A Unified Biological Model of Meridian and Chakra Systems with Confirmed Predictions** Charles Shang <cshang@caregroup.harvard.edu> (Woburn, MA)

Introduction: The gold standard for a valid scientific theory is to have predictions which have been independently confirmed by multiple researchers. This standard is applied to scientific research on meditation. Yoga and qigong are two major meditative traditions with similar descriptions of a network like signal transduction or energy transduction system as their physical and biological basis. Method: Literature search and review of publications in medline and other databases, combined with discussion with many experts to identify and analyze biological models of meridian system or chakra system with confirmed predictions. Results: Initial screen collected about 400 articles related to the subject. Further review showed that the growth control model of meridian and chakra systems is the only published model which meets the gold standard with confirmed predictive power in this multidisciplinary field. The growth control model suggests that a macroscopic growth control system originates from a network of organizers in embryogenesis. In growth control, the fate of a larger region is frequently controlled by a small group of cells, which is termed an organizer. The activity of the growth control system is crucial in the formation, maintenance and regulation of all the physiological systems. The following predictions of the growth control model have been independently confirmed or supported: 1. Singular point and separatrix have important roles in morphogenesis. 2. Organizers and growth boundaries are macroscopic singularities of morphogen gradient field and bioelectric field with high electric conductance, high current density and high density of gap junctions. 3. A high density of gap junctions is distributed as separatrices – boundaries at body surface after early embryogenesis. 4. Some morphogens and organizers continue to function after embryogenesis and throughout adulthood. 5. Subtle, nonspecific stimulation at the singular points of the growth control system can cause important, long lasting systemic and growth control effects. Since small change at singular points can precede and cause significant and long lasting systemic change, the existence of singularity in the growth control system can offer an efficient way of monitoring and manipulating the system involved in various pathophysiological processes. Intrinsic stem cells are likely part of the underdifferentiated growth control network. The germ cell is one of the least differentiated cells and also a type of stem cell – similar to the embryonic stem cell in its ability to differentiate into all three germ layers. The primary germ cell tumors have a midline and para-axial distribution pattern which spans from the sacrococcygeal region to pineal gland, similar to the distribution of major charkas. This pattern reflects the distribution pattern of intrinsic germ cells which are likely to be highly inter-connected in a normal state and provide important regulatory functions. This also suggests a hierarchy in the degree of cell differentiation and function in the growth control system which is likely to be the unified biological basis of meridian system and chakra system. **P5**

307 **Toward a Theory of Consciousness Transformation** Cassandra Vieten, Marilyn Mandala Schlitz, PhD; Tina Amorok, PsyD <cvieten@noetic.org> (Institute of Noetic Sciences, Petaluma, CA)

Our research over the last decade has explored in depth the phenomenon by which people make significant shifts in the way they experience and view the world. These transformations in consciousness can result in long-lasting changes in the way one experiences themselves, others, and their environment. Focusing in particular on positive transformations in consciousness, or those that result in improved health, well-being, and sense of meaning, purpose, and belonging, we systematically surveyed hundreds of people's stories of their own transformations, conducted in-depth interviews with over 60 teachers and masters of the world's spiritual, religious, and transformative traditions, and completed a longitudinal study following participants in a specific transformative practice program over the course of one year. In this research, we've looked for commonalities across individuals and traditions in the transformational process, with an eye toward determining what predicts, mediates, and results from the transformative experiences and practices, both spiritual and secular. In this presentation, we share some of the most salient findings from these studies, and present a theory of consciousness transformation that is emerging from this body of work. **C5**

308 **Stairways to Heaven: The Cultural Construction of Enlightenment** Burton Voorhees <burt@athabascau.ca> (Center for Science, Athabasca University, Edmonton, Alberta, Canada)

A basic argument in discussions of mystical experiences revolves around the possibility of the unmediated experience of pure consciousness. Against claims that such experience is the essence of enlightenment (e.g., Forman), it is pointed out that every report of mystical experience is couched in culturally specific language and every system aimed at providing a vehicle for such experiences is intrinsically culture specific (e.g., Katz). In this paper, we describe some of these sys-

tems within their cultural contexts in order to discern common characteristics and inquire whether or not they can be seen as leading to a common result. References: R.K.C. Forman (ed.) The problem of pure consciousness: Mysticism and philosophy. NY: Oxford University Press (1990) S.T. Katz, Language, epistemology,and mysticism. In S.T. Katz (ed.) Mysticism and philosophical analysis. NY: Oxford University Press. **P11**

309 **Immediate and long-term effects of meditation on the processing and anticipation of visual stimuli** Stephen Whitmarsh, Prof. Dick J. Bierman; Stephen Whitmarsh, MSc; Dr. H. Steven Scholte <stephen.whitmarsh@gmail.com> (F.C. Donders Center for Cognitive Neuroimaging, Nijmegen, The Netherlands)

Eight experienced meditators and 8 matched controls participated in a fMRI study. The meditators participated in two sessions, either meditating or in rest (counterbalanced). All subjects were exposed to randomly selected emotional and neutral pictures. Using two contrasts, namely meditation vs. non-meditation and non-meditation vs. control, 32 brain regions of differential activation upon stimulation were found. The relatively most important of these regions have been implicated in a.o. primary visual processing (BA17), visual association (BA18) and binding of emotions and perception (BA R13). There were also distinct differences in response activity dependent of type of stimulus, neutral or emotional in these regions. In general meditation resulted in more attention to visual stimuli. The contrasts and stimuli-type dependent differences reflect immediate and possibly long term effects of meditation on the processing of visual stimuli. Variability in anticipation activity was obtained from time course analysis comparing conditions from 8 to 0 seconds before the stimuli were presented using the mean of the absolute values in first derivative of the BOLD signal. From these analyses it was concluded that most dynamic changes in anticipation precede emotional stimuli rather than neutral stimuli. This is an anomalous finding elsewhere dubbed 'presentiment', because the selection of neutral and emotional pictures was random with replacement and nobody could know and anticipate the type of picture to be presented next. This presentiment effect was more outspoken for meditators. There was an interesting interaction: during meditation erotic stimuli give more presentiment while when not meditating violent pictures resulted in more presentiment. When averaging the BOLD signal, rather than calculating the BOLD variability, the only tentative direct indication for a presentiment effect, when taking all 32 brain regions together, was found 3 to 0 seconds before presentation of erotic stimuli to meditating subjects. Further analyses will focus on the spatial distribution of presentiment and on individual differences between the different participants. **C12**

*See also:*

318 **The Illusion of Control: A Dynamic Model for Psychotherapy**
106 **Toward the Neural Correlate of Nondual Awareness**
274 **Relaxation and Mental Effort Self-Monitoring for Rehabilitation**
329 **Moving Consciousness: From Zen's Immediacy to Deleuze's Immanence**
315 **Reconstitution of the Self During the Study of Advaita Vedanta (Traditional Indian Teachings of Non-Dual Consciousness): Phenomenological Investigations**
265 **The Cybernetics of Life/Consciousness**
306 **A Unified Biological Model of Meridian and Chakra Systems with Confirmed Predictions**
166 **Influence of Meditation Styles on Visual/Spatial Cognition**

## 5.3 Hypnosis

310 **Evoking an MDMA (Ecstasy) State Through Hypnotic Suggestion Without the Drug.** Arthur Hastings <ahastings@itp.edu> (Institute of Transpersonal Psychology, Palo Alto, CA)

This research reports the use of hypnosis to successfully reproduce a state of consciousness similar to the drug MDMA (Ecstasy) without the presence of the drug. The study was carried out with 12 participants in two groups (mean age = 50). Participants were required to have had at least one MDMA experience in the past (mean years since last experience = 4.4). The participants did not take the drug before or during the experiment. The Harvard Group Scale of Hypnotic Susceptability and the Tellegen Absorption Scale were administered prior to the session. A hypnotic induction was carried out and the participants were given suggestions to re-experience an MDMA state fully and completely, physically and psychologically, for one hour following the hypnosis. The participants were brought out of the hypnosis, and instructed to "Begin." Each person carried out preplanned activities during the posthypnotic hour such as creative artwork, talking

with a partners about their relationships, walking in nature, and self reflection. Each participant was accompanied by one of the research team. At regular intervals during the hour, the researchers asked for a rating of the nature of the experience compared to MDMA on a scale of 1 to 7. The ratings ranged from 2.5 to 8.0 (mean = 5.08). One participant gave a rating of 8 at one point, saying that the state was stronger than the drug condition. At the end of the hour, they were told that the time was up and it was time to come back from the experience. The participants completed a post questionnaire after the experiential session to provide a narrative of the experience, to fill out a checklist of subjective effects, and to retrospectively rate the similarity to the drug state. The group mean was 5.04 (SD = 1.25), with 8 ratings of 5 or more, indicating that the hypnotic condition was successful at re-evoking the drug state for most of the participants. The Tellegen Absorption Scale correlated positively with the retrospective ratings of similarity (Spearman rho = .87, p = .0003). The HGSHS showed no correlation. The subjective effects reported by participants included happiness, joy, calmness, safety, love, empathy, self acceptance, slowed time, vividness of nature, and internal energy sensations. One person reported self-consciousness from being observed, but there were no reports of negative psychological or physical effects. The protocol was not a mechanical process. Attention was given to careful preparation, a comfortable setting in natural surroundings, safety of the participants, and careful de-briefing at the end of the sessions. Some of the questions raised are these: Did the hypnotic suggestions somehow produce the same chemical or neurological conditions that the drug produces? Residual drug effects were not likely, given the length of elapsed time from past use. Or, did the hypnotic suggestions evoke "memories" (perceptual, physiological, psychological) and overlay them on the field of awareness? On the practical side, could the hypnotic technique be tailored for therapeutic use of MDMA or similar substances? **C12**

311 **Hypnosis And Anthroposophical Medicine** Reginald Humphreys, Kathleen Eagan-Deprez <DrRBH@compuserve.com> (American Society of Clinical Hypnosis, Dallas, Texas)

The theoretical orientation known as "Anthroposophy" refers to the collective literary contributions of Rudolph Steiner to the science of consciousness. Steiner's conceptions include the earlier concepts of Theosophy, provided by H. Blavatsky, A. Besant, and C. Leadbeater. Theosophy defined itself as the science of spirituality, and struggled to integrate as many principles of consciousness as could be recovered from ancient religious traditions of both Eastern and Western origin. Of critical importance within theosophy and anthroposophy is the concept of the multidimensional nature of human existence. Humans are understood as possessing multiple bodies or "vehicles", each embedded within another. The resulting hierarchy of embedded vehicles includes the physical, etheric, astral, mental, and spirit/soul (transcendental) bodies. This structure is taken from earlier Tibetan Buddhist concepts of the five interpenetrating sheaths of increasingly finer "matter" that constitute the human being. These sheaths are designated anna-maya-cosa, prana-maya-cosa, mano-maya-cosa, vijnana-maya-cosa, and ananda-maya-cosa. Steiner referred to the mental vehicle and above collectively as the "I" organization of the individual. Steiner's anthroposophical model includes numerous concepts of health, disease, and treatment, which collectively make up the approach called anthroposophical medicine. Anthroposophical medicine should be considered to be an essential prototype of mind-body medicine based on consciousness and spirituality. Given the richness of these models, it seems inevitable that contemporary clinicians/scientists should turn to anthroposophical concepts as a guide for designing treatment strategies within mind-body medicine. Of special interest to the authors is the question of how we may better understand the use of clinical hypnosis using anthroposophical concepts, or even extend the practice of clinical hypnosis according to anthroposophical medicine. It is a straightforward matter to identify a subset of hypnotic techniques which produces results that are desireable from an anthroposophical point of view. Anthroposophy, like theosophy, stresses cultivation of concentration, inner reflection, and calm states involving parasympathetic dominance within the autonomic nervous system, while simultaneously rejecting states of sympathetic dominance, excitement, and extreme emotions. Being careful to hypnotically suggest only parasympathetic phenomena, we may begin to approximate a subtype of hypnosis which may be called "anthroposophical hypnosis". A second and even more direct way of achieving this anthroposophical hypnotic state is to induce hypnosis by offering a sequence of suggestions intended to "hypnotize" each of the human vehicles in succession. For example, we first "hypnotize" the physical vehicle by inducing muscular relaxation, then "hypnotize" the etheric vehicle by inducing a reduction of electrical/nervous sensations, and then "hypnotize" the astral vehicle by inducing reduction of craving, desire, and of emotions in general. Finally, we "hypnotize" the mental vehicle by inducing a reduction/cessation of any remaining thinking or preoccupations. Preliminary clinical use of these suggestions has yielded results that appear to be at

least equivalent to results obtained with established induction techniques, thus providing initial validation for these suggestions as bona fide methods of inducing hypnosis. The effectiveness of the suggestions did not require that the individual be familiar with the anthroposophical model. Followers of anthroposophy reported an enhanced sense of meaningfulness after being hypnotized with these suggestions. **P5**

## 5.4 Other altered states of consciousness

312 **Ayahuasca & Meditation Exploratory Field Research: New Models, Methods, & Findings in Discovery Oriented Consciousness Research** Frank Echenhofer <fechenhofer@ciis.edu> (Clinical Psychology, California Institute of Integral Studies, Richmond, CA)

This workshop will describe a new model for doing exploratory field research devised specifically to study altered states of consciousness. The model, methods, rationale, and practical implementation of this new approach of exploratory field research will be presented with opportunity for questions, answers, and comments. Two field research studies, conducted by the presenter, will be used as case examples to describe how exploratory field research works in practice and how it can play an important role in the overall effort to develop a science of consciousness. The first field research study to be presented will be a Meditation EEG research study conducted in Dharamsala, India in the Dalai Lama's monastery. A video conversation with the Dalai Lama will be shown to highlight the value of detailed conversation between researchers and an expert informant prior to conducting research. The second field research study to be presented is an ayahuasca EEG & phenomenology study conducted in Brazil and Peru. Conversations with a Shapibo shaman will be examined to explore the issues related to describing and interpreting altered states of consciousness experiences from Western vs. indigenous worldview perspectives. A video will be shown of an ayahuasca ceremony to help workshop participants understand the opportunities and challenges of altered states of consciousness research. Exploratory field research will be presented as an example of one method of what has been called the science of discovery. In the science of discovery, the emphasis is not upon providing evidence to support hypotheses based on prior research, but rather upon discovering as yet unknown correspondences among variables that have not been examined. The value of discovery oriented research hinges upon the quality of preparation in deciding what specifically to examine, therefore the elements of this preparation process will be examined in fine detail. Altered states of consciousness are, by definition, unusual and for reasons related to ecological validity, it is often appropriate to conduct such research in the field so that research participants can be in familiar environments during research activities. The practical issues involved in conducting field research will be explored using a "where to start, and what to do" approach. Topics such as ways of locating and qualifying research collaborators from the field research setting, finding venues to conduct research, locating and qualifying participants with specific altered states abilities, and locating and qualifying a knowledgeable logistics assistant well acquainted with both the field environment and potential pool of participants will be discussed. Recent research findings and developments in the research methodology for examining altered states of consciousness will be presented that have helped shape this research model. The issue of the research investigator's own experiential familiarity with the altered states being examined will be addressed and methods for researchers to develop skills in maintaining observational skills during altered states will be discussed. **PL11**

313 **An empirical study about altered states of consciousness and subjective experience during sexual intercourse and some implications** Torsten Passie <dr.passie@gmx.de> (Department of Clinical Psychiatry and Psychotherapy, Hannover Medical School, Hannover, Germany)

Sexual intercourse is for most humans a common experience correlated with trance- and ecstatic-like states. We followed some recent sexual science paradigms and defined the whole course of a heterosexual sexual intercourse as "sexual trance" and studied in a scientific design the subjective experience and altered states of consciousness associated with it. An astonishing fact is that up to now there was no scientific study regarding subjective experience and alterations of consciousness during sexual intercourse. The lecture will give the results of our study (some are pretty interesting and some contradict established paradigms of sexual science) and interpret them in the context of psychopysiology and cognitive science. Implications for understanding these experiences as ecstatic states and altered states of consciousness are especially mentioned. **PL4**

314 **In My Flesh Shall I See God: Sex as a Natural Trigger for "Varieties of Religious Experience"** Jenny Wade <jwadephd@yahoo.com> (San Rafael, CA)

