

Conference Report

The Explosion of Consciousness: TSC Conference Tucson Arizona 2012

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ABSTRACT

It may be said that TSC conference 2012 was an explosion of consciousness with a wide variety of presentations related to consciousness. The war of the worldviews was an interesting introduction to the conflict between the spiritual and material accounts of consciousness, but in the end there was a sense that more effort should be placed on establishing some common ground. There was a great deal of focus on neurology and NCC. This is likely due to the advances in the field of neuroimaging that allow the localization of brain function and the effects of connectivity. This conference also featured a new marriage between consciousness and fractals. New modalities of consciousness were also seen. There was also interesting research on precognition. In addition, there were many new and exciting topics in the poster presentations which ranged from quantum physics to plant sensitivity to human emotion. So overall, this was a well organized conference with many excellent presentations from many different areas that are moving toward a science of consciousness.

Key Words: TSC 2012, science of consciousness, worldview, spiritual, material, NCC, fractal, new modality, precognition, quantum physics.

Introduction

This year's 2012 *Toward a Science of Consciousness* (TSC) biennial conference was held in Tucson Arizona at the fabulous and beautiful Loew's Ventana Canyon Resort. I also attended last year's TSC 2011 conference in Stockholm Sweden, so the concept of this type of multi-interdisciplinary conference that focuses purely on this thing called *consciousness* is not foreign to me. This conference is held annually- alternating one year at Tucson and the other year somewhere else. It was pioneered by Dr. Stuart Hameroff, who has been putting on the TSC conferences for 20 years, and still going strong! Much of the work and organization for this type of conference falls on conference secretary Abi Behar Montefiore, who by all means deserves honorable mention. In fact, Stuart referred to her as "superwoman" during the conference opening.

I did attempt to cover as many different types of presentations as possible in order to keep this article balanced, but with so many plenary sessions and several concurrent sessions taking place throughout the week (not to mention that I had a presentation of my own to do), this was indeed

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difficult. In addition, I also tried to mention some of the poster presentations as I feel that these presentations are important as well and typically are overlooked in most conference reviews that are published.

I did not attend any of the preconference workshops as it is against my religion to pay additional fees after already paying a conference fee. I wanted to be comprehensive but I did not want to go to hell in the process. Finally, I was not able to stay until Saturday, April the 14th due to work obligations, so I apologize in advance for the presentations not mentioned on that day.

War of the World Views: An Ongoing Affair

This is a continuation of a debate that began between spiritualist Deepak Chopra and scientist Leonard Mlodinow. These two gentlemen coauthored the book *War of the World Views*, which initiated this debate and some of the readers may remember their debate from the TSC 2011 conference in Stockholm Sweden. However, this year there would be two additional speakers added to the debate- another spiritualist Menas Kafatos and another scientist Susan Blackmore, thus increasing the number of axis and allies.

During the introduction, moderator David Chalmers said jokingly that this is not so much a “war” per se, but perhaps a “tennis match” of the world views and he then made some other cheerful analogies, which received a good response from the audience. This lighten up the mood for the debate.

The first speaker up was Deepak Chopra. He opened up with an account of how this *war* of the world views began and then stated “I am a lover, not a fighter”. Evidently, the *consciousness* of the spirit of Michael Jackson is still alive and well. He then went on to state that science builds and organizes facts and measurements, but there is still no scientifically testable theory of consciousness to which someone yelled out “Hameroff might be upset about that”! He then discussed the yoga paths of unified consciousness and the seven states of consciousness, which are topics in some of his books.

The second speaker was Leonard Mlodinow as one of the scientist and/or materialist. He opened up with a retort to Deepak that “scientists are not embarrassed about not having a theory of consciousness”. Then he discussed how from the dawn of time that man has tried to explain, from explaining eclipses by dancing wolves up to the ancient Greek atomist explaining that if everything is broken down into smaller parts that the result would be atoms. It was made clear that scientists do not try to prove their theory but rather they try to disprove it using the scientific method because scientists want to explain.