Sex and altered-state experiences have been linked from ancient times, though what sacred sex actually was has been distorted into limited ideas about Tantra, Taoism, fertility rites, and mythic archetypes. Research into the spontaneously occurring non-ordinary experiences of naive subjects aged 20-70 shows that sex can unintentionally trigger a wide range of visionary, temporal, psi, and mystical altered states phenomenologically identical to those considered hallmarks of spiritual attainment in indigenous and established religions, regardless of the beliefs of the individual – indeed, often confounding them. Such profound but unanticipated experiences can have lasting, transformative effects, both positive and negative. They range from the conversion of atheists into spiritual seekers to suicidal depression. **PL4**

*See also:*

279 **Psychedelic Facilitated Altered State of Consciousness as a Therapeutic Intervention: A Case History of a 54-year-old Woman Treated with Psilocybin for Cancer-Related Anxiety**
103 **Into the Scanner, Out of the Body: Neural Correlates of Ketamine-Induced Alterations in Body Perception**
312 **Ayahuasca & Meditation Exploratory Field Research: New Models, Methods, & Findings in Discovery Oriented Consciousness Research**
340 **Altered States of Consciousness and Visual Arts: Salvador Dalí, Henri Michaux and Antoni Tàpies**
108 **Using fMRI to Detect Consciousness in the Absence of Behavioral Signs**
132 **Psychedelics and the Chemical Architecture of the Mind**

## 5.5 Transpersonal and humanistic psychology

315 **Reconstitution of the Self During the Study of Advaita Vedanta (Traditional Indian Teachings of Non-Dual Consciousness): Phenomenological Investigations** Olga Louchakova <hridayam@prodigy.net> (Transpersonal Education and Research Specialization, institute of Transpersonal Psychology, Palo Alto, CA )

Spiritual tradition of Advaita Vedanta is a path of self-knowledge liberating from suffering, and grounded in the experience of one's nature as non-dual consciousness. In spite of the magnanimity of this claim, the changes of the mind in Vedantic practice were never studied by psychology. This study presents the phenomenological analysis of the psychological changes during the ten-month study of Advaita Vedanta with the group of thirteen graduate psychology students. Students were listening weekly to Vedanta Pramana, i.e. logic grounded in the simultaneous empirical analysis of once perception, pointing to the non-dual nature of consciousness. Weekly discourse utilized the 15th century text Advaita Makaranda (the Honey of Non-Duality) by Lakshmidhara, combined with traditional guided contemplation (nididhyasana). Weekly accounts of inner experience, obtained with the specially developed questionnaire of egological ("I" based) experience, were analyzed in regard to the psychological changes and the constitution of the self. Tradition indicates several stages in the process. Beginning with the initial gestalt of one's' awareness as indivisible, ontologically primary, pure substance, sentient, independent of the content of cognition (1), one progresses through doubts (2) to grounding the initial insights in one's own lived experience (3) and the irreversible dissolution of the sense of separate individual existence-awareness (4), which becomes eventually replaced by steady perception of one's nature as immortal, indivisible, unchanging, completed and fulfilled (5). Students success fluctuated between the stages (2) and (3). The capacity of discrimination between the pure subjective awareness, and other faculties such of the mind appeared crucial for finding the non-dual consciousness. Capacity of steady attention, related to the absence of internal conflict and characterological maturity, and the interest in the pure awareness versus contents of the mind, were also factors defining success. Students unable to differentiate the subjectivity of awareness from imagination (n 2), and students with low characterological maturity (n2), displayed no changes. Remaining participants (n10) reported inner dynamics, stating "teaching is working in me," causing changes in self-concept and self-perception, changes in the body-image/schema, increase of healthy detachment, internalization of the locus of control, and the increase of the sense of connection with themselves, decrease of fear, and increase of self-worthiness. Self-alienation and internal void-ness shifted to self-acceptance and internal fullness, reflected also in the dynamics of dream images. Even though Vedanta works only with the mind, participants consistently reported the increase of the bodily self-awareness, and hightened presence in daily life. Restructuring was "quantum" rather than gradual, and the shifts were associated with onsets of positive emotional states. Gradually deepening sense of self led to

the shift where hyletic, corporeal component of experience was differentiated from the sense-bestowal, resulting in dissolution of the self (ego). This stage in the process was accompanied by the emergence of fear, which subsided as the underlying structures of experience were not "nothing" or "unknown", but on the contrary, described through the metaphor "I feel at home." **P5**

*See also:*

304 **Realization Process: The Relational Potential of Nondual Awareness An Experiential Workshop**
313 **An empirical study about altered states of consciousness and subjective experience during sexual intercourse and some implications**

## 5.6 Psychoanalysis and psychotherapy

316 **A Boolean Algebra of Ego Mechanisms of Defense** Daniel Beal <dmbealmd@msn.com> (Psychiatry, University of Cincinnati, Cincinnati, Ohio)

Ego mechanisms of defense can be modeled in formal manner using modified Boolean Algebra. This modeling can yield a practical heuristic method for associating logical propositions and emotion expression. Ego mechanisms of defense were first suggested by Sigmund Freud; his daughter Anna Freud published a full and formal treatment of this subject in The Ego and the Mechanisms of Defense in 1936. Defense mechanisms were defined as protecting the ego from unconscious drives and involved relationships with the id and superego. Since this initial formulation, there have been many revisions and reinterpretations of the concept of ego mechanisms of defense. Among them, the work of George Vaillant and his hierarchy of defense mechanisms is most useful. Vaillant describes four levels of defenses, psychotic defenses (i.e. psychotic denial, delusional projection); immature defenses (i.e. fantasy, projection); neurotic defenses (i.e. intellectualization, dissociation, repression); and mature defenses (i.e. sublimation, suppression, anticipation). If one simply examines the structure and content of ego mechanisms of defense free from the underlying psychoanalytic theory, it is possible to see them as structures of paradoxical logic and as structures combining logical propositions and affect in a particular way. Mapping ego mechanisms of defense with a modified Boolean algebra gives us a method of looking at these issues in a more formal way. But what we see initially is striking; psychotic ego mechanisms of defense involve relatively simple a logical paradoxes. The mechanisms of defense become more structurally complex as one goes on from psychotic to neurotic and then mature ego mechanisms of defense. The structure becomes more involved and more difficult to describe as one ascends the defense hierarchy. With the mature ego mechanisms of defense, one is mapping logical propositions onto affective states. Psychotic denial is a simple example in that what is real is simply denied. The can stated as a formal paradox: A ? A (A therefore not A). Mature ego mechanisms of defense must be mapped more elaborate propositions. Suppression, which indicates deliberately suppressing a feeling about an event could be stated: A ? not F(?) (A therefore not F(A)) where F(A) would represent a negative emotion associated with proposition A. Formal mechanisms of associating emotion with logical propositions are difficult to elaborate. Computer algorithms for associating ideas and emotion are frequently focused on measuring physiological manifestation of emotion in human subjects, rather than having an independent theory of the relationship of emotion and affect. One can also analyze the simple structure of psychotic ego mechanisms of defense and conclude that there can be a simple structure underlying the simple paradox. The more elaborate structure associated with mature defenses suggests a more elaborate structure. The paradoxes and elaborate relationships suggest a complex intrinsic relationship between logic and affect. This has implications for theories of the organization of consciousness and underlying neural structures. Reducing and simplifying in the mechanisms of defense to a modified Boolean algebra notation can lead to an understanding of how logical propositions and affect come together in consciousness and neuro-dynamics. **P11**

317 **A Psychoanalytic Contribution to the Theory of Consciousness** Caroline Duthy <mail@carolineduthy.com> (British Institute of Psychoanalysis , London , United Kingdom)

I will posit the following without arguing for it: Consciousness is entirely explained by physiology but experienced phenomenologically. This is neither reductivist nor eliminativist. The position I take up is that consciousness emerges as a consequence of our ongoing bodily states. In much of the literature on the subject, consciousness is put forward as, in principle, indescribable. For instance, to avoid reducibility the recourse is to 'describe' consciousness as something which it is like to be which necessarily defies a physical explanation because it purports to say something so obliquely and obscurely that it says nothing. The issue is emotive. For those who maintain the uniqueness of consciousness as defying physicalistic explanation, reduction debases conscious-

ness, elimination is dismissive of consciousness. Consciousness is mysterious, suggesting a super-natural or awesome phenomenon. They offer a puzzlement, invite us to deal with that which is beyond our grasp, an unbridgeable gulf, an explanatory gap, a hard problem, a ghostly presence, the intangible, the ineffable – consciousness as unworldly, untouchable, ontologically superior. Our conscious attention to ourselves, is vitally, a necessary method of protecting ourselves from hazard. In disparate ways, in my self-awareness, in being conscious of myself as a person I maintain vigilance and control over my safe being and existence. There is a sliding scale of conscious self-awareness which goes from attentive self-awareness as we might note our being conscious now – to a sort of ongoing unalert awareness of our environment as a means of negotiating and maintaining a position within it – to a kind of peripheral limited awareness, a low key noting of where we are when we are, say, part of an audience. aware that we are watching a play or following some presentation – culminating in a state where the body needs no assistance from consciousness, when it is asleep and we are free from the constraints of regulating how we are placing or directing ourselves in our muscular activity – our behaviour. The problem arises In creative thinking and dreaming where there is consciousness but no awareness of consciousness and there is a loss of vigilance over the body. Self-revelation occurs in creative thinking and dreaming and is frightening because it requires us to face our natures as falling short of the ideal. This ideal includes immortality. To lose vigilance, then, is to die as the ideal. The elevation of conscious self-awareness to an isolated unworldly status is believed to protect us from this specific form of death. The argument implies that If consciousness is safely secured as an ineffable phenomenon, then it need not be lost to the interests of creative thinking which constitutes the death of the desired ideal self. In the creative thinking process there is no phenomenology. The process sinks the creator into the act. The vigilance we require to protect ourselves against self-discovery, is lost. The act of the claim for the unique quality of consciousness maintains a split where mind invigilates body in the interests of ignorance. **P11**

318 **The Illusion of Control: A Dynamic Model for Psychotherapy** David Holan, Combs, Allan; <dave@therapistdave.com> (South Bend, IN)

Langer (1975) describes the concept of "the illusion of control" as the belief in an ability to control outcomes in situations in which a person perceives that such control is associated with the exercise of skill or where there is familiarity with the stimulus or the impact of their decisions. The construct or map of relationships demonstrated in the accompanying poster explores the relationships between isolated but related concepts from a variety of thinkers representing psychology, neurology, philosophy, general systems theory, chaos theory, and nondual wisdom traditions. In it we see the cyclic relationships, corollaries, and dynamic tensions between elements of disparate disciplines. The common thread that exists across the domains thus far identified, explored in this presentation, is the critical and implicit assumption of the illusion of control and its subconscious impact on beliefs and behaviors. Specific relationships identified and explored in the presentation include Bateson's "abduction" (interpretation of patterns); cybernetics (patterns of control); control (of outcome) vs. self-control (the illusion of control); and Husserl's ideas of retention, intention, and protention; as well as nondual traditions; Chaos theory; Husserl's reductionism and the "veil of perception." The diagram also illustrates the similarity between Parmenides and Dzogchen on conscious awareness and their relationship to "control"; and others. Many disciplines propose theories or beliefs that imply or recognize the human need for control. In chaos theory, for example, it is understood explicitly that "control of outcome" is impossible. There are simply too many complex dynamics within a given system for a single organism to have a realistically significant impact. Systems theory discusses the self-organizing feedback loops that lead to homeostasis in complex social systems (in which there are multitudes of implied mechanisms to control behavior). The prefrontal cortex associates past events with past emotional content, and this pairing has at least a subconscious effect on present beliefs and their impact on behaviors by choosing behaviors that, in the past, were associated with desirable outcomes. Thus we subconsciously believe that we can control the outcome of events by performing behaviors similar to past behaviors that achieved desirable outcomes. The discussion which we will engender in this presentation demonstrates how these myriad dynamics across domains and disciplines can be utilized in the therapeutic context, namely by identifying the implicit belief of control (of outcome), exposing the subconscious illusion (of control), and by consciously (or deliberately) exposing and maintaining a more realistic assessment of one's ability to control outcome. The information in this presentation will be presented as a visual flow chart, with references. **P5**

319 **The 'Really Hard Problem' Becomes Even Harder – and More Interesting: Disambiguating Belief, Awareness, Reality, Experience and Neediness in Persons with Aberrant Com-**

**mon Sense** Roulette Smith <najms@postgraduate-interdisciplinary-studies.org> (IPIS and ITP, Palo Alto, CA)

Chalmers' 1995 description of "easy problems" and "the really hard problem" of experience provides a 'blueprint' and 'roadmap' of obstacles and challenges confronting research on consciousness. This report focuses on a much harder problem; to wit, the challenges of disambiguating experience from reality in persons who lack common sense. We then consider implications for diagnosis, belief formation, awareness, neediness and therapeutic intervention in those persons and their associates. Our in situ phenomenological study of several persons with aberrant common sense also provides novel clues to underlying cognitive (and consciousness) processes associated with common sense and aberrant common sense. These findings highlight the importance in distinguishing between descriptive-structuralism (DS), heuristic-functionalism (HF), and logistic reasoning (LR) approaches in life science research. In particular, LR reveals novel approaches for genomic and non-proteomic sciences, medicine and other clinical professions, and the neurosciences. Because of evidence that DNA is the repository of long-term memories in brain, these approaches may contribute to one's understanding of common versus individual molecular events associated with consciousness – as well as derangements and disorders in consciousness and common sense. Perhaps most important, this study identifies and illuminates important aspects of 'experimenter-subject' and 'clinician-client' dyads in research on consciousness. Significantly, this research underscores a need for investigating common sense and aberrant common sense in the neurosciences and helping professions. **P11**

## 5.8 Anomalous experiences

320 **"Is Consciousness Distinct From Attention?"** Abdellatif Abujudeh <amalwaanan@yahoo.com> (Ministry of Education, Rusaifa, Jordan)

The aim of this paper is to provide a direct answer (to the above question): of course YES. What gives this answer an air of certainty is my reliance on a special 'CRITERION': an extraordinary visual experience relevant to the mind/body problem in general and consciousness in particular. To serve us in our current issue, this experience can be summed up in one sentence: "I look at a physical object, then, I close my eyes, and can see/ watch/ perceive the photo: SNAPSHOOTING." I believe that I am naturally equipped with a sort of "gift" that enables me to take photos whether consciously or unconsciously. These photos are shown internally on what I will call a "Heavenly Screen"(HS) and are, with eyes closed, quite visible from the inside. I plainly state that this is no metaphor.It follows that on this view I can argue against any theories that deny the existence of actual photos/pictures/images in the human head. The description which I will present in this respect is sustained with "distinguished" details of this pictorial display. To declare my claim (photos shown on the HS) as a fact rather than a mere hypothesis, may draw the attention to a right track toward establishing a "theory of consciousness", if my experience is lent conscious ears and granted necessary study and investigation. Finally, I think I should furnish you with the way I could deliver a decisive "YES" verdict to the above question case in the light of my "experience criterion": Sometimes, I consciously and purposefully fixate my eye(s) on a certain scene/physical object and take a photo to watch on the HS for clearer pictures for study and experiment purposes. Some other times I close my eyes unconsciously, and to my surprise I find that there is a scene already displayed on the HS. This simply means that snapshooting must have unconsciously and automatically been taking place:(experience was sensed, information received inside and processed on the HS but not yet perceived due to the lack of necessary paying of attention) and that without having paid attention at the right time and before the scene vanishes, I would have missed noticing it (when it happened that I closed my eyes). I even check/ compare the internal scene with the external by opening my eyes and saying: 'Oh yes, so there has been a glass on the external table.' This is proof enough that consciousness is distinct from attention: the former embraces all incoming information and associated processing along with all parts of the content (whatever) without making the recipient aware of anything except when attention is paid/triggered. Thus, I am bringing both the subjective and objective views together in such an unprecedented way. The paper will provide more invaluable and genuinely new information about this 'live' experience and its content: data (input), information processing, and output in addition to a comparison between the external physical object and its internal photo color, shape, size and dimensions ... etc., that would enrich consciousness field. Questions that may be raised by the "friendly audience" will be welcomed and answered as long as they come within the boundaries of the above experience which represents my approach "to the fundamental issue of how the brain produces conscious experience." My experience would yield essentially significant CLEAR-CUT ANSWERS to problems/queries related to the case

study of the famous color scientist (Mary), and just as well Herring House (Green/Red) and background matter. The attention is expected to be drawn toward a new case worth studying to deal with the consciousness issue. To a question like: are we still very far from the "Hard Problem" solution? I would like to answer (with confidence and hope and taking into consideration my experience which I acquainted you with only a glimpse of): I do not think so. **P11**

*See also:*

20 **Boundary Conditions for Theories of Consciousness: Satisfaction by a Dualistic Interactionist Theory**
322 **Eliciting the Paranormal in the Lab: Making the Paranormal Normal**
333 **Philip K. Dick, Gnostic Science Fiction, and the Problem of Religious Experience**
324 **The Evolution of Telepathy**

## 5.9 Parapsychology

321 **How to interpret apparent paranormal effects: Immediate and long-term effects of meditation on the anticipation of visual stimuli** Dick Bierman, Stephen Whitmarsh, Steven H. Scholte, Dick J. Bierman <d.j.bierman@uva.nl> (PN, University of Amsterdam, Amsterdam, Netherlands)

Traditionally, apparent paranormal effects have been interpreted as, either the result of inadequacies in experimentation, or as an extra sensory modality mediated by some unknown mechanism like 'morphogenetic fields' as proposed by Sheldrake. The difficulty to replicate these effects and the observation that the effects seem to depend on the experimenter seem to favor the first interpretation. However we propose that these aspects might also be explained by an interpretation that focuses on time-reversal. To illustrate this we report on recent findings of anomalous anticipation of visual stimuli in a meditation fMRI study: Eight experienced meditators and 8 matched controls participated in this study. The meditators did two sessions, either meditating or in rest (counterbalanced). All subjects were exposed to randomly selected emotional and neutral pictures. Differential activation due to meditation was found in regions that have been implicated in a.o. primary visual processing (BA17), visual association (BA18) and binding of emotions and perception (BA R13). There were also distinct differences in response activity dependent of type of stimulus, neutral or emotional in these regions. The contrasts and stimuli-type dependent differences reflect immediate and possibly long term effects of meditation on the processing of visual stimuli. Variability in anticipation activity was obtained from time course analysis comparing conditions from 8 to 0 seconds before the stimuli were presented. From these analyses it was concluded that most dynamic changes in anticipation precede emotional stimuli rather than neutral stimuli. This is an anomalous finding elsewhere dubbed 'presentiment', because the selection of neutral and emotional pictures was random with replacement and nobody could know and anticipate the type of picture to be presented next. The presentiment effect was more outspoken for meditators. There was an interesting interaction: during meditation erotic stimuli give more presentiment while when not meditating violent pictures resulted in more presentiment. **PL10**

322 **Eliciting the Paranormal in the Lab: Making the Paranormal Normal** Maureen Caudill <Maureen.Caudill@pobox.com> (MC Enterprises , Clemmons, NC)

Researchers often assume that paranormal skills are difficult to elicit in laboratory studies. Frequently difficulties arise as much from inappropriate study design as from the rarity of the phenomena. Underlying misunderstandings about psychic phenomena contaminate experimental designs, which result in studies that may lack scientific rigor or generate results that are misinterpreted. Improvements in both scientific rigor and "paranormal friendly" are neither mutually exclusive nor necessarily difficult to implement. Experience suggests that with proper protocols and minimal study participant training, paranormal skills can reliably be elicited in laboratory settings at substantially higher rates than are generally reported. This paper explores common pitfalls in protocol design, reviews the functional characteristics of paranormal functioning, and suggests methods of improving protocols while still maintaining scientific rigor. Section one first assesses protocols in recent experiments, including the Harvard prayer study (Benson, et al., 2006) and various Ganzfeld experiments. Flaws in those study designs are analyzed to determine the impact they have in proper interpretation of the outcomes of the experiments. The second section reviews what is known from experience about paranormal functioning, and how those knowns affect study protocols and study results. The final section proposes basic "paranormal-friendly" conditions that can be incorporated in study designs in a scientifically rigorous manner. Some crucial aspects of paranormal functioning that should be considered in an experimental protocol include: • Contrary to what might be ex-

pected, it is generally easier for subjects to access paranormal functions if they have zero knowledge of the target information. Even slight knowledge of "expected" outcomes can make it difficult for subjects to distinguish between genuine information and inferences drawn from those expectations. • Paranormal functions do not appear to involve a "transmitter" and a "receiver." A better metaphor appears to be that the subject "tunes into" information that is already present. • Paranormal functions operate best with an emotional investment in the experiment. The more boring the task, the less likely subjects will keep their attention on what they are doing. Attention, intention, and emotional investment in the process of the protocol appear to be crucial. • Outcomes that are emotionally powerful for the subjects will draw more subject attention than those that are less emotionally loaded. Thus, it is essential to have possible choices that are of approximately equal emotional content. • Paranormal functions often (though not always) seem to take place outside of current spacetime. A study subject may view the future or past as well as the present. Thus, assessment of the "correctness" of a response depends on whether the target was temporally located as well as spatially identified. • It is crucial that strict control of who sees incorrect choices be maintained. In other words, if using a sender/receiver pair of subjects, the sender must never be shown anything except the correct target data. Even though the sender might not see incorrect choices until after the experimental procedure is complete, that eventual perception can confuse the target space for the receiver, and generate incorrect results. **P5**

323 **Basic Conceptual Problems in Parapsychology** Peter Lloyd, Peter B Lloyd <peter.b.lloyd@fencroft.com> (Whole-Being Books, London, UK)

The emphasis in parapsychology has been on 'proving' experimentally the existence of certain informally defined phenomena. These phenomena are principally telepathy (the transfer of information or imagery between minds), telekinesis (affecting physical systems directly by the mind), and telecognition (obtaining information or imagery from remote targets directly by the mind). Although these terms (or cognate euphemisms such as 'anomalous cognition' and 'remote viewing') are widely used, and there is much heated debate about whether the phenomena genuinely exist, there are nonetheless certain logical and conceptual problems that arise in attempting to define these terms with any precision. These problems are normally glossed over. This paper neither attacks nor defends the parapsychological thesis that these phenomena are 'real'. Rather, it presents an analysis of some conceptual issues in the foundations of parapsychology, and proposes some solutions. **P5**

324 **The Evolution of Telepathy** Rupert Sheldrake <rsheldrake@clara.co.uk> (Cambridge – Clare College, Cambridge, UK)

All social animals need to co-ordinate the behaviour of members of the group. They do so by a variety of means, one of which may be telepathic. For separated members of a social group to communicate beyond the range of sight, hearing or smell, telepathy would be the only possibility. If telepathy happens at all, and if such communication is of survival value, natural selection will favour its development. Field observations suggest that wolves communicate telepathically over many miles. Surveys have shown that at about 50% of dog owners and about 30% of cat owners believe that their pets respond to their thoughts or silent commands. A common claim is that animals anticipate the return of a member of a household, often 10 minutes or more in advance. Experiments in which dog owners returned from at least five miles away at randomly selected times in unfamiliar vehicles have shown highly significant anticipation effects, suggesting that the dogs did indeed seem to know when their owners were coming home. In the human realm telepathy seems to occur between members of close social groups, as within families and between close friends and colleagues. Apparent telepathy occurs most commonly in connection with telephone calls, when people think of someone for no apparent reason who calls soon afterwards. Telephone telepathy has been studied experimentally in tests in which subjects have to guess which of four potential callers is on the line before answering the phone. The hit rates in hundreds of videotaped trials were very significantly above the 25% expected by chance. A similar phenomenon occurs with emails, and again experimental studies have shown significant positive effects. Automated telepathy tests are now running on the internet and through mobile telephones; anyone interested can take part. The nature of telepathy is not yet understood, nor is there any general agreement about its possible relationship to the phenomenon of entanglement in quantum physics. Nevertheless, despite our limited current understanding, telepathy seems to be normal rather than paranormal, a natural means of communication between members of animal groups. **PL10**

325 **Why a Turing Machine Cannot Remote View? Alexander Yakhnis, PhD-ayakhnis@hotmail.com** Alexander Yakhnis, None <ayakhnis@hotmail.com> (Pioneer

Technologies, Brockport, New York)

Alan Turing, Computing machinery and Intelligence, Mind, 59, 433-460, 1950 was probably the first who has considered the issue of machine intelligence. He has looked at nine arguments against machine intelligence. One of them Turing viewed as very strong one against machine intelligence. That argument was whether a Turing machine could exhibit extrasensory perception. Turing phrased this argument in an intuitive manner and it is a strong one. Still it is not a proof, because it could be viewed as relying implicitly on its conclusion. A clean argument (i.e., a proof) is offered here that any Turing machine cannot remote view. Remote viewing (RV) is a form of extra sensory perception shaped by Ingo Swann, Harold Puthoff, Russell Targ and others at SRI and US Army installation at Fort Mead early 70s-1995. RV has several varieties. One of them, called coordinate remote viewing, is especially suitable for conducting a proof that any computer cannot remote view. According to the definition of consciousness proposed in the paper the above-mentioned proof implies that computers will not be able to exhibit consciousness. This will settle the question about which many scientists hold opposing views. E.g. Penrose, Searle do not believe that computers will have consciousness. Tipler, Minsky believe that computers will possess consciousness. This definition of consciousness is probably consistent with what Turing had in mind. The definition appears also to be consistent with some of the oriental traditions based on oral transmission. **P7**

*See also:*

331 **Observer Theories: The Next Step**

## 5.10 Miscellaneous

326 **Measuring the Effects of Intentionality in Energy Practitioners on Extra Low Frequency Magnetic Fields** Mary Flores, Melinda Connor; Gary E. Schwartz <mtflores@email.arizona.edu> (Psychology, Tucson, AZ)

This poster presents a basic scientific test method that may be used to study how energy-based practitioners produce effects. Also presented are the results of testing and potential methods of use to describe individuals engaged in the process of being an energy medicine practitioner. While there are approximately 1 million energy medicine practitioners in the United States (Connor, Schwartz & Jacobs, 2005), the mainstream medical community as a whole has paid little attention to the physiological effects of healing intention, which is considered to be an essential component of the energy medicine model. Significant effects have been reported in meta-analyses of energy medicine studies (Schlitz & Braud, 1997; Winstead-Fry & Kijek, 1999; Warber et al., 2000; Astin, Harkness & Ernst, 2000). Cellular changes produced as effects of energy medicine have been demonstrated in a research environment (Syldona & Rein, 1999; Rein & Syldona, 2003; Rein, 2004; Creath & Schwartz, 2005; Rubick & Schwartz, 2005). Valid and replicable research design and measures will help clarify differences in intentionality, placebo, and randomly produced effects of healing presence and predict potential practitioner competence. The data reported here replicates and extends experiments conducted by Connor and Schwartz (2004, 2006, & 2007) using a Triaxial Extra-Low Frequency (ELF) Magnetic Field Meter. This method provides a baseline assessment of a practitioner's ability to produce measurable and reliable changes in the amplitude in the ELF range through the use of intentionality on demand in a research environment. Data analysis to date demonstrates significant changes in amplitude ($p < 0.0001$) in the ELF range on one minute measures of energy practitioners' universal qi point in the palms of the hands. This data also suggests a relationship between this objective measure of performance and widely-used state/trait measures of well-being (Bell, et al., 2000), spiritual experience (Underwood, 2000; Fetzer, 1999), and absorption in various life experiences (Tellegen & Atkinson, 1974; Dixon, et al., 1996). **P11**

327 **Crossing the Corpus Callosum: Clarifying Our Ontology, Redirecting Our Agency** Ronnie Hawkins <liveoak@pegasus.cc.ucf.edu> (Philosophy, University of Central Florida, Chuluota, FL)

Having evolved as social mammals, we should see ourselves as fundamentally Janus-faced: one visage belongs to an individual organism that generally thinks autonomously and treats peers in accord with an inborn moral gyroscope; the other embodies behaviors, concepts, and perceptions normative for groupings in which the individual participates as member – sometimes even when such norms work to the detriment of all, singly and severally. The ontological status of an emergent group mind has long been debated, but surely it must be more substantial than its conceptual products – a prime example of the latter being money, a social construction we collectively endow with value. Our human ability to think and act with "community concern" contributes enormously to our survival and flourishing; group norms of mutual respect and aid tend to stabilize "morally upright"

individual behavior, and the potential for a richly detailed, metastereoscopic vision integrated over many differently positioned viewpoints could connect us securely with the reality of our common situation, clearly now a survival necessity. Alternatively, the strong forces undergirding mutual reflection and reinforcement of a conceptual/behavioral system can so preoccupy "rational" capacities with self-justification that the constructed reality peels away from physical/biological reality, creating a yawning epistemic gap. When major strands of the shared belief web can no longer be maintained by rational discourse, irrational, group-defense maneuvers (such as scapegoating) may break out and even manifest as abuse, torture, and genocidal violence. Three examples are illustrative: the stigmatization of "group selection" within evolutionary biology, the denial of both conceptual and perceptual evidence heralding a major planetary climate shift, and the failure to acknowledge a dramatic vector reversal of many functionally necessary epistemic, ethical, and legal constructs within the USA. Questions of agency must emerge at this point, leading into an examination of extant western metaphysics. What are its ontological units – impenetrable billiard balls mindlessly bumping about, or perhaps words in sentences and arithmetic points marching off toward infinity? – and what sort of coherence do they have with the entities of contemporary science, or with each other? Would it not, for both consistency and accuracy, be preferable to re-frame our metaphysics around centers of life, both individually identifiable and collectively joined, capable of coevolutionary synergy within the ceaseless flux but also of enframing themselves into dismal patterns that are ultimately untenable? Unfortunately, the organization of some subgroupings so as to maintain hegemonic exploitation of "others" is self-perpetuating and obscures clear vision of the larger life system and its proper part-whole relations (I suspect self-justification at the anthropocentric level accounts for what we perceive as the "hard problem" of consciousness studies). More starkly, will we let our future be "determined" by inarticulate social forces acting below the level of consciousness, or will we facilitate a massive interhemispheric transfer actualizing both an expanded moral circle embracing the biosphere and an expanded collective consciousness reopening itself to poiesis? I think the choice is ours, immediate, and real. (483) **P5**

328 **Transpersonal Phenomenological Parameters of Human Sexual Experience** Stanley Krippner, Michael Maliszewski, Gregor Hoeller, Barbara Vaughan <skrippner@saybrook.edu> (Psychology, Saybrook Graduate School, San Francisco, CA)

Considerable data are available in regard to physiological, social, and behavioral aspects of sexual interactions, but scant attention has been paid to the patterns of phenomenological properties characterizing sex. This study of U.S. 100 men and women (about equally divided) attempted to address "sexual consciousness." The instrument used was the 55-page Psychological Dimensions of Sexual Experiences Inventory. This inventory is labor intensive, taking four or five hours to complete. The 100 research participants were the first to respond to a mailing of 1,000 inventories; most of those invited to participate never responded, hence no claim is made that this is a representative sample of U.S. adults. The inventory consists of five major sections: (1) attributes of alternate states of consciousness; (2) ecstatic states and transcendent experiences; (3) personal and interpersonal modes; (4) dimensions of sexuality; (5) other factors. Each section contained multiple choice questions and the opportunity to write in additional comments. One surprising result was that, despite differences in the physiological response cycle between males and females, there was a commonality of phenomenological experiences; for example, both genders emphasized love or mutual sharing as an important part of their sexual interactions. The main exception was that spontaneity in experiencing ecstatic or transcendent states was greater for females than for males; the latter more often reported alcohol or drug use in attaining these states. Other literature indicates that males more often reach these states during near-death experiences and traumatic accidents, demonstrating that they are capable of transcendence but attain it in different ways from women. This finding (which replicates data from an earlier study by Wade) may account for the use in indigenous societies of various rituals to help men have ecstatic sexual experiences. There are many other implications of the collected data. Some 150 pages (word processed, single-spaced) of subjective experiences were added by participants; an analysis of these comments yielded considerable clues valuable for psychological therapists dealing with sexual dysfunction as well as for couples counselors, for example, the detailed reports of emotional and attitudinal shifts during coitus and other sexual interactions. Finally, 95% of the participants self-identified as heterosexual; however, 26% of females and 27% of males indicates that they had had sex with both genders, some of them frequently. This finding questions commonly used labels and sterotypes concerning sexual orientation. **PL4**

329 **Moving Consciousness: From Zen's Immediacy to Deleuze's Immanence** Mary Larrabee <mlarrabe@depaul.edu> (Philosophy, DePaul University, Chicago, IL)