Menas Kafatos took the stage next by opening up “I do not like being placed in a category” because “you can’t go too much to one side”. This was a commendable statement but strange at the same time as the debate was suppose to have two materialists and two spiritualists. Either way, he began by stating that classic physics allows direct observation, whereas quantum physics has opened the door to consciousness. However, the quantum world allows complementary aspects of a reality that the human mind rejects e.g. “maybe the atoms don’t exist”. The

possibility that the atoms may not exist is based on the possibility that particles may be strings (as in string theory) and even “super string theory”. Menas closed by stating “do not reject science, revise it, we have always been revising it”.

Last, but certainly not least, was Susan Blackmore, who opened up by stating “In six years so much has been learned about the brain”. She stated that the problem [with consciousness] is duality and the answer is “I DON’T KNOW”, which she yelled humorously. Susan then revisited Daniel Dennett’s teachings and that he proposed that one should give up their intuition because it is usually wrong. She also discussed her journey to becoming a materialist/reductionist, which began, ironically, as a researcher of paranormal activity for several decades. After all that time of researching paranormal activity Susan stated that she found no proof of paranormal activity and that spiritualists may want to keep an open mind because “they may be wrong”. She ended by throwing a dagger directly at the heart of Deepak about a statement that he made in regards to his book on money, “Deepak, you may be happy to call that *spirituality* but I am not”, and the crowd went wild!

After the four speakers were finished there was a “discussion” of sorts that ensued. This consisted of three of the speakers sitting, which was the procedure that was involved in all the other discussions during the conference; however Deepak felt the need to stand up and move toward the front of the stage. This was perhaps an attempt to elevate himself in the eyes of the audience or perhaps he believes that he is that much more important. Either way, the general perception was that he was not so much a part of the conversation but rather the intentional crux of the discussion.

The conversation volleyed back and forth between Deepak and Susan for most of the discussion, with Deepak playing some word games e.g. “what do you mean by I?” when there was a disagreement. Susan had astutely pointed out some glaring contradictions on Deepak’s concept of dualism, which he maintained was not dualism at all. Many of us in the audience were confused about were Deepak actually stood and some folks sitting next to me were shaking their heads during Deepak’s unduly expostulation.

The war of the world views was an interesting display of different perspectives on consciousness. However, I would have liked to see the four of them focus on what they all have in common in an attempt to establish a core or nexus and then dispute the differences. It was obvious that some common ground was sorely lacking in all of this and that with all of these world views we have a lot of books, but no answers.

Science of Meditation: Concurrent Session April 10, 2012

I attended a few presentations from this concurrent session as the topic caught my attention. The one that really stood out was “Meditation-Induced Bliss Viewed as Release from Conditioned Neural (Thought) Patterns which Block Reward Signals in the Brain Pleasure Center” which was given by Patricia Sharpe from Bowling Green State University, Ohio. This presentation began by proposing that half of all human thought is considered daydreaming and that this maybe a

compulsive behavior. However, Buddhism attempts to clear the mind of *discursive* thought with meditation and this leads to bliss.

Patricia then gave a very in-depth discussion of what she calls “the correlates of bliss”. This involves primarily the nucleus accumbens, its connection to dopamine release, the release of endogenous opioids, and a two way feedback loop with the medial prefrontal cortex. Dopamine release is strongly associated with reward learning and is released while doing drugs, gambling, or having sex. However, this release decreases over repeated exposure and this leads to discontent. She then reviewed a study that showed that meditation-induced bliss involves dopamine release in the nucleus accumbens and that a decrease in this type of release does not take place over repeated meditation sessions.

This was a very interesting presentation, but there were some questions about the research methodology. One of the audience members asked about different forms of meditation and how this can be delineated with the results that were presented. Also there were questions as to how meditation serves to breakup repetitive grasping thought patterns. There were no definite answers at this point in the research, but this did appear to be a great introduction to some of the neural correlates of meditation.

Searching for Consciousness in Sleep, Coma, and Anesthesia

This was the first part of Wednesday’s plenary presentations. The first presentation “Brain Connectivity in Disorders of Consciousness” was given by Melanie Boly from the Belgian National Fund of Scientific Research. She presented some very interesting research on the functional neuroimaging of disorders of consciousness e.g. coma patients, vegetative states, and minimally conscious state.