The juxtaposition of Gilles Deleuze with Zen Buddhism probably elicits a wide range of reactions from mild curiosity to disbelief. Deleuze could be called a philosopher preeminently of philosophy, his authored and co-authored works raising the question of the very notion of philosophy as an undertaking – and then of the notion of concept as the work of the philosopher. Zen Buddhism, on the other hand, has been often described as operating without and even against the concept, conceptualization and the intellectual intermediarizing of theory. Yet they both come together in the sense of their challenge to pre-existing conceptualizations – of philosophy and concept (among other things) for Deleuze and of any concept or thing for Zen. Each proposes practices to help one break through past, older philosophical theorizing – for Deleuze, e.g., the arborescent theories of Eurocentric modernity – toward what lies directly in front of us, so to speak, naked reality, chaotic becoming, bodies without organs, true thusness or the Void. The core issue for this paper is the way in which a handful of Deleuzian ideas might facilitate an elucidation of texts describing kensho experiences and how this elucidation might provide an ontological understanding of consciousness that is nondualistic. Kensho is a term used by some Buddhist groups or sects to indicate a first enlightenment or realization (which may or may not be the only one, depending on how one understands enlightenment – e.g., sudden or gradual, one or many, shallow or deeper), which opens consciousness to the immediacy of the moment, among other things. The difficulty with many of the descriptions of kensho is that they tend to be either enigmatic ("It happened!") or affectively ebulliant ("I kept laughing and jumping around") or highly conceptualized ("All is one"). Accounts in both traditional Buddhist sources and contemporary personal or experiential narratives cut across these categories of description, just as Deleuze cuts across the categories of subjective and objective, of immanent and transcendent. I will argue that both these accounts, the phenomenological and the ontological, when taken as intersecting, provide an alternative account of consciousness as nondualistic process. **P11**

330 **Sex: Potential for Shared Consciousness** Kleopatra Ormos <ORMOSKLEO@aol.com> (Sobras Institute, Falmouth, MA)

Tantra, an advanced energy work, is realization of emptiness as the ultimate nature of all forms and manifestations through the joy of deep connection for sustained periods of time between uniting partners. For men, Tantric sex implies withholding orgasm and promoting multiple female orgasms. Without recognizing emptiness as the nature of joy, the sexual exercise is not Tantric. Tantra is transformation: from separation toward experiencing dissolution of individual boundaries into shared unity of emptiness and joy. Women, whose evolutionary task is to assure survival of the offspring, are intuitively oriented toward connecting. Strong bonds and emotional ties are of primary importance, significantly influencing their attitude towards sex. For men, on the other hand, whose evolutionary task is spreading the gene, their bonding needs being cyclical, it is often a struggle to maintain deep connection after encounters. Orgasm, a cardinal component of tension relief for men both biologically and psychologically, is also their cue to disconnect, at least temporarily. What could be the benefit of postponing or withholding male orgasm in Tantric sex, while promoting female orgasm? How could it be more attractive or worthwhile to go against evolutionary, biological and psychological pressure, not to mention the unparalleled joy and relaxation arising from orgasm? Yet, for thousands of years, Tantric practitioners have been exchanging individual needs for shared consciousness through unity. **PL4**

331 **Observer Theories: The Next Step** Amanda Seipel <ahseipel@yahoo.com> (Sun Prairie, WI, Sun Prairie, WI)

What else can we learn about consciousness by re-examining the role of the observer? How can experimental techniques be modified to refine our understanding of the nature of the observer? Can new experimental techniques pinpoint a role for the observer in the process of state selection, as suggested by parapsychological research? This presentation briefly reviews Observer/Observational Theories as proposed by Houtkooper, Bierman, and others, and suggests that these theories and their associated findings represent a testable perspective on consciousness. Primary topics to be covered will include, a review of the difficulties Observer Theories have been faced with, and suggested ways in which experimental techniques might be modified in order to help answer the questions posed above. Topics to be covered in additional depth as time permits include, multiple-observer problems, isolating and identifying the strongest observer, and ways to reduce or eliminate experimenter effects. **P5**

332 **We are the Worlds, Coupling via Semiotic Structures : Reframing Reality for Survival** Laurence Victor <ljv137@aol.com> (Psychology, Pima Community College, Tucson, AZ)

The vast diversity of minds/worlds in the human population must be much better comprehended

if we are going to survive/thrive. Is our best adequate? Might we need to question fundamental assumptions about reality and explore alternative frames for our hypotheses and social policies? A modification of Maturana/Varela's concept of structural coupling of autopoietic living/cognitive systems may guide us in action/research efforts to create a viable nested pattern of human-human interactions from interpersonal through communal to planetary; with the stability of our multi-cellular biological miracle as exemplar, an awesome unity within a vast diversity of variation emerges as our potential. "Frames" constraining how we each think and act in our personal constructed worlds, although a concept not yet adequately understood, may be useful in designing social processes that will significantly reduce conflict and violence and contribute to enhanced respect for others. The contemporary frame that we are different selves living in a common "objective" world (that we each act as if we believe our personal world to the objective world for all) blocks our ability to respect significant differences. Our personal worlds are much more than memories of perceptual inputs, thoughts and actions; they are "organized" sysnets of "entities" we have yet to comprehend. Big Bangs and Black Holes, Evolution and Ecology, Markets and Manipulators, atoms and individuals and societies are the world context for our moment to moment experiences and behaviors. WorldWeaving may be the primary dynamic of human development from conception to death. Instead of perceptual-motor/consciousness processes being modulated by memory; an alternative of basic WorldWeaving processes being modulated by perception provides an alternative frame. When we observe others acting weird, we need to ask what world they must have as context to support their behavior (as we interpret it). We should not imagine them as behaving as they do in an objective world consistent with our own personal world. Personal worlds are never experienced, but we are aware of their existence. The phenomenology of believing, knowing and experiencing remains a challenge. The unexpected informs us that there are realities beyond our constructed worlds, and contemporary science supports the impossibility of our having direct access to this larger reality. Yet, we can change our personal worlds to encompass more and more of the unexpected. Worlds are not what we perceive of our relevant environments. Languaging (a process yet in its infancy, both in emergence and in our comprehension of it) adds semiotic structures (sems: e.g., text, graphics, patterns) to our relevant perceptual environments. We use these perceived (and created) sems in weaving worlds beyond the perceivable. Sems are unique – they are repeatable patterns in physical reality, somewhat independent of substrate; when perceived they stimulate meaning in our personal worlds. One can propose that the foundation of science is sems (patterns in data) and not an observed universe. This presentation will be exploratory and motivational. Nothing can be proven or refuted at this stage. Our Crisis of Crises demands we query our most fundamental tenets. **P11**

*See also:*

369 **How Towards a Science of Consciousness Formed**
309 **Immediate and long-term effects of meditation on the processing and anticipation of visual stimuli**
314 **In My Flesh Shall I See God: Sex as a Natural Trigger for "Varieties of Religious Experience"**

# 6. Culture and Humanities

## 6.1 Literature and hermeneutics

333 **Philip K. Dick, Gnostic Science Fiction, and the Problem of Religious Experience** Erik Davis <erik.r.davis@gmail.com> (San Francisco, CA)

Twenty five years after his death, the visionary science fiction of Philip K. Dick has exploded in popularity and cultural relevance. His mind-bending and often funny tales have become the basis for almost a dozen films, with more on the way. Dissertations multiply, and the august Library of America has seen fit to canonize him with a collection, with another volume in the works. Dick asked two central questions: What is reality? and What is authentically human? The relevance of those questions to the field(s) of consciousness studies should be clear. Reality, in his fictions, is often falling apart, as ontologies and psychologies collapse due to the shape-shifting power of technological mediation, of paranoia and drugs, and of the colonizing thrust of capitalist relations. The characters who try to make their way through these labyrinths are not supermen, but ordinary, all-too-human folks – except when they are actually machines, some of whom don't always know

they are machines. Indeed, one of Dick's most penetrating tales concerns a man who discovers he is actually an android – and who then begins to hack his own programming. In the age of Second Life and consumer neuroscience, it's often said that our world is becoming more like a PKD novel all the time. But what really makes Dick relevant to consciousness studies is the fact that the author was a visionary in a more than metaphoric sense. Like William Blake, Philip K. Dick sometimes saw "actual" (to him) visions – like the ominous metallic being he glimpsed in the sky over Marin County in 1963, a demiurge who inspired his great work The Three Stigmata of Palmer Eldritch. Dick's central visionary ordeal began in 1974, when the sight of a delivery woman's Christian fish necklace triggered a long and various series of powerful altered states of consciousness and paranormal experiences. Sometimes Dick felt he was communicating with a first-century Christian named Thomas; other times with the radio, the Russians, or a cosmic mind he called VALIS, a Vast Active Living Intelligence System whose redemptive information reverses entropy. Some Dick scholars have remotely diagnosed all this "craziness" as temporal lobe epilepsy. At the same time, there are clear connections between 2/3/74 and "classic" religious experience, and Dick himself often invoked the large metaphors of gnosticism. In the end, what Dick's 2/3/74 most resembles is a Philip K. Dick novel. I want to argue that Dick's mystical experience represents a paradigmatic instance of "religious experience" in our postmodern age. 2/3/74 is a fundamentally ambiguous site of competing discourses and postmodern hermeneutics: neuroscience, meta-programming, media, fiction, gnostic immediacy – not to mention the fundamental mismatch between knowledge and experience. 2/3/74 did not give Dick messianic conviction; instead, it deepened his fundamentally open-ended inquiry into mind and reality. Most of his later fiction, as well as the over million words of the "Exegesis" he wrote, relentlessly interrogated 2/3/74, and his lack of a conclusion is both an exemplary model and an invitation for further exploration. **C14**

334 **Narrative Consciousness and Psychological Enhancement** Neil Scheurich <nesche2@email.uky.edu> (College of Medicine, University of Kentucky , Lexington, Kentucky)

The promise of psychological enhancement – the modification of mood, memory, intelligence and other characteristics in ways that are allegedly advantageous – bears controversial implications for personal identity, particularly those aspects of identity under conscious control. This paper examines the pros and cons of narrative as a way of approaching psychological enhancement and its implications for consciousness and personal identity. Arguably narrative, a primary generator of what we experience as free agency, was the original enhancement technology. The conscious self, faced with contingencies of biology, physical environment, and social context, has always tried, implicitly or explicitly by means of individual and collaborative stories, to shape and reshape itself and its destiny in certain ways. As Joseph Carroll and others have argued in work on evolution and literature, the narrative mode is a crucial tool with which consciousness manages its own ambiguity. In this respect narrative is understood not in a limited literary sense, but as broadly social and ethical; narratives of myriad kinds have always served to illuminate, justify, and where necessary, alter the self and the environment. Three fictional examples – Daniel Keyes's "Flowers for Algernon," Philip K. Dick's "Do Androids Dream of Electric Sheep," and the film "Eternal Sunshine of the Spotless Mind" – are considered with respect to both positive and negative implications for supposed psychological enhancement. In different ways they illustrate the risks of technological hubris, emotional solipsism, and trend-driven self-mutilation, issues that have been raised in the past in debates over enhancement. Meaningful narratives (and narrative selves) entail free agents acting against the backdrop of reality that offers resistance to the agent's projects. These fictional examples show that enhancement stories can founder upon overreaching, escapism, or slavish conformity. An additional example, the allegedly successful super-enhancement that concludes Arthur C. Clarke's "2001: A Space Odyssey," shows how narrative models of the self may presuppose much more conscious control over personal identity than we can in fact possess. For while we do speak of unconscious sources of creativity, narrative assumes active and self-conscious shaping of material. If we assume that determinism in the abstract is true, we can nonetheless argue that free agency is at least a necessary psychological phenomenon. Yet we increasingly understand the degree to which unconscious and contingent evolutionary factors underlie the self and its appraisals of self and others. As the sources of personal identity and its conscious dimension become more transparent and changeable, the urge to alter selves in drastic ways could produce novel psychopathologies of identity that seesaw between fatalism and random impulsivity. Consciousness is highly adept at devising means to ends, but it is much more poorly equipped to abstractly justify ends, which arguably are contingently present within evolutionary human nature. We value the sense of spontaneous choice, even though unbeknownst to us, we select among individual and social contingencies. While narrative models of consciousness admirably valorize the subject per-

sonal agency that consciousness cannot do without, such models must resist the illusory conviction that contingency can ultimately be overcome. **C14**

*See also:*

157 **'I'm not thinking of you.' Poetic metaphor: intrinsic inhibited during extrinsic, cross-modal, hand-eye, 'conscious' sensory engagement: 'losing the self' while gazing at hand drawn, beloved faces.**
63 **Toward a Consciousness of Science: Historical Models for a New Imaginative Scientific Method**

## 6.2 Art and aesthetics

335 **NeuroFloat: Real-time Exploration of Brain Spaces** Steven J. Barnes , Meehae Song; Diane Gromala; Christopher D. Shaw <sjb@nervouscreation.com> (Psychology, University of British Columbia, Vancouver, B.C., B.C, Canada)

The "Neurofloat" system is a novel interactive system that uses electroencephalographic (EEG) signals from the user to navigate through a real-time 3-D visualization of the human brain. Our system is delivered via a head-mounted display (HMD) that is used to display a combination of real-time video and 3-D graphic representations to the user. We had three goals in developing NeuroFloat. Our primary goal was to create a system where the brain-computer interface (BCI) was intrinsically related to the content of the virtual reality (VR) environment that it interfaced with. Accordingly, we chose to develop multiple VR environments that collectively represent a tour through the early stages of the user's own visual system. A second goal for the NeuroFloat system was to challenge traditional visualizations of the human brain. Most visualizations of the human brain are dominated by science-inspired metaphors and the supported interactions are mostly of the traditional point-and-click variety. The NeuroFloat system steps away from those traditional representations and interfaces in at least two ways: (1) our visualizations employ metaphors that serve to inform the user about the functionality of a particular brain region; and (2) our visualizations are delivered through a HMD and the user navigates representations of their own brain by adjusting their physiological state of arousal – as assessed with EEG. Our final goal in developing the NeuroFloat system was to incorporate a representation of a particular theory of consciousness. This goal was particularly important since we sought to illustrate that, even within the early stages of visual processing, one's conscious state can govern which stimuli are processed and how they are processed. Accordingly, we chose to incorporate a graphical representation of the dynamic core hypothesis of Edelman & Tononi (e.g., Edelman & Tononi, 2000) in which the real-time animations of its graphic components are influenced by the user's EEG signal. Taken as a whole, the NeuroFloat system represents several novel forms of interaction and representation. First, most BCI-to-VR projects have been developed for health care purposes; in contrast, the NeuroFloat system is largely for artistic and/or information representation purposes. Second, most BCI-to-VR projects present content that is not fundamentally related to the input signal; to our knowledge, the NeuroFloat system is the first system to employ EEG as an input for the purpose of navigating through a VR representation of the human brain. Finally, the NeuroFloat system uses a unique representational transition between the real world and the VR representations of the human brain. **CART**

336 **The Invasion of the Body Snatchers** Sara Bizarro <sarabizarro@yahoo.com> (Philosophy , Lisbon University, Lisboa, Portugal)

The Invasion of the Body Snatchers is a movie with several versions (1956, 1978, 1993, 2007) based on a novel by Jack Finney. The story is another version of the zombie scenario where strange pod plants morph into an exact replica of our bodies, up to the last detail in the brain, but having a lack of emotional content or feeling. My participation for this conference would be a POSTER where, using the example of The Invasion of the Body Snatchers, I would try to challenge the zombie intuition if it is understood globally – the idea that there could be a world just like ours, from day one, where consciousness would not have existed, is not conceivable. I will argue that the zombie hunch can work locally, like in the body snatchers story, where you have two identical bodies throughout but different "minds". However, it wont work generally for either: 1. Consciousness has a causal role (and so it would have effects on the physical, changing it) or, 2. Consciousness is epiphenomenal (but still if everything in a possible world would have happened just like our world, then it would have arisen, like everything else that exists, if we are materialist). The zombie hunch would have to be somewhat local, something like the story of the invasion of the body snatchers would have to be the case to give rise and explain the situation. Does this have any consequences

for a scientific explanation of consciousness? Let's imagine another physical phenomenon that has a satisfactory scientific explanation: reproduction. Imagine that a normal human was "sperminated" by one of the pod people in the story (other movies with this intuition are Rosemary's Baby or Alien). The baby would be the same as a human baby in anyway, but he would be part alien, and maybe some other humans would later notice his inability to "feel" like regular humans. If this is logically conceivable, would we say that our explanation of reproduction as it stands right now is not satisfactory any more? Maybe this indicates that the local explanation is always only partial, both for metal events, and for other kinds of events (say all events), and in this case all scientific explanation is always open pending on physical facts about the past? The intuition of The Invasion of the Body Snatchers is that it is conceivable that we would have exact physical replicas of ourselves that are mentally different, but that we need a physical history to cause and explain that. This sort of intuition does not lead to drastic explanatory gaps, it just indicates that scientific explanation is open pending on the history of the causal chain that created the phenomenon being studied. **P12**

337 **The Aesthetics of Consciousness** John Callender <jscall@doctors.org.uk> (Royal Cornhill Hospital-Mental Health, University of Aberdeen, Aberdeen, United Kingdom)

In this paper, I describe the nature of aesthetic judgments and the justifications that underpin these, with a particular focus on the theory of aesthetics set out by Kant in the Critique of Judgment. I argue that judgments of self often take the form of aesthetic judgments and illustrate this with statements made by patients undergoing psychotherapy. These include components such as emotion, cognition, a sense of inner worth, moral value and feelings of internal coherence and unity. Such judgments are prevalent in the psychotherapeutic discourse and this has major implications for the type of dialogue that is required in therapy. Such a dialogue shares many of the characteristics of art criticism but may be supported by scientific empiricism. I then discuss the idea that the art object is an externalisation of inner reality and a way of bringing a cast of mind or subjective state of being out into the world of objects. We therefore have first the proposal that judgments of self take the form of aesthetic judgments and second the idea that art is the expression of our inner subjective reality. I conclude that aesthetic philosophy provides a common ground for emotion, cognition, ethics, feelings of inner coherence or incoherence and a sense of the meaningfulness of life. Self-awareness is the original aesthetic experience. REFERENCES Callender J.S. (2005). The Role of Aesthetic Judgments in Psychotherapy. Philosophy, Psychiatry and Psychology, 12(4), 283-295. Callender J.S (2005). Aesthetics, ethics and the experience of self. Philosophy, Psychiatry and Psychology, 12(4), 311-313 **C14**

338 **Virtual Reality: Image Structure and Consciousness Organization** Margaret Dolinsky <dolinsky@indiana.edu> (School of Fine Arts, Indiana University, Bloomington , Indiana)

Virtual art, as well as any art for that matter, situates human consciousness. Digital projections, virtual environments and high end virtual reality display systems emphasize the line between biological self and technological world by providing mindware upgrades. Virtual art extends the private research laboratory of social awareness and intimate interaction by resituating the personal in experiential time based modes of aesthetic experience. This paper will discuss Andy Clark's definition of cognitive niche construction and provide dynamic illustration using time based virtual art that acts as revelation in terms of the evolution of image as a deciphering momentum and aesthetic construction as a provocation of human consciousness. Clark insists that we are who we are as a result of our brains, bodies and cultural and technological scaffolding. Here we examine the subversive confrontation of virtual art and its relationship to self construction in the 21st century technologies during the aesthetic experience. This paper examines the stream of consciousness while interacting with virtual environments. The artist's art making process is re-enacted through the viewing moment as the participant processes the artwork through navigational participation. Revelation as consciousness organization occurs as the art work itself unfolds and as it in turn unfolds the viewer during the art experiencing. This aesthetic experience is a dynamic construction of personal phenomenon. It is an ever flowing interpretation of the art, the self and the relationship they establish as an ensemble. Hello World (Illuminated Manuscript) is a digital progression that illustrates the stream of consciousness movement that occurs when vision is aligned and realigned to assimilate glimpses of recognition. As the images evolve the subject is temporally brought into focus. As the focus is achieved, albeit momentarily, the viewer's sense of realization and thereby the sense of self is momentarily altered. The progression of images illustrates a journey through the inner and outer eye and reveals where the eyes are situated and culminates in a full frontal visage. That visage is quickly reverted back to a creation known through fragments and an examination of the markings. The illustrations evolve from digital sketch marks, brush marks, photography and 3D

modeling. Beginning from a 13th century anonymous manuscript and examining ancient Christian Orthodox icons the artwork has been created using 21st century technologies to reflect the computer's technological influence over a biological need for illumination. This paper extends the notion of the mind-body-scaffolding problem by examining how art making and art viewing not only creates cultural constructs but how interacting with virtual art allows it in turn to create us too. **CART**

339 **The Visceral Register: Toward a Phenomenology of the "Second Brain"** Diane Gromala, Diane Gromala, PhD. <gromala@sfu.ca> (School of Interactive Arts & Technology, Simon Fraser University, Burnaby, BC, Canada)

Recent studies of the visceral and especially enteric systems have posed a challenge to the dominance of the brain in the study of consciousness. Unlike any other physical system, the enteric system can still function even if it is no longer connected to the brain. In addition, the visceral and its subcomponent, the enteric system, produce the majority of mood-altering substances. For these and other reasons, the enteric system has been referred to as the "second brain." Terms such as a "gut reaction" or a "visceral response" are regularly used in common parlance. What is suggested is that somehow, our viscera functions like intuition or acts as a subversion to conscious, rational thought. On a common level then, we are aware in some way about our viscera and its effects, if only in dim, unproven ways. Yet, relatively little is known about the visceral system and its relation to consciousness in scientific or scholarly terms. Work in the past decade, however, have added significantly to scientific and medical literature and pose provocative questions about the relation of consciousness with the visceral systems. Drawing upon scientific and phenomenological studies of the past several decades, this paper will examine what is known about the visceral and particularly about its subsystem, the enteric system, along with the implications for conscious states that such knowledge gives rise to. Along with scientific findings, several works of art will be referred to in order to illustrate scientific findings. These artworks were created in collaboration with an artist, physician, and computer scientist, and their findings have been published in their diverse disciplines. One work in particular, The Meditation Chamber, is a unique combination of an immersive virtual environment with biofeedback devices. Over 400 user studies have been conducted, and the work is now in clinical use at Virtually Better and 20 of its clinical partners. Finally, an extension of the work in phenomenology by Maurice Merleau-Ponty, Samuel Todes, Drew Leder, Shuan Gallagher and Andy Clark will be offered to account for the subjective and objective aspects of the visceral, described on a continuum of conscious awareness of the visceral to not-conscious responses to its inner workings. **C14**

340 **Altered States of Consciousness and Visual Arts: Salvador Dalí, Henri Michaux and Antoni Tàpies** Ana Eva Iribas-Rudín <airibas@art.ucm.es> (Dept. of Painting, Complutense University, Madrid, Madrid, Spain)

Among contemporary visual artists, it has not been infrequent to resort to altered states of consciousness as a tool for accessing new visions to be integrated in their production. The choice of artists in this paper has been motivated both by the importance of consciousness alteration in their creative process and by the extensive autobiographical literature written by these authors. A double analysis of statements and artworks covers the scope of the verbal and the visual, of the phenomenology of the mind and its expression on paper or canvas. Salvador Dalí's, painting and drawing are discussed in the light of his interest in destabilizing ordinary consciousness, playing with the senses, approaching madness, dreams, reverie, hypnagogia, and of his paranoid-critical method, a way of bringing the multiple meanings and ambiguities of primary-process thought to coexist simultaneously in consensual, ordinary perception, putting the external reality to the service of the reality of the spirit. Henri Michaux's many experiments with psychedelics (such as mescaline, psilocybin, LSD or hashish) were the consequence of his desire to think in a new way, to open his consciousness beyond its ordinary limits. His first approaches to the drug experiences, which occurred under a psychotomimetic paradigm, consisted in taking notes and drawing during the effects of the substances. With a growing confidence, he later became more contemplative and passive, and the contents of his experiences acquired a more mystical character. Antoni Tàpies views art as a way of deep and spiritual knowledge, as a tool for the evolution of consciousness and as an unparalleled inducer of contemplative, extatic and even healing states. His use of poor materials draws attention to the sacredness of the everyday elements of life and postulates a regard that appreciates beauty even in the things considered ugly. Tàpies has a prevailing interest in mysticism and Eastern thought, especially Zen, Taoism and Buddhism, and himself practices idiosyncratic forms of meditation during his creative process, destined to empty the mind and concentrate in the instant. **P12**

341 **Totemic Energy Oil Painting – Understanding the Inner Potential** Sun-Don Lee <center@sbs.arizona.edu> (Fine Arts, Peking University, Beijing, China, CHINA)

Two thousand five hundred years ago, Sakyamuni Buddha illuminated upon enlightenment the oneness of the internal and the external world as the "Human Life Science." The Buddha expounded that all beings have the Buddha nature; the Buddha also instructed us on the path to enlightenment. Being enlightened on the intrinsic essence leads naturally to the understanding of all the effects of the essence of cosmos. Since the ancient times, the Chinese people have been expressing the Zen meaning through water-ink painting, and also their respect to Buddha and Bodhisattva through colored drawing and stone sculpturing. However, with the oil paintings best known in the Western world, no one has ever manifested and incorporated Buddhist doctrines into this form of art. I established the Totemic Energy Oil Painting as a new art genre and have started the world tour exhibitions in Europe, the United States, and Asia since last year. Through these oil paintings, I am able to manifest the most amazing energy of the universe in the Buddhist doctrines and in the process of the Buddhist spiritual practice. The internal energy of a person is able to interact with the energy of the external world through various means, especially through what is known as spiritual cultivation that uplifts body and mind. Not only can our mental energy of the brain wave purify our physical functions, it is also able to render the changes on the forms and the course of events in the external world, that is to say, creating the "Inductive Energy Field." In this exhibition, we will conduct the "Human Life Science" experiments directly on the audience with our "Totemic Energy Oil Paintings" that are full of the energy achieved from the Buddhist spiritual practice. We will allow our guests to close their eyes while standing in front of each of the painting that has its unique meaning to personally experience the accordance that will render the mental and physical developments as what would be experienced in Buddhist meditation! Based on the experiments I performed in the past year on more than twenty thousand people throughout Europe, the United States, and Asia, most likely the participating audience will be amazed by the instantaneous accordance he may experience on his body and mind. **CART**

342 **We show that the contradiction in consciousness definition by different schools of philosophies is a necessary condition for the unified concept of consciousness! We then present a unified definition.** Oded Maimon <maimon@eng.tau.ac.il> (Tel Aviv, Israel)

Consciousness is a central issue in many philosophies, and in particular in the Indian six main schools of philosophies. Though it is a unified experience, the authentic definitions and descriptions vary dramatically (from Carvaka through Yoga to Tantra; and others). We classify the Indian school of thoughts regarding consciousness to three levels, and then show that even though they are contradictory, they explain the same phenomena. In fact we claim that the contradiction is a necessary condition (in the mathematical sense) for the concept of consciousness! We then proceed to a unified presentation of the characteristics of the nature of consciousness. **P6**

343 **Change in the energetic matter of my human body following the new order of my energy body, my dream body** Ana Rosa Richardson <arr.intento@free.fr> (Paris, France)

Over the last ten years or so my method of investigation has required the suspension of the interpretative system. Suspension of the interpretative system is based on the lack of human methodology, which means it starts from apparently erroneous behaviour and free will and leads to meaning that is not transcribed and has no philosophical grounding. This work method brought about a remodelling of energy in my daily life leading to a change in human relations through the extraordinary fact of SEEING energy. In late spring 2007, coming to grips with a situation in the immaterial world that was a very difficult to handle and even dangerous for my person, I understood that the only escape was to make a huge energy shift so as to be no longer accessible through the immaterial world. Accessibility means that a human being can be localised wherever he is through the energetic matter of his human body which works like a hologram when he sleeps and dreams. I therefore decided to make a great energy change. And so instead of only imitating my cosmic movements/the dream movements of my cosmic body/my dream body, I put my entire human organism on the alert to understand my dream body. Thus a new way of living emerged in my life. I decoded and basically reprogrammed my energetic matter. **P6**

344 **The Swarming of the Memes** Nicholas Tresilian <nicholas.tresilian@artstation.org.uk> (International Society for the Study of Time, Bath., United Kingdom)

TOWARDS A SCIENCE OF CONSCIOUSNESS THE SWARMING OF THE MEMES Abstract Nicholas Tresilian Traditional art history equates the production of art-memes exclusively with individual consciousness. An evolutionary art history looks also at the patterns into which art-memes flow – patterns which clearly display widespread synchronicities of cultural motivation,

both within the arts themselves and between the arts and sciences – patterns of collective memetic behaviour... We are all familiar with short-wave collective behaviour: football fans, religious congregations, corporate cultures, political demonstrations, rioting crowds, panicking troops all display it. This paper is concerned with long wave collective behaviour: as evidenced in the migration of Western elite culture from the open to the closed meme in the arts and sciences of the Renaissance period, and in the reciprocal migration from closed to open memes going on at the present time. How do we explain this `swarming of the memes', such that artistic and scientific communication seem invisibly linked together, albeit that as our memes rock'n'roll topologically between open and closed states, arts and sciences (syncretic and analytic meaning respectively) alternately play the more influential role in the human economy? The paper suggests that memetic swarming – the synchronisation of our memes in long waves of alternating open and closed states – may reflect the sensitivity of human consciousness to the changing dynamics of our own relationship with our planetary biosphere through ecological evolution. If so, the ultimate driver of memetic swarming may be a commonplace figure-ground algorithm, linking our evolution with our memes by means of a simple reciprocity-principle, such that consciousness tends to output closed memes in periods of open evolution, and open memes in periods of closed evolution. Keywords: Consciousness, Meme, Memetic, Open, Closed, Reciprocity Principle Nicholas Tresilian is an art-historian writing about visual art in relation to cultural evolution. He has taught art-history at London's Central School of Art and Design and elsewhere, made art-films for the BBC, founded media Plcs in TV and radio (including the world's largest independent classical music station Classic fm), He is a member of the Planetary Collegium and a member and former Vice-President of the US-based International Society for the Study of Time (ISST). He lives in Cordoba (Spain) and Bath (U.K) . nicholas.tresilian@artstation.org.uk +44 (0) 7970 702 706 **C14**

## 6.4 Religion

345 **Framing a Philosophical, Cosmological, and Theological Anthropology of Consciousness (as seen by the Philosopher-Coach)** Jesse Bettinger <jessbett@hotmail.com> (Philosophy of Religion/Men's Soccer, Claremont Graduate University/Pomona College, Claremont, California, United States of America)

In my 2006 abstract, the ingredients for an integrative, heuristic model of consciousness were set forward. At this point I would like to now house that model in terms of a consilient: philosophical, theological, quantum, and cosmological – worldview that, among other things, lays down a case for the ubiquity of consciousness as theologically-panentheistic, philosophically-primordial, [and] biologically-emergent phenomenon. In the process, a set of novel approaches will be introduced that ask us to modify the way we think about consciousness and the cosmos; religion and society; anthropology and teleology. The move to frame the 2006 model is meant to serve as an intermediary primer to the formal introduction of the model first proposed two years ago. This is done on the basis that, in order to understand the approach to the modal, platform-logic of consciousness (2006), a sense for the kind of worldview and anthropology espoused in constructing this theory is seen as advantageous to the overall efficacy of the program. The components given in 2006 still hold. The framework will draw mostly from the intuitions of Whitehead. That said, the correlations to Whitehead are retroactive and the chief guiding frameworks will convey the 2006 program according to the account of two, original philosophical and theological theories: the Humpty Dumpty model of Consciousness and Cosmos (theological and philosophical); and Puzzle Theory (methodological, biological, and emergent). The Puzzle Theory will also posit an ethic drawing from E.O Wilson's biologically based 'new ethics'. The work of Richard Dawkins, A.N Whitehead, Charles Peirce, Philip Clayton, and Roland Faber will be highlighted and drawn from – in addition to recent articles published in the journal, NeuroQuantology – which also (via Sultan Tarlaci) invited the 2006 abstract (by this author) for publication. Another question this framework will try to answer regards the role that quantum theory may play in informing consciousness, and the role that electromagnetic theory informs the same venture – and whether these two vehicles are mutually exclusive or can both be brought to bear. This question will also involve the work of Johnjoe McFadden, articles published in Neuroquantology, and contemporary data drawn from the field of neurocardiology re: electromagnetics. This framework (for the 2006 abstract) is meant to serve as no less than the rudiments of a philosophical and theological anthropology of consciousness. To be sure, this program appears to be unfolding as a trilogy. Part one: the ingredients; part two: the philosophical and theological anthropology; and part three: the model itself as the formalized, substantial systemic proposed in the 2006 abstract. The third part is meant to denote a theory in the range of a philosophical cosmology in the Whiteheadian sense. This abstract nominates part two of three. **P12**

346 **The Lost Voice of God: Julian Jaynes and Neurotheology** Brian McVeigh <bmcveigh@email.arizona.edu> (East Asian Studies Department, University of Arizona, Tucson, AZ)