Melanie had made it clear that there has been an evolution in the field of study with patients with disorders of consciousness. This has transformed from measuring resting cerebral blood flow or electrical activity to studying an actual functional response to stimuli and to active paradigms, which can be accomplished utilizing connectivity approaches that are based on newer technology e.g. PET scan and functional MRI (fMRI).

She began by pointing out that the clinical definition of consciousness focuses on wakefulness and alertness. However, 40% of patients in a minimally conscious state and vegetative state are misdiagnosed. Her approach is that with decrease or loss of consciousness the focus is on the functional connectivity of the brain, which focus on evaluating global cerebral functions. This involves looking at a global workspace which has two components: awareness of self and awareness of the environment. She also mentions a second method, called the perturbational approach, which utilizes TMS-EEG (transcranial magnetic stimulation and electroencephalography). Her research and approach concludes that decrease in consciousness e.g. in a coma patient, correlate with decrease in brain connectivity and decrease in cerebral integration, which can be demonstrated with PET scan and fMRI.

The second speaker was Antonio Zadra from the Centre for Advanced Research in Sleep Medicine, at the University of Montreal. His presentation “Sleep Mentation and Sleep EEG During Adult Somnambulism”, focused on sleep walking (somnambulism). He pointed out that behavioral episodes during somnambulism can vary, in where these patients actually get up and do things as if they were conscious. These events are typically accompanied by visual and/or auditory hallucinations; in many cases the event is remembered by the patient upon awakening. This brings up the question- are sleep walkers asleep or dreaming?

Antonio provided some very interesting clinical case studies on this topic. One patient was a woman, who during a somnambulism episode would get up and scratch at the wall because she could hear children crying behind it. Another patient believed that his dog, sleeping at the foot of the bed, was on fire and he got up in his sleep and threw the dog in the shower, dousing the animal with water. Antonio provided a few other examples, but his point was that these patients would get up and do activities as if they were awake, as if they were conscious and not asleep. Antonio also presented laboratory findings on sleep EEG that were recorded during actual episodes. The patterns of brain activity were consistent with the idea that sleepwalking is a dissociative state with some parts of the sleepwalkers’ brains being asleep while others reflect wakefulness.

He ended by concluding that, perceptual, cognitive, and affective dimensions play a role in the subjective experience of somnambulism. Hameroff asked the question “are they conscious or just zombies on autopilot?” to which there was no definitive answer, but Antonio did add that there is a strong genetic component to this disorder.

The third presentation in this series was given by George Mashour, an anesthesiologist from the University of Michigan. His presentation on “Consciousness in the Operating Room” focused on the phenomenon of intraoperative awareness. This is a clinical description of a patient’s experience and explicit recall of a surgical procedure despite being under anesthesia, which is associated with a high incidence of post-traumatic stress. George proposes that the problem with intraoperative awareness is linked to the problem of consciousness in terms of measuring anesthetic effects in the brain.

The network of the frontoparietal portion of the brain was discussed in response to different types of anesthesia e.g. Propofol, Sevoflurane, and Ketamine. This network consists of a cortical feedback connection that is “preferentially inhibited” during general anesthesia, although feed forward connection seems to persist during general anesthesia. His conclusion was that general anesthesia is a “higher order” phenomenon that may be rooted in top-down signals from the frontal cortex to important areas of integration such as the posterior parietal cortex.

George also gave honorable mention to Iodestar anesthesiologist Henry Beecher, who proposed in the 1940s that anesthesia could help unravel the problem of consciousness. Additionally, there was an excellent question at the end of the presentation about the effect of polypharmacy in the patient undergoing anesthesia. George responded that “the effect of anesthesia is so profound, that it usually does not matter”. He emphasized that general anesthesia—at some dose—is able to suppress consciousness.

Overall this plenary session was outstanding because there were some very tangible objectives met about consciousness from a medical stand point. This highlights the growing amount of scientific acumen that is establishing definable NCC.