Recently books on atheism have garnered much attention in the popular imagination. However, they fail to adequately explain why odd beliefs, irrational behavior, and far-fetched story-telling characterize spirituality. How can the origins of religion be logically explained? And if science is as commonsensical as many anti-religion writers assert, why did it take almost 35 centuries to appear in incipient form after the first civilizations emerged, and another 20 or so centuries to develop into a more recognizably modern form? In my presentation I apply a Jaynesian neurotheology to the history of religion, placing spirituality within the context of evolutionary psychology. Specifically, I contend that the origins of religious beliefs can be found in the work of Julian Jaynes, who in The Origin of Consciousness in the Breakdown of the Bicameral Mind (1976) theorized that the "voices of the gods" reported in ancient religious texts were not just fanciful literary devices. Rather, they were hallucinations: a god's words functioned as an individual's volition. Such voices were produced by a two-chambered neurology (hence "bicameral") as an adaptation to the agriculturalism and urbanization of the Neolithic revolution. By around the 12th century BCE the psycho-hierarchy of god – man had disintegrated, no longer capable of handling the pressures of complicated social organization triggered by population growth. Though vestiges remain (hypnosis, schizophrenia, spirit possession, glossolalia), bicamerality was replaced by conscious interior experience suited to politico-economic complexity. In this sense, self-introspection is not an innate bio-evolutionary adaptation but a learned cultural response. As a consequence of the gods growing silent, more philosophical perspectives developed that, if not dismissing unanswerable questions about ultimate existence, at least took a more skeptical stance toward the supernatural. This attitude, clearly evident by the sixth century BCE, would form the basis of our secular and scientific worldview. **C13**

347 **Evolution, Neuroplasticity, and the Beatific Vision** Pamela Reeve <pj.reeve@utoronto.ca> (Toronto School of Theology; Philosophy, St. Augustine's Seminary, Toronto, Ontario, Canada)

In the metaphysical psychology of the 13th century theologian, Thomas Aquinas, one finds a fundamental relationship between the nature and limits of human knowing and the physical body. Although Aquinas considered that sense perception, imagination, and memory required physical organs, he argued that our higher intellectual operations could be exercised in an 'immaterial' manner. While Aquinas believed that the ultimate end of human existence is the beatific vision, in which the intellect achieves direct participation in the divine mind, he thought that the embodied condition of the human soul is an impediment to the realization of this end in the present life. Hence one finds in his works repeated references to the need for 'separation' from the material conditions of the body for the inception of the beatific vision. Nevertheless, Aquinas did not have a concept of the evolution of the human body and brain. Nor was he aware of 'neuroplasticity' in which focused attention can produce material changes in the brain in a top-down manner. In view of these discoveries, and recent research on the neurocognitive correlates of meditative states, the question arises whether separation from the body is necessary for the operationalization of higher cognitive states and the beatific vision itself. My paper will explore the implications of evolution and neuroplasticity for Aquinas's perspective on the human capacity to achieve the beatific vision in the present life. If human nature, and especially the human brain is not fixed in nature, but is in an ongoing process of adaptation and development in response to experience, then human life may have the potential for cognitive states beyond what was considered possible within the conceptual framework of 13th century philosophical psychology. **P12**

348 **Immortality versus resurrection: Xavier Zubiri´s final mistake** Carlos Risco Risco <carlosriscorisco@yahoo.es> (Madrid, Spain)

The purpose of this work is to retake the philosophy of Xavier Zubiri, a Spanish thinker of the twentieth century, in order to analyze the final variation of his position with respect to the problem of the relationship between the body and the soul. This happened after the conversations he hold with Boismard, a Dominican theologian who visited Madrid to give a group of conferences on the topic "Our victory over death: immortality or resurrection". He persuaded Zubiri to accept that, when a human being dies, which dies is the whole person, denying so the immortal character of the human soul. The Spanish philosopher, previously very faithful to the Catholic Church, after the dialogues with Boismard, (1973), changed his mind and began to defend the death of the whole person. The resurrection would happen, for him, as a grace of Christ, affecting the whole human being who had died fully. As a result immortality and resurrection were considered two contradictory

things, being relegated the first term to the past, as a Platonic legacy, overcome already in the Judeo-Christian tradition, in which there would be only space to speak about resurrection. This position was not exclusive of Zubiri and Boismard. Other intellectuals in the twentieth century hold similar ideas, such as Paul Althaus, Carl Stange or Adolf Schlatter; these last coming from the protestant thought. The change had real concrete consequences at a practical level: the way of experiencing corporeity and time would be different. The personal death would mean for the person at the same time the end of history and the Final Judgment, altogether, and the resurrection would be already given at that point. The Magisterium of the Catholic Church differs clearly with respect to this topic: according to it there is not opposition between immortality (of the soul) and resurrection ( of the body). When a person dies, which dies is the body, but not the soul, since it is immortal. And, when Christ will come in his second and final return, it will take place the Final Judgment, and also then the resurrection of the body will happen. From the personal death to the final resurrection, which will happen at the end of history, there would be an intermediate time, unless Christ comes before that person dies, which is a possibility. The philosophy made from that moment till his death by Zubiri did incorporate this mistake in its depth. (That includes his trilogy on Sentient Intelligence, his book "Man and God", and other minor writings, such as "El hombre y su cuerpo" – Man and his body – to mention some of them). Since the author of the poster presented in the conferences of 2004 two works (with dr. Sonia Lopez Arribas as first author one of them) defending the philosophy of Xavier Zubiri's last period it was due by him to rectify. He declares himself a Catholic, fully in agreement with the Magisterium of the Catholic Church. **P12**

349 **Visions as a special form of altered state of consciousness** Josiah Shindi <josiahshindi@yahoo.co.uk> (Psychology, Benue State University, Makurdi, Benue, Nigeria)

Registration ID: CON830T61565 Last Name: Shindi First Name: Josiah Abstract Title: Abstract: The Paper reviewed Biblical accounts of visions, since over one third (1/3) of the Bible is devoted to narration of visions and dreams. Several persons who claimed of have seen visions in the last five years were interviewed using structured questions. Results indicate that there are some similarities between the visions reported in the Bible and those of the participants in the study. Precipitating and exasperating factors in vision are discussed together with the visions' content. Evidence point to the notion of special altered state of consciousness during the period of visions, specifically during the hyponagogic and hypnopompic states. **P6**

*See also:*

203 **Quantitative and Qualitative Analyses of the Ascribed Characteristics of Spiritual Discernment: Higher Consciousness or Self-Deception?**
305 **The States of Consciousness**
348 **Immortality versus resurrection: Xavier Zubiri´s final mistake**

## *6.5 Mythology*

350 **Cycles in Consciousness – An Ancient View** Walter Cruttenden <Walter@BinaryResearchInstitute.org> (Binary Research Institute , Newport Beach, CA)

Cycles in Consciousness – An Ancient View According to Giorgio de Santillana, the former professor of the history of science at MIT, over 30 ancient cultures believed consciousness would rise and fall over long periods of time. In his landmark work, Hamlet's Mill, Giorgio and co-author, Hertha von Dechend, document how the myth and folklore of ancestral people describe a cycle of alternating "Dark and Golden Ages". It was believed that in the higher ages mankind's consciousness was equivalent to a "demi-god or god" whereas the lower ages would bring man back to his "mortal or material" state. Plato called this cycle "the Great Year". While historians recognize a classical Dark Age period they do not recognize any prehistoric "Golden Age" as described by Hesiod and other ancient cultures, consequently most of us were taught this idea of a "Great Year" is just a fairy tale. However, new astronomical and archaeological evidence suggest the cycle may have some basis in fact. If true, an understanding of the ancient beliefs might provide insight into whether or not world consciousness has any cyclical aspect, and if so, where consciousness may be headed today. The ancient view of world consciousness was tied to celestial motion. Interestingly, new research shows the body's adaptation to the earth's diurnal motion is the major factor causing human awareness to move from a conscious state, to subconscious state (sleep), and back to a conscious state again, every day. Likewise, we know that earth's annual motion around the sun produces dramatic changes in the earth and the migration and reproduction pattern of billions of life forms, as well as affecting the mood and adaptability of the human species. Thus, if there is another celestial motion as some ancient cultures believed, and some modern scientists suggest, then it is

possible that this might affect life and consciousness on a broad yet subtle scale. The hypothesis for how consciousness would be affected in such a celestial cycle builds on the work of Dr. Valerie Hunt, the former professor of physiology at UCLA. In a several studies she has found that changes in the ambient EM field (produced by the earth and sun) can dramatically affect human cognition and performance. In short, consciousness may be mildly affected by proximity to EM fields. Consequently, the theory behind the Great Year or cyclical model of consciousness and history, consistent with myth and folklore, is based on the motion of the sun through space, subjecting the earth to waxing and waning EM fields, resulting in the legendary rise and fall of the ages over great periods of time. This paper/presentation highlights a few of the ancient myths about rising and falling ages tied to a modern astronomical motion, and refines the hypothesis for how a change in proximity to stellar-generated electro-magnetic fields might be the mechanism that induces cyclical changes in the earth's ionosphere, magnetosphere and most importantly, consciousness itself. **P6**

351 **Mythological Consciousness: Jaynes' Bicameral Mind & Vico's Imaginative Universals** John Hainly <jfhgames@netzero.net> (Philosophy, Southern University, Baton Rouge, LA)

Following Julian Jaynes' definition and theory of the bicameral mind and then modern consciousness, we explore a philosophical theory of what bicameral awareness must have been like. Drawing on the insights and terminology of the 18th century Italian philosopher, Giambattista Vico, we consider what the human mind was like before conscious awareness. In Vico's terms immediate sensed images first shaped men's thoughts, creating "imaginative universals" before men could think in terms of rational universal concepts. I have termed the type of awareness of pre-rational people "mythological consciousness" to draw attention to the narrative, yet very concrete and physical awareness they had. They used these grand narrations as archetypes of thought, not as fictional stories, but in place of abstract concepts that we use today. For this reason, mythological "gods" were actually translated, as we would translate concepts today. Myths were necessary for thought, they comprised a lexicon of ideas, the universal categories by which men first classified their particular experiences. Consistent with Jaynes' analysis, the mythological mentality is not religious. It is a mode of thinking. Religion is a nostalgia for that earlier mentality, as Jaynes argues. Mythological consciousness is a complete system of apprehending and living in a world. It is more immediate, sensed, and concrete than later conscious awareness would become. Modern consciousness uses such primitive awareness to build on, create new concepts, abstract, then build on those, until an entirely new, artificial world is created in the new mind-space. Metaphor is the basic initial device for both the mythological world and the modern conceptual world. Both Jaynes and Vico attempted to explain what a human mind would be like before the development of current rational abstract universal concepts. Both pushed the limits of their language to describe rationally what the human mind was like before abstract rationality. Both attempted to make some sense of how and why our current mentality evolved. Both reject the naïve assumption that men have always thought as they do now. Jaynes' bicameral mind theory best explains the mental control of social behavior and decisions made under stress. It provides the stability and authority of man's early cultures. Vico's philosophical speculation best explains the day to day mental activity, speech and thinking, exchange of ideas, that led to the adaptive behavior of modern conceptual thinking. Though centuries apart, they complement each other well, and provide a solid foundation for understanding myth, consciousness, and the human mind. **C13**

## 6.6 Sociology

352 **Quantum Philosophy, A Social Approach** Alejandro Manuel Alcaraz Ramirez <aalcarazr@gmail.com> (National Autonomous Mexico University, Taipei, Taiwan)

The differing interpretations of the relationship and definition of subject and object have been largely discussed. From Greek Philosophy to Materialism, the subject-object definition has varied, what changes Ideology, Philosophy and Human Perception. What is the difference between subject and object? When does the subject define the object, and when, if possible, does the object define the subject? What happens between subject and subject relationships? Humans act not only as subjects but also as objects. Can a subject define another subject since it represents an object for the former? Self existence comes from representationalism, whereas it can emerge from outside or inside, what sets the interaction between subject and object. These concepts are gathered for daily human "reality" and "life" analysis, from the social perspective of Power, thought as the willing of existence. Quantum Mechanics brings a new spectrum of possibilities trying to explain social relations. There is an interesting interaction between ma and me, and between subject and object, that helps us to analyze the relationship between Power and Existence. **P12**

*See also:*

353 **From care of the self to the care of others : an ethnologic inquiry of a Tai-chi-chuan school.**
123 **Autism Spectrum Disorders – Neurological Abnormality and/or Cramped State of Communication Shutdown?**

## 6.7 Anthropology

353 **From care of the self to the care of others : an ethnologic inquiry of a Tai-chi-chuan school.** Sylvain Rouanet, Perera Eric ; Recours Robin <sylvainrouanet@gmail.com> (Sociology, IRSA, Montpellier, France)

Since antiquity, philosophy is haunted by the question of mind and consciousness. The ancient obvious split of body and mind, perception and action, emotion and reason are central in current sciences. The "mind / body" problem obsesses philosophers and neuroscientists and crosses over human and natural sciences. Asian traditions have been recently been used as a way to resolve or dissolve this problem. Ironically materialist scientists like Varela gaze at Asian philosophical concepts like non-dualism or vacuity and spiritualist scientists put Buddhist monks under x-ray or RMI. My purpose is to take part in this debate through a two-year participant observation as a student in a French Tai-chi-chuan school. I will also introduce facts about the current results in neurosciences research. The master describes sensitization as the way and the goal of Tai-chi-chuan learning process. There are two steps on this way. First the care of the self: "tai-chi is a date with yourselves" claims the master. It is a necessary condition which makes possible the care of others. It also permits "to make the contact in tai-chi and life" which makes of "martial arts a way of respect others". This development from the care of the self to the care of others is present in several different periods and civilizations. In ancient time's Taoist sages already asserted "the one who governs his body, governs the country". Foucault, from his studies of sexuality in Greek antiquity, concludes: "the care of the self is in a certain way, the care of others" because "maintaining oneself direction, exerting the management of its house, taking part in the city governance are three practices of the same kind". The permanence and continuity of this learning process in different civilisation and times lead to question its status: simple observation or part of human nature? Recent neurosciences research results give sense to this observation. The theory of enaction asserts that knowledge is constructed through action and motor skills. Alain Berthoz by conciliating physiology and phenomenology of action concludes that human interactions rely on the ability to put oneself in the position of others. This possibility to physically and mentally resonates with others through interoception and mirror neurons gives a new insight of the man's conception. Mauss invitation to study human as a "bio-psycho-social complex" opens new anthropological perspectives and a possibility to bridge the gap between body and mind, human and natural sciences. **P6**

354 **Liminal Consciousness** Richard Sorenson, E Richard Sorenson <ers@richardsorenson.org> (The Study of Child Behavior and Human Development in Cultural Isolates, Roonguthai Human Studies Research Center, Phuket, Thailand)

In many aboriginal societies high levels of liminal consciousness,that appear to have evolved during prehistoric times, were the outstanding means by which people related to one another and their natural surroundings. When isolated survivals of such societies were absorbed by aggressively-competitive social systems, subliminal awareness deteriorated along with the human concord it fostered. A three decade diachronic study of such populations suggests that emphasis during childhood on verbalized conceptualization and abstract rules of conduct obstructs ontogenesis of high levels of liminal consciousness. That liminal awareness is briefly expressed ontogenetically during adolescence in modernized societies suggests evolutionary implications. **P12**

## 6.8 Information technology

355 **Consciousness and Human Interface Technology** TingTing Chen, Mark Billinghurst, HIT Lab NZ University of Canterbury; Jennifer Beck, 1UTek, New Zealand <tingting.ttchen@gmail.com> (Philosophy and Human Interface Technology Lab, University of Canterbury, Christchurch, New Zealand)

There are moments in life when we are fully immersed in an activity, we take total control of our actions, we feel a deep sense of exhilaration, time seizes and joy flows in. This is what it is called Optimal Experience or Flow by Csikszentmihalyi. It is a state of mind that is highly conscious and aware. An interesting relative state is the subconscious state, where one turns their attention to a

single point of reference which can be described as meditated or relaxed. What is actually changed when these two somewhat extreme states are reached? Is there any correlation between these two states? Human interface technologies, especially mixed reality technologies, can engage the user in such an environment that it can facilitate the changes. In this paper, we articulate a few of our human interface technology (HIT) applications which use multi-modality treatments to attract and maintain attention, facilitate involvement through interaction, in addition to controlling and organizing conscious awareness. We believe consciousness can be organized in terms of different goals through our intentions which manifest the result of our consciousness to create and control our subjective reality and influence the objective world. **CART**

356 **Individual Differences in Video Game Play and Presence** Jordan Olischefski, Jayne Gackenbach <OlischefskiJ@mymacewan.ca> (Grant MacEwan College , Edmonton, Alberta, Canada)