Fractal Consciousness

This was one of the other three sections of Wednesday's plenary presentations and was being telecasted to India, which is where the 2013 TSC conference will be held!! I remember about six months before this conference when I was watching a PBS special "Fractals: Hunting the Hidden Dimension"; I said to myself "wow, there are some correlations to consciousness here". Perhaps I am a tad bit psychic as there was an entire plenary session dedicated to "fractal consciousness" at the 2012 TSC.

The first presentation was "Scale-Free Brain Activity" given by Biyu Jade He from NIH/NINDS, Bethesda, Maryland. She opened with a somber disclaimer "I am not claiming fractal consciousness". An introduction was given on brain oscillations and fractals. However, I will not discuss the equations or the math here. She proposed that we must go beyond the power-law distribution and to explore the fine spatiotemporal patterns and scale-free brain activity (SFBA). A part of SFBA is the slow cortical potential (SCP). This was studied with intracranial EEG and fMRI to observe scale-free dynamics and oscillations.

He's research maintained that task modulation of SFBA results in a decrease in exponent that correlates well with the fractal signal obtained by fMRI or intracranial EEG. She concluded that SCP is not too slow for consciousness. However, it appears that conscious awareness under these experimental conditions is at this point inconclusive.

The second presentation was "Rapid Sampling of Brainwaves Clarifies Fractal Nature of EEG", which was given by Peter Walling from Baylor University Medical Center, Anesthesiology and Pain Management. He opened with discussing attractors in phase space and how sine waves are important in consciousness as they carry information and are themselves attractors. In physics, an attractor is typically a point in ideal multidimensional phase space that is used to describe a system toward which the system tends to evolve. This is irrelevant to the starting conditions of the system. In addition, he mentioned four types of attractors, classical pathways toward chaos, and fractals.

He presented an intriguing graph of attractor dimensions plotted verse time. This graph had many different animals plotted against their appearance in the fossil record. He then proposed that attractor dimensions increased with the appearance of newer species, which may be important to evolution, but also stated "this is not proof but [rather] a clue".

The third presentation was given by Stuart Hameroff. His topic was "Fractal Brain Hierarchy, Consciousness and Orch OR". He began by defining scale-invariant brain processes which have $1/f$ fractal-like conformations. The grid cells in the entorhinal cortex were provided as an example as they represent the spatial environment at different fractal scales, "like zooming in and out on a Google map".

Stuart then proposed that we need to go deeper into finer scales inside neurons that underlie neuron and synaptic functions, specifically cytoskeletal microtubules. He then jokingly announced “I have been obsessed with microtubules for 40 years, so you knew that was coming”! He also proposed that the fractal nature of microtubules, for example recently discovered coherent microtubule dynamics at kilohertz, megahertz and gigahertz frequency ranges, may provide sub-neuronal layers in a fractal brain hierarchy.

As to what process might occur at these various levels to provide consciousness, Penrose-Hameroff Orch OR was then discussed as the only theory proposing a specific process that results in consciousness. According to Orch OR, quantum computations in the microtubules are terminated by a mode of quantum state reduction due to an objective threshold (or objective reduction) which was proposed by Roger Penrose. This is represented by the equation $E = \hbar/t$, connecting conscious moments to self-organizing processes in fundamental space-time geometry, the most basic level of the universe, which itself may be scale-invariant according to Stuart.

Stuart also addressed criticisms of Orch OR, specifically from two Australian groups from both the University of Sydney and the University of Queensland that pointed to problems due to the nature of microtubule coherence which is ascribed for the most part to the nature of Frohlich condensation. Stuart’s replied by referring to recent experimental evidence from the group of Anirban Bandyopadhyay in Japan, who offer feasibility of the Orch OR from research using nanotechnology to study electronic conductance properties of single microtubules assembled from porcine brain tubulin. Anirban Bandyopadhyay is also an invited speaker to the TSC 2013 in India. I think it would be an outstanding idea to have a representative from the Australian groups there as well- a war of the Orch OR worldviews if you will.

Stuart concluded that consciousness, occurring by $E = \hbar/t$, can move among layers in a fractal hierarchy, like music changing scales and octaves. One such layer is gamma synchrony EEG at 40 Hz, with high intensity altered states occurring at deeper, finer scale levels.

I found this to be an extremely intriguing plenary session. The application of fractals to consciousness is very appealing. Additionally, these three presentations served as a starting point to this potential merger and by all accounts did a very good job at explaining the basics. It will be interesting to see where this goes in the near future.

HOT/NOT: Higher Order Theories of Consciousness

This was the first plenary session of Thursday’s portion of the conference. The higher-order thought (HOT) theory of consciousness proposes that a mental state is conscious when a subject is aware of itself as being in that state. This awareness is explained by the presence of higher-order thought, which is a thought about another of the subject’s mental states.

HOT comes in two categories- Actualist and Dispositionalist. The actualist HOT theory, which was addressed in this session, maintains that a phenomenally conscious mental state is a

particular state in where the object of a HOT that causes that thought. However, the subject is not aware of the HOT as being due to any inference. In simple terms the HOT is about the first-order state.

The first speaker was David Rosenthal, from CUNY Graduate Center New York, NY. He is well known as the engineer of the HOT theory. His presentation was “Conscious Awareness, Higher-Order Theories, and Overflow”. He proposes that a mental state’s having or being conscious would require having a suitable higher-order awareness of that state.

David maintains that a good marker of this higher-order awareness is the fact that we can report what we are aware of. However, higher-order awareness is not the same as being globally accessible. In fact, states with mental qualities can occur without being conscious, which occurs in unconscious perceiving or subliminal perceiving. He also dealt with a large number of objections that have been raised by Ned Block and other thinkers in this field.

David concludes that higher-order awareness represents a state and that it need not capture all the mental properties of that state, only some of them. The target first-order state is conscious only in respect of the features that the higher-order awareness actually captures. Thus, the first-order mental properties overflow what we are consciously aware of but phenomenal consciousness, on the other hand does not overflow what is represented by the higher-order awareness, as Ned Block argues. So the aspects of perception that are conscious do not overflow reportability. He ended by saying “thank you for your *conscious* attention”, which the audience really seemed to enjoy.

The second presentation was “Two Forms of Higher-order Theories of Consciousness” given by Ned Block from New York University, New York, NY. He discussed some of the criticisms of the HOT theory of consciousness and pointed out that most of the criticism derives from the notion that versions of this view are duplicative theories.

Ned proposes that a conscious perception of something, which he uses red as an example, requires a first order representation of that something, in this case red. Thus, the higher state attributes that content of red to the first-order state and that higher-order state is a thought that is the effect that one perceives red. He concludes that a non-duplicative HOT of consciousness would be where the higher-order state is a pointer to a first order state that does not have its own content.

The third presentation was “A Higher-order Statistical Decision View Accounts for Apparent Phenomenological Overflow” which was given by Hakwan Lau from Columbia University New York, NY.

Hakwan proposes that conscious visual phenomenology is determined mainly by how first order signals e.g. early visual signals, are interpreted by a higher-order system which is in the prefrontal cortex. Thus, according to this, the prefrontal cortex reports awareness. He points out that Ned Block disagrees with this model.

Hakwan also states that higher-order systems establish what he terms- *decision criterion* in order to determine if the early visual signals should contribute to the conscious visual phenomenology.

He concludes that during decreased states of attention that these systems interpret unreliable information, but the brain believes that the information is reliable.

The HOT/NOT session was interesting, but a lot of higher-order this and higher-order that came across as confusing, at least to me and some of the other attendees in the audience. It does seem natural that a system that is aware of its own consciousness would require higher-order functions. However, this was a very good introduction to the HOT theory.

Keynote Speaker: Thursday April 12, 2012

The first of the two keynote speakers at the TSC conference was Steven Laureys, who also hosted a preconference workshop “Functional Neuroimaging the (Un) Consciousness?” and his keynote presentation was “Identifying the Brain’s Awareness System: Lessons from Coma and Related States”. Steven is from the University of Liege, Coma Science Group, Cyclotron Research Center, Department of Neurology, Liege, Belgium. www.comascience.org

Steven reviewed modern neuroimaging and also electrophysiological research that demonstrates a relationship that exist between awareness and brain function in patients with disorders of consciousness e.g. minimally conscious state (MCS) and unresponsive wakefulness syndrome (previously called persistent vegetative state). His clinical approach is that you must be awake to be aware.