Following a line of inquiry into how video game play affects consciousness, the variable of interest relative to consciousness in these two studies is presence. Presence has been defined most simply as the sense of being there. Although most often explored in the computer science literature as telepresence or immersion in virtual reality (VR), it is also a concept familiar to literature and the arts as well as media studies. The design of study 1 was a 2 (High versus low level of game feedback) by 2 (high versus low level of game play history) factorial with one within and one between subject independent variables. There were three broadly defined dependent variables: self report presence, physiological presence, and behavioral presence. Participants were selected based upon their video game play history with 61 subjects having been run. Contrary to expectation regarding self report presence only one question out of 22 was significant with a gamer type by game type interaction on having to adjust back to the physical environment when the game ended. Three other self report indicates of presence approached traditional levels of significance. In terms of behavioral presence, performance on the two video games was compared using time estimations. Because they were different types of games, game performance per se could not directly be compared between groups of subjects but could within groups. There were no between or within subject difference on any game performance variables. The biofeedback information on one game type is currently being analyzed. Due to this general lack of within and between subject effects, factor analyses were calculated to examine the potential relationships between variables. Because there was a small number of subjects (n=61) self report presence scales were reduced logically to four types of presence for each game (i.e., perceptual/physical, emotional, cognitive, immersion). A principle component factor analysis was computed using these eight self report presence scale scores, gamer group designation, and four performance scores (two for each game). Factor 1 loaded all the self report presence scores while factor 2 loaded the performance scores. The individual difference variable of gamer play history loaded on factors 3 and 4. Factor 4 loaded high gamer history with high time estimates on both games and a self report of a lack of emotional presence in one game. Factor 4 loaded a combination of game performance variables and gamer type in a complex manner. The biofeedback information should add another layer to this multi-pronged approach to presence in games and gamers. Study 2 is currently being run with the same basic methodology, sans the biofeedback information, but with one game of a more traditional type (i.e. car racing) rather than two unfamiliar games. The game was chosen for its accessibility and high intensity, an important component in assessing presence. In this study subjects will play through two experimental conditions such that high presence will involve playing the game as intended by the designers, in surround sound, through a projection device. The low presence condition will be the same, only with audio removed and a distracter task in its place. The task will require participants to tap a button each time a particular word is heard. This will serve to divide the participant's attention. Following each trial the user will estimate its duration. They will also be asked to fill out the same presence instrument as in the first study. Lap times will be recorded and averaged. The results of both studies will be presented. **P6**

357 **The Psychecology Game I: Using Role Playing Games to capture veridical data on subliminal states of being (An interdisciplinary correlation)** Stephen Schafer, NA <dagazschafer@aol.com> (Digipen Institute of Technology, Redmond, WA)

Hypothesis: In order to disclose unconscious sources of social pathology and to heal a culture, the culture's media (particularly film, television, and video games) can be interpreted according to rules of literary explication and the amplification method of dream analysis developed by Dr. Carl G. Jung. Incorporating these analytical parameters, the Psychecology Game (Role Playing Games or RPGs) can be employed as a research instrument to access veridical data relative to subliminal states of being. I. The key to navigation of the mind's eye map of reality resides in the correspon-

dences (based on recursions of isometric form) that may be found in an array of narrative-metaphorical structures. II. The purpose of this navigation model (as narrative) would be to access meaning (Harnad 1990) and to foster insight relative to the individual and collective premise (Schafer 2006) of the player in a game story mediated by the Role Playing Game. In drama, premise (what a player-avatar learns)is the key to didactic potential intrinsic to the unified structure of a story (Aristotelian dramatic unities and analogical formulation). Player choices (a mixture of both conscious and subliminal urges) made as s/he learns to win an RPG constitute enactive insight relative to the premise of the game. Similar data relative to collectives could be accessed by similar programming of Massive Multiplayer Online Games (MMOGs). III. The incipient media age portends an epistemological paradigm shift in the Kuhnian sense. The scientific mandate for the age of mediation is to approach research from a more psychological perspective. As discussed in Psychecology II, Jungian synchronicity may be understood in terms of mathematical recursion. And though the Jungian concept of projection is complex, it may be stipulated that dreams are projections – semiotic maps of the territory – that originate at archetypal levels of psyche. In addition to their symbolic-metaphorical resonances, Jung observed that dreams have narrative structure, and it is this narrative structure that makes the archetypal source of metaphorical resonance in dreams accessible to the amplification method of Jungian analysis. According to Jungian principle, symbolic-metaphorical resonances in projected dream images must have corresponding resonances at archetypal levels of psyche. If the resonances at levels of image and archetype are recursive and understandable as isometric form, archetypal levels of psyche become susceptible to computation and the accumulation of veridical data. By addressing the medium of enactive imagery that defines both dreams and games, the Psychecology Game (Role Playing Games) could provide a model (the Dream Paradigm) for tracking synchronicities among multi-dimensional patterns of cognitive function and accessing veridical data relative to archetypal levels of individual and cultural psyche. IV. Computational access to subliminal patterns of meaning on individual and collective levels would be invaluable in the construction of better educational curricula in an incipient age of mediation (Schafer 2006). V. More importantly, experimental data garnered with use of navigational models (RPGs and MMOGs) could be applied to improved understanding and treatment of social pathology. In the future, access to the archetypal premise imbedded in the symbolic story told by a culture's media could – in the same way that dreams embody affordances essential to the healing of patients suffering from psychological pathology – provide insights relative to healing a cultural patient suffering from social pathology. **P6**

358 **Information technology, the sense of presence, and the evolution of the conscious self** John Waterworth <jwworth@informatik.umu.se> (Informatics, Umeå University, Umeå, Sweden)

We have suggested previously that consciousness of being present in an environment originated as the feeling of something happening from outside rather than within an organism. In other words, it distinguished self from non-self. In complex organisms, the sense of presence evolved into the ability to experience a graduated feeling of the extent to which attention is focused on external, perceived events versus on internally-realized events such as imagined situations and remembered happenings. This is a vital ability, because we cannot make this distinction on other grounds such as emotional impact. And this is the ability that is, in a sense, misled by some information and communication technologies (ICT), such as immersive virtual realities. The evolution of human consciousness is part and parcel of the evolution of ICT. This has been interpreted by some authors in terms of three inter-related arguments. The first is that ICT in general is increasingly part of our bodies: not only embedded devices such as pacemakers or electrodes on the brain, but also carried devices such as mobile phones or even laptops. The second is that tangible or "embodied" interaction characterizes the future of ICT. The third is that the individual is in some ways an abstraction. The mind is identified with the body, which is extended by ICT beyond the skin boundary, through extended perception and distributed cognition. We challenge these views via an examination of the sense of mediated presence, stressing the abiding significance of distinguishing self from other. Some kinds of ICT become part of the self; other kinds become part of the other, the non-self. We need to address this divergence in attempting to understand the future evolution of human consciousness (and ICT). While it is true that without the technologies we have become used to and depend on, we feel at a loss, at least temporarily. The loss may feel as if some aspect of the world can no longer be perceived. But it may also feel as if a part of long term memory has been erased, as when the address book on my mobile phone suddenly disappears. These are quite different psychological effects that reflect the presence faculty in operation. Certainly, we may feel strong presence in some kinds of technologically-realized external environments, such as immersive virtual reali-

ties. But we do not feel present within an electronic address book; nor would we want to, because of the inherent limits of tangible interaction. Language, after all, is intangible. This story leads to what might seem a paradoxical conclusion. When information is realized internally, as with text or other abstract forms of representation, any ICT involved is experienced as part of the other. But when information is realized externally, in or as a surrounding environment in which one can act, the ICT becomes part of the self. To be part of the self, ICT must create or modify an external other of which it is not perceived to be a part. This will be an other in which, or with which, we can feel consciously present **C21**

359 **Lucid 2.0 a Development Environment for Synthesizing and Measuring Interactive Audio and Visual Experiences** Gino Yu, Jose Rueda <phusikoi@gmail.com> (Multimedia Innovation Center, School of Design, Hong Kong Polytechnic University, Hung Hom, Hong Kong)

We will demonstrate our progress towards developing the Lucid 2.0 platform; a development environment for creating computer based interactive experiences with biofeedback. Lucid 2.0 provides consciousness researchers with a platform for conducting first-person research. The platform provides a suite of tools for creating experiences that influence what test subjects see and hear, while also sensing biometric data which can be used for analysis or to synthesize new experiences in real-time. For biometric data, we are developing interfaces to measure heart rate variability and EEG data. Lucid 2.0 also provides Internet support that enables group participation, dialogue, and "second person" experiences. Our hope for this project is to encourage a community of consciousness researchers to integrate video game technologies into their experimental work. Lucid 2.0 also provides a platform for dialogue and shared media experiences. Media including video and audio can be viewed from within the virtual world. As the platform matures, we hope to develop a platform that the science of consciousness community can use to share ideas and develop further collaborations. Lucid 2 has been under development over the past three years at the Hong Kong Polytechnic University and funded by the Innovation Technology Fund. **CART**

*See also:*

174 **Dreams and Electronic Media: Current Status**
332 **We are the Worlds, Coupling via Semiotic Structures : Reframing Reality for Survival**

## 6.9 Ethics and legal studies

360 **Consciousness, Cognitive liberty, and Culpability: An Examination of Constitutional Law Issues** Linda MacDonald Glenn, J. S. Boyce <lindaglenn@biomedlaw.com> (Alden March Bioethics Institute, Burlington, Vermont )

This presentation will be an examination of the potential legal impact and precedents that cognitive science and neuroscience advance. Cognitive science and augmented cognition, both interdisciplinary fields, deal with the brain's software – analyzing how the processes in the brain, mind, and intelligence develop and interact. Neuroscience, on the other hand, deals with the brain's hardware. It is the point of convergence between cognitive science and either biotechnology or information technology. . Implantation of brain-to-brain communication systems – which would "wire up" different individuals to enable them to instantaneously exchange their conscious thoughts and experiences, could blur the borderline between the self and machine. This ability could have a direct impact on the justice system, the admission of scientific evidence, the issues of criminal intent, free will, and neural privacy – calling into question our definition of what it means to be human, what it means to be culpable and the constitutional rights of an individual. **P6**

361 **Strategies for Countering the Teaching of Hatred to Children** Gerald Katzman <geraldktzm@aol.com> (Pediatrics, Midwest Health Center, Farmington Hills, MIchigan)

The teaching of hatred to children is carried out by many groups throughout the world. Such indoctrination fulfils the definition of psychological abuse and thus has a devastating impact on the psychosocial development of children (A Bioethical Analysis of a Form of Psychologic Abuse: Teaching Hatred to Children, Clin. Pediatr, 2005;44:143-150). The violent speech and often violent actions of individuals taught to hate results in societal chaos. The emotional and physical injuries suffered by those who become targets of these verbal and physical attacks are commonplace occurrences in many countries. Therefore, it is imperative that efforts be made to stop the teaching of hatred to children, so that all peoples may realize their optimal potentials and not have to endure the effects of unwarranted verbal and physical attacks. Extensive studies today support the linkage between optimized social and emotional learning and both ultimate school success and construc-

tive behaviors (Building Academic Success on Social and Emotional Learning. New York, NY:Teachers College Press;2004). Such learning must start in the preschool years with curricula commonly characterized as Human Relations Programs for Children (HRPC). Goals of HRPC include enhancing self-esteem, promotion of human values (i.e. virtues), understanding emotions and their control, highlighting human similarities, building an understanding of others and their differences and non-violent conflict resolution. The organization and funding of these programs is lacking in many countries, thus setting the stage for undesirable alternatives. Mainstream religions and the discipline of Philosophy promote the internalization of accepted moral behaviors by their respective congregants and students. Some radical sects and cults promote learning that propagates antisocial and violent behaviors. Funding for these elements needs to be opposed. Legislatures and the United Nations (U.N.) have the potential for developing policies that counter the teaching of hatred to children and support nurturing learning experiences. The Convention on the Rights of the Child, signed by most U.N. member nations, could be very helpful in this regard, should the U.N. Committee on the Rights of the Child become more active. Media incitement to violence through vilification of certain groups is an ongoing problem that needs to be addressed. Children should not be exposed to such distortions. Certainly, some families also initiate the process of learned hatred, as a consequence of previous parental indoctrination. This especially speaks to the need for intervention through positive learning experiences for children in the early years. Working with families to decrease prejudicial attitudes also has the potential to promote desirable outcomes. **P6**

*See also:*

38 **Artificial Agents and Moral Status: The role of Consciousness Present and Absent.**
284 **Neuroethical Concerns Raised by Religious Experiences in Epilepsy Management**

## 6.10 Education

362 **Introducing Students in the Helping Sciences to Quantum Mechanics, Chaos/Complexity Theory, and Consciousness** Greg Brack, Michele Hill, Ph.D., Leadership Initiative, Department of Psychology and Sociology, North Georgia College and State University, mbhill@ngcsu.edu <gbrack@gsu.edu> (Counseling and Psychological Services, Georgia State University, Atlanta, GA)

Undergraduate and graduate students in the helping sciences (Counseling, Leadership, Social Work, etc.) can profit from an introduction to the sciences of Quantum Mechanics, Chaos/Complexity theory, and Consciousness, but such pedagogy is often not easy. The present paper is based upon 15 years of experience introducing such students to these exciting and challenging domains. Many students entering the helping sciences often report being "science phobic" and avoiding the "hard sciences" whenever possible. Unfortunately, often these same students believe that "hard science" and "Newtonioan Physics" are synonymous. Further, most of these students admit to distrusting science as any form of guide for working with "real human problems." Experience has shown this tragic misperception is due to several factors: 1. Not having a science course beyond basic undergraduate "science for humanities majors"; 2. Lack of self-efficacy in understanding modern scientific concepts; and 3. Not understanding how Consciousness can be understood from the domains of both Quantum Mechanics and Chaos/Complexity Theory. To circumvent such obstacles, we have instituted several curricular formats to first engage students, and then to encourage them to pursue more study. First, using videos such as "What the Bleep?" we encourage students to explore these ideas, while also cautioning students on over generalizing and misconstruing science. Second, helping to map human problems onto the domain of Quantum Mechanics, Chaos/Complexity theory, and Consciousness offers exciting new perspectives on the human experience. Third, we have found that not "teaching down" to students, but "encouraging up" student thinking sets expectations for success. Many excellent popular scientific books can move students far forward in their thinking and framing of the human dilemma. Fourth, approaching these sciences from the metaphorical side as well as the empirical perspective offers unlimited opportunities for engagement. Fifth, using in vivo experience with such devices as beepers and computer simulations brings the subject to life for these students. Finally, working to shift students' core consciousness when they "try on" these new paradigms translates to more flexibility, innovation, and creativity in their real world work. Consciousness as a science has been shown to be well within the grasp of such students and pays real curricular dividends in their critical thinking. Consciousness as a science is an excellent foundation for reintroducing students to scientific thinking and scientific paradigms. Many excellent clinicians report being turned off to science by their previous

education, but finding a new respect and fundamental rethinking of their profession in light of these "new sciences." **P12**

363 **From the Spirit to the Synapse: Creating and Implementing a Unique Interdisciplinary Consciousness Studies Class for Undergraduates** Mathew Gendle, Gendle, Mathew H.; Pugh, Jeffrey C. <mgendle@elon.edu> (Psychology, Elon University, Elon, NC)

The creation of undergraduate classes in consciousness studies poses a special challenge for academics, primarily due to the complex and theoretical nature of the subject matter. Faculty attempting to teach courses on consciousness may find themselves limited by their own knowledge base, and uncomfortable in discussing scholarly areas far outside of their own discipline. In this presentation, we discuss a unique approach that we developed to implement a team-taught consciousness class designed for university sophomores. By combining our respective scholarly expertise in biopsychology/neuroscience (MG) and religious studies/theology/philosophy (JP), a broad-reaching course on consciousness was constructed that exposed students to the breadth of theoretical and experimental approaches currently utilized in the field. Through a team-taught approach, students considered the ways in which different disciplines approach the fundamental questions underlying the phenomenon of consciousness. Because of our diverse professional expertise, we were able to create a course that was superior in both content and scope to what we could have achieved individually. By examining consciousness through the lenses of neurobiology, religious studies, physical science, and philosophy, students were provided an example of how multidisciplinary approaches are particularly well-suited to the investigation of complex phenomena. This presentation will discuss and provide specific examples of the variety of pedagogical approaches utilized in this course, including: hands-on phenomenological experiments, individual self-regulation of consciousness, and the production of mock research proposals. Students responded favorably to this unorthodox and multidisciplinary approach by providing comments on end-of-semester course evaluations such as "Oh my. I can't stop the thinking cycle that these guys have started in me." and "[this course] changed my life. I think about everything in a new way and I try to help others to understand the new concepts I have learned. This class is what college is supposed to be.". **P6**