The research that was presented suggested that awareness is an emergent property of the collective behavior of the frontoparietal connectivity, which Steven applied the term “top-down connectivity”. This connectivity establishes a network with two components: external sensory awareness and internal self awareness. Steven explained that the function of external sensory awareness derives from the lateral prefrontal/parietal cortices and that the internal self awareness is associated with the precuneal/mesiofrontal midline activity.

It was also reiterated that consciousness is an emergent property of the collective widespread connectivity, and that connectivity of the thalamo-cortical regions are critical for the emergence of consciousness. Steven supports this with similar work done in collaboration with Melanie Boly (from the searching for consciousness plenary session and is also from the Coma Science Group) on minimally responsive consciousness. In fact, she also mentioned the components of awareness of self and awareness of the environment in her work.

The clinical relevance was also discussed. Steven maintains that this research will improve the diagnosis of patients with disorders of consciousness. He also discussed treatment with the drug Amantadine, which works as an antidyskinetic by increasing dopamine in the brain; incidentally it also works as an antiviral agent against influenza A. In coma patients this drug increases metabolic brain activity and improves consciousness. Overall, the conclusion was that the neural correlates of conscious awareness are derived from wide spread frontal-parietal connectivity.

I thought that Steven Laureys keynote presentation was phenomenal. As was seen in the other neuroscience type of presentations that were given the day before, Steven's work demonstrated tangible correlates e.g. frontal-parietal connectivity that can be researched objectively.

Echolocation and Consciousness

The title of this plenary session was intriguing from the start and the introduction was given by David Chalmers, who opened up with Nagle's famous query "what is it like to be a bat" and then jokingly stated that what Nagle meant was "what is it like to echolocate". That David Chalmers is such a witty guy!

The star of the show in this plenary session was Daniel Kish from the World Access for the Blind and his presentation was "Sound Vision: The Consciousness of Seeing with Sound". Daniel was born blind and developed the ability to utilize echolocation. He opened up with his own response to the question "what is it like to be a bat" that was asked evidently by a non-blind person, to which "what is it like to be a hawk" was his retort.

Daniel stated that echolocation can be used to obtain an image of an individual's surroundings. He demonstrated this by generating click sounds with his tongue and the top of his mouth. Then he showed how the basic principles of echolocation worked by holding a laptop in front of his face, while making a "shhhhh" sound. During this demonstration he would move the laptop farther away from his face and then closer, which caused an audible change in frequency and pitch.

After the demonstration with the laptop, Daniel discussed how using this technique enables him to "visualize" an acoustic flow field and edge detection (also called edge geometry of an object) in order to determine objects in his surroundings. He also discussed how this technique can help detect the depth or density of a structure. All of this takes training and practice.

Daniel teaches this technique to other blind people. He played a video demonstration of one of his former students Juan Ruiz using this technique of echolocation. Juan, who was born blind, set the Guinness Book of World Records by riding a bicycle while using echolocation on an obstacle course and navigating around columns without touching them or knocking them over. Mind you, Juan was not allowed the opportunity to familiarize himself with the obstacle course prior to performing this amazing feat. Here is a link to this demonstration: <http://www.worldaccessfortheblind.org/node/299>

This was a really fascinating presentation. The fact that Daniel can generate sound to make a map of his environment and navigate in it without vision is truly outstanding! I actually had the opportunity to watch Daniel do this off stage in the hotel lobby. I can not express here how impressed I am that he as taken a disability like being blind and in turn evolved a new modality of sensory perception and consciousness. In addition, he is able to teach other blind people how to do this. Again, I can not possibly express how much admiration that I have for this man.

Keynote Speaker: Friday April 13, 2012

The second keynote speaker for the TSC 2012 conference was Daryl Bem from Cornell University. His presentation was “Feeling the Future: Recent Experimental Evidence for the Anomalous Anticipation of Future Events”.

Daryl began by discussing that *PSI* is a term that represents anomalous processes of information retrieval or energy transfer that cannot be explained by any known physical or biological mechanisms. *PSI* replaces the older term *ESP*. Examples of anomalous processes of energy transfer are telepathy, clairvoyance (also called remote viewing), psychokinesis, and precognition (also called premonition).

During this presentation Daryl reviewed recent laboratory experiments that demonstrated physiological and behavioral responses to random future stimuli. This featured showing a subject slides that contained calm, scary, or erotic pictures that were randomly selected by a computer. The results were that there was a slight representation of what he terms “time-reversing”, a retroactive influence, in where a putatively causal stimulus event occur prior to the computer deciding what picture to show.

He then discussed the five different effects that were observed in these studies: precognitive detection of erotic stimuli, precognitive avoidance of negative (scary) stimuli, retroactive priming, retroactive habituation, and retroactive facilitation of recall. Individual-difference variable of stimulus seeking, which is a component of extraversion, was also factored in as to how it correlates with *PSI* performance. The conclusion was that memory works both ways, forward and backwards and that *PSI* involves retroactive facilitation of recall.

Daryl also pointed out some of the challenges to this type of research. First is an empirical challenge, which is providing well controlled demonstrations of *PSI* that can be replicated by other researchers. The second is a theoretical challenge, which is providing an explanatory theory for the proposed phenomena of *PSI* that can be compatible with physical and biological principles.

Poster Presentations at the TSC 2012

I decided to do a small write up on the poster presentations at the TSC conference in Tucson Arizona 2012 for two main reasons. First, I feel that this is an area that is often overlooked at most conferences. This is probably because of the large amount of verbal presentations- keynote speakers, plenary and concurrent sessions, which are ongoing throughout the duration of the conference. The second reason is that this is an interesting opportunity to walk into a bullpen that is chalk full of new ideas and research. There were two poster presentations held one on the evening of Wednesday April 11th and the second one on the evening of Friday April 13th. I did do a poster presentation on both days “Neurogenetics and DNA Consciousness”. This is a short summary of a few of the poster presentations that really stood out at the TSC conference 2012. In an attempt to be balanced I did try to highlight different areas and topics of consciousness.

Wolfgang Baer: The Cognitive Force in the Hierarchy of the Quantum Brain.

Wolfgang is a research associate professor of information sciences at the Naval Postgraduate School, Monterey California. This presentation is an expansion of his 2010 article “An Introduction to the Physics of Consciousness”, which was published in *The Journal of Consciousness Studies*. Here he presented a process flow diagram of a generalized thought process in where consciousness is represented in a cognitive process loop. In this loop the equations represent a process that converts a “description of phenomenological experience” into a “description of the model of the physical world [that] we believe”, and then back again. He also proposes that qualia are the energy contained in the charge-mass separation field that balances external gravito-electric influences from the past, present, and future. The main conclusion of this poster presentation was that consciousness must be incorporated into the cognitive loop of our current model of the physical (quantum or classic), which must be expanded to include a force that holds charge and mass together.

Ingrid Fredriksson: Does Consciousness Exist in Water?

Ingrid is the editor of the book *Aspects of Consciousness: Essays on Physics, Death, and the Mind*, which features writers such as Anthony Freedman and Susan Blackmore; and she will be the editor for the forthcoming *Aspects of Consciousness II*. Her presentation proposes that water has components that are similar to consciousness e.g. memory, which she references the works of Luc Montagnier and Jaques Benveniste. According to her proposal this degree of consciousness is found with in the hydrogen bonds linking the water molecules. Based on this proposal, Ingrid also speculates that there is a similar degree of consciousness that is found in the hydrogen bonds that hold the DNA molecule together. Her poster supports this proposal with the vibrant and various forms of life that are all around us which contains both water and DNA.

Ling-Fang (Terry) Kuo: Is Experience of Conscious Will Just an Illusion?

Terry is a philosophy student at the National Yang Ming University in Taiwan. His