*See also:*

355 **Consciousness and Human Interface Technology**

## 6.11 Miscellaneous

364 **Theory of Consciousness Theory of Knowledge** Edouard Asseo <edouardasseo@yahoo.com> (University of Nice – Antibes, Antibes, France)

The Theory of consciousness was successfully presented as a thesis of Doctorate in Philosophy Epistemology at the University of Nice France. Central in the theory are the concept of duration which belongs to Bergson and the concept of intentional aiming to Husserl, but the Theory of Consciousness is essentially a reformulation of the Hegel system. As such it gives a vision of the universe as an all-inclusive whole including the objective world and the subjective world. Science is based on the postulate of objectivity, if we expect science to consider subjectivity, we should call into question this postulate, otherwise, subjectivity will remain out of the scope of science. On the other hand, if we succeed, we would come up with a comprehensive theory encompassing both the experience of subjectivity, and the objective world, that Physics addresses. A Theory of consciousness is necessarily a global system. Calling into question the postulate of objectivity is our starting point. To do so, we start by thinking about a very simple experiment by which we can express this postulate. This leads to taking into account the so called knowledge function C(X) by which the object X is known. It quickly appears that this function should be reflexive, i.e. C(C) should be meaningfull and defined. Then, the conditions to which the function C(X) should comply are expressed and called the Conscience relations. We can see, here, that the current and mysterious experience of reflexivity of knowledge by which I know that I know, will be basic in the Theory.The Theory is composed of three documents briefly presented here below. A knowledge Theory : Our Theory goes much further than the Hegel system because the Conscience relations are developed mathematically and it is shown that the fundamental laws of modern Physics (Quantum Mechanics and Relativity) can be derived from the Conscience relations. This yields a new paradigm in Physics. A Theory of consciousness : We define consciousness as : – knowledge of knowledge – knowledge of being and existing – donation of sense – intentional aiming It is shown that the knowledge function complying to the conscience relations bears these properties. Knowledge of knowledge comes directly from the reflexivity property. Knowledge of being and existing comes from the concept of duration expressed as a mathematical function. Consider the statement which begins by : "I

myself….", "I" means : "I" at each instant of time, while myself is always myself, yesterday, today and tomorrow, it stays the same, it lasts above or beyond time. In other words : I exist, myself is. The knowledge function can be expressed as a function of each instant of time and as a function which does not depend on time. The two other points come from the concept of passage in the knowledge process by which the inner world and the outer world of the subject pass into one another. Conscious systems : A conscious system is a system which implements the conscience relations. The main characteristics of human subjectivity have been analysed and connected to the Conscience relations ; the principle of operation of the brain and the corresponding architectures are derived. The Theory can be found on our site : www.geocities.com/edouardasseo **P6**

365 **Collective Consciousness and the Social Brain.** Allan Combs, Stanley Krippner Saybrook Graduate School and Research Center <Allan@SourceIntegralis.org> (Transformational Studies-Psychology, CIIS, Santa Rosa, CA)

This paper discusses the possibility of a neurological basis for collective consciousness in the strong meaning of a shared sense of being together with others in a single experience. The phrase "collective consciousness" is taken here in the strong meaning of a shared sense of being together with others in a single experience. We contrast this with the weak meaning originally suggested by Émile Durkheim in 1893 to identify beliefs and attitudes shared within a society, and with the term "intersubjectivity" which usually refers to beliefs, opinions, or feelings simply held in common. Finally, we distinguish this meaning from infantile or childlike mental states prior to the appearance of individuality or self-consciousness. Such collective experiences have been reported in spiritual traditions such as the Quakers' "gathered" meetings, have been associated with advanced states of group meditation, and by various groups in modern society especially while problem solving together. During recent decades academic discussions of consciousness have been dominated by analytic philosophy or phenomenology, neither deeply concerned with the actual roots of human consciousness, or of atypical or transcendent experiences. Recent neurological approaches informed by evolutionary thought seem more useful. For instance, the discovery of mirror neurons in the premotor and posterior parietal cortex suggests the possibility that imitation between pre-human hominids helped facilitate the historical acquisition of empathy and language, a view consistent with Merlin Donald's emphasis on mimicry as the predecessor to modern communication. At past Tucson meetings and elsewhere Christophe Menant has made a strong case that such mirror neuron assisted exchanges between early humans facilitated the advent of self-consciousness and finally intersubjectivity. Ramachandran argues for a similar developmental sequence between infants and their mothers. If such ideas are valid it is not difficult to extend them to include the evolution of empathy between individuals and throughout groups via. the induction of parallel patterns of activity in the limbic and emotional brain centers of individuals within families, tribes, or other groups. Walter Freeman among others has suggested that the human brain evolved in communities and must be considered a community organ. Thus we might expect a simpatico between the complex dynamical processes of individual brains that form working communities, a simpatico leading to intersubjectivity in both the weak and the strong senses identified above. In the latter instance the issue quite literally becomes a kind of "binding problem" between individuals. To carry the discussion one step further, there are many reported instances of what appear to be subtle fields, forces, or other influences that transmit information or otherwise connect people even at a distance. The research on these is so extensive that no account of human nature is complete without taking them into consideration. If we view the higher mental processes of the human brain as complex and dynamic it would not be surprising that they might be influenced by even the slightest effects of other nearby brains, tending toward a kind of dynamical harmony perhaps not entirely unlike the powerful menstrual synchrony experienced by women living in proximity of each other. Something like this is indeed what seems to be what is reported in instances of true collective consciousness. **C7**

366 **Spiritual Experience and the Theory of Anti-Structure** David Craik <boscocraik@hotmail.com> (London, U.K.)

Many people expressed surprise when pioneering research by Hardy, Hay, Morissey and others revealed that in the agnostic West, no less that 60% of people experienced 'religious experiences' (REs) of a life transforming character. However, in societies with animistic belief systems, people have such experiences every day, or at least once or twice a week. Further, Erika Bourguignon, from a study of almost 500 societies has shown that the frequency, accessibility and quality of REs correlate inversely with the complexity of social structure. In the simplest and most egalitarian societies, ritual trance states tend to be voluntary, conscious and accessible to most people who desire them. In more hierarchic societies and nation states such as Haiti and Brazil, possesssion trance is

the norm. Possession trances are often the domain of specialist priests and priestesses, and are generally involuntary and unconscious – a kind of religious non-experience, It would appear that spiritual experience is suppressed by social structure – the less structure, the richer, more frequent, and more satisfying the resulting spirituality. Perhaps we are having 'spiritual 'expreriences' all the time, but some kind of imposed structure prevents their access to reflective awareness. The therory of anti-structiure ultimately derived from the work of Arnold van Gennep, based on two years of research into rituals in India. Van Gennep claimed that all sacred rituals are 'rites of passage' in the sense that they have a transformative function. Further, they are almost universally divisible into three phases – a 'separation' phase, in which participants are carried from the mundane to the sacred world; a transformative phase which he called 'liminal' – a betwixt-and-between world in which the normative rules of everyday life are suspended or inverted; and a 'reincorporation' phase in which participants are returned to the mundane world transformed. Victor Turner coined the term 'anti-structure' to describe the topsy-turvy character of the liminal phase in ritual and mystical states, and also what he called the 'liminoid' world of childhood play, entertainment, recreation, and the cultural arts. Anti-structural states, Turner believed, are essential for the maintenance, repair, and creative transformation of self-ordering systems. Turner's theory might explain why REs – as anti-structural states – can have such creative and life-transforming effects. **C7**

367 **BrainPaint is our first peak at consciousness in a visual medium.** Debi DuSold, Bill Scott <dbduso@aol.com> (BrainPaint/MindWorks, Tucson, AZ)

Fractals are mathematical graphs or visual representations of chaos theory. It has been through fractal technology that Bill Scott, creator of BrainPaint, has evolved a growing appreciation for the process of creation and the perfect order of all things created. Therefore, it is no wonder that Bill was attracted to EEG biofeedback, the brain being a complex system and brainwaves, the communicating interface. BrainPaint couples fractal images with our neurophysiology in order to provide non-linear feedback on the non-linear aspects of our brain states. Is your brain really painting these images? Or, is it the software? When you give an artist a canvas, brush and paint, is it the tools that paint the picture? The same goes for BrainPaint. BrainPaint gives your brain a canvas, a brush and different palettes of colors to begin painting your masterpiece. We experience improved brain function as being more present, harmonious and joyful – this is the ultimate goal of EEG biofeedback whose efficacy has been proven in research. Many notable artists, scientists and philosophers, such as Leonardo da Vinci, Aristotle, Socrates and Plato to name a few, believed that beauty is harmony made visible. Bill's intention for BrainPaint is to help people create a life more in harmony with their true nature and purpose. **CART**

368 **Julian Jaynes, Historical Psychology, and the Role of Metaphor in the Generativity and Discontinuities of Concepts of Identity** Scott Greer <sgreer@upei.ca> (Psychology, UPEI, Charlottetown, PEI, Canada)

This paper discusses the theory of consciousness by Julian Jaynes in the context of historical psychology. According to Jaynes, consciousness is not part of the naturalistic world, but part of a linguistic and metaphoric one – a world inhabited by discourse, not things. As Jaynes described it, consciousness is based on metaphor and developed through language and social practice. I propose that Jaynes' discussion of language and metaphor has some very positive and important connections to the field of historical psychology, and, as a result, to the study of consciousness and human subjectivity. Namely, research and questions regarding consciousness must first turn to the complex social and disciplinary network of metaphors, and their history, that define and perhaps (following Jaynes) even help create consciousness. Jaynes' theory argues that the origin of consciousness was based on changes in language and language use, with the role of metaphor particularly instrumental in its emergence. As Jaynes argued, at the individual level reflexivity (the subject taking itself as an object) is based, and even dependent, upon the use of metaphor. At the social level, metaphors situated within a larger social discourse often become representations representing a representation (e.g., mind as information-processor). Following Jaynes, if metaphors have helped create a "mindspace," the use of metaphors in theories of consciousness are not only part of what generate these theories, they are part of the very fabric of consciousness itself. In effect, then, it is impossible to entirely or exclusively separate 'consciousness' from 'theories about consciousness,' since, in this view, the very possibility for consciousness rests within the tools we use to define and understand it. The link between consciousness and language, and the grounding of mind in social praxis and production, are certainly not unique to Jaynes. I intend to explore the ways in which Jaynes' ideas are consistent with many forms of historical psychology, going back to the classic works of Horkheimer and Collingwood, and how this can further inquiry into consciousness. Metaphors of mind and identity are inherently social products, and have thus evolved

over time to reflect the ideas and practices of various social and historical contexts. Consciousness therefore would also be a deeply historical phenomenon, both in terms of the practices that generate it, the meanings assigned to it, and the theories proposed to explain it. Understanding the historical discontinuities we see in the various concepts of 'consciousness,' 'self,' 'mind,' etc. are part of the project for an historical psychology. While there is not one accepted definition or even a dominant theory of historical psychology, various writers on the subject all share the idea that human subjectivity is intimately tied to history, and that there is a broad, fundamentally contextual dimension to the individual subject. I conclude by discussing how Jaynes' ideas on the genesis and ontology of consciousness serve as an example of an historical psychology program of research, and how such research may turn out to be an invaluable prolegomena to more specific empirical questions concerning consciousness and the mind in general. It is argued that understanding the history of metaphors of mind, and how they operate within our social context, will enable us to delineate the discursive boundaries of objects more clearly, and develop a fuller, more grounded understanding of consciousness, and the various meanings of this elusive term. **C13**

369 **How Towards a Science of Consciousness Formed** Jeremy Horne <jhorne18@earthlink.net> (RhinoCorps, Ltd., Alamogordo, NM)

On 18 August 1991, the Towards a Science of Consciousness conference series was born. Known then as "The Fantastic Conscious Mind Conference" the original auspicious assemblage of about sixty persons at the Sierra Vista, Arizona Ramada Inn Balroom that day had great hopes that there would be future conferences to bring together the world's experts in consciousness to answer a question of one of the conference's major organizers. Dr. Gordon Olson a Sierra Vista internist had a daughter, Maria, who ". . . one frightful day in February 1981 . . [was] suddenly thrown into a coma." After her persistent vegetative state for eight years, she died in 1988. During that time, Olson was obsessed by the thought that she was "always there". Dr. Olson, true to his dictum "Think Positive", as reflected on his fliers advertising the conference, had his dreams at least partially fulfilled. Serendipitously, Olson and Drs. Stuart Hameroff, Jeremy Horne, and William Wheeler came together to organize what they called the "pre-conference" of Towards a Science of Consciousness". Even at that time, numerous disciplines were represented, ranging from mathematics, anesthesiology, philosophy, and artificial intelligence. From April 1994, onward, the main conference has proceeded periodically, 2008 being the eight biennial meeting and still preserving the interdisciplinary approach originally imitated in 1991. On 10 June 1994, J.K.B Sutherland announced the beginning of the Journal of Consciousness Studies. After the U.S. National Institute of Mental Health's "Decade of the Brain" (1990-1999), the Towards a Science of Consciousness conferences continue but at more sophisticated levels and with more participants. This paper, with some photos of original documents, describes in detail the history of the conference, the sources being original documents from the "pre-conference" and this author's memory of how it formed. **P6**

370 **The Philosophy of Immunization, which value do you choose as the "highest"?** Mark Moyers, This article wss edited for publication in the Voluntaryist by the publisher/editor Carl Watner. To find out more about Carl or the Voluntaryist search the web. <moyersmrnbi@gmail.com> (Columbia, South Carolina, Columbia, South Carolina)

Philosophy of Immunization by Mark Moyers, D.C. By the time that the year 1984 came and went, the powers that be had convinced the "masses" that George Orwell's prediction of "Big Brother" had been nothing but fantasy. Orwell had said that the State would control people by controlling their thoughts-by way of language destruction, language pollution, and word-meaning reversals. Orwell painted the future with definition changes such as "Ignorance is strength," and "Freedom is slavery." I don't believe he ever focused on the contradictions inherent in compulsory immunization, so I would like to do so now. The word "immunization" is used to describe an injection of a substance which is intended to make a person free from the necessity of fighting a disease. "Immune" was borrowed by the scientific community from the political community. A Latin word, derived some 4000 years ago, immune meant "free from obligation or duty to the city or public". "Immune" was a political word used to describe a particular status of an individual. When the scientific community began to use it, it had a similar basis with regard to disease, yet no thought of a political reference was apparent. Within a hundred years after the development of immunizations, they became compulsory (as a matter of law) for all children attending public schools. Here was "compulsory freedom" long before Orwell ever thought of mind control. As in many cases, the State has successfully obtained the sanction of the victim. The most sacred of all ownership rights is your freely granted permission to do to your body or your property what someone else wishes to do with it. By discouraging a person to reflectively think about, and therefore understand, the meaning of compulsory immunization laws, the State has kept from that person (better known as

the victim) the simple fact that this form of "freedom" – compulsory immunization – will be done to him over his objection and against his will. In other words, it will be done whether he likes it or not. When people object you need to have policemen there to force them and/or build jails to coerce them. Hence, obtaining the voluntary sanction of the victim through proper psychological warfare techniques is by far the most cost-effective method of controlling people or, as the State likes to refer to them, "political animals." In the words of a noted scientist and developer of one of the vaccines in question, Dr. Albert Sabin is quoted as follows: "Life expectancy at birth jumped from 36 years in 1776 to 72-plus in 1976. Most of the change has occurred since 1900. We have determined that medical advances have not really caused this great change," he remarked. "It's the tremendous advance in our standard of living in the United States which has improved housing conditions, sanitation, hygiene, diet and agricultural production. Give me a choice between providing everybody with sufficient nutritious food and giving them fancy medicines and vaccines, and I would take the sufficient food." While there are often paradoxes within the paradigms which are presented in order that the universe be understood, this is not such a case. Either men will live better and longer through compulsory vaccination programs or they won't. Conversely stated either men will live better and longer as a result of freedom and liberty or they won't. No room for paradoxes here: men live and die as a result of which philosophy they choose, the correct one leads to all the wonders of human life. **P6**

*See also:*

362 **Introducing Students in the Helping Sciences to Quantum Mechanics, Chaos/Complexity Theory, and Consciousness**
308 **Stairways to Heaven: The Cultural Construction of Enlightenment**
211 **Quantum Duality, Theory of Mind and Personality Assessment Applied to Social Meta-Diagnosis: The Case of Cognitive Mapping for Diagnosing the Safety Issue in Rio de Janeiro**
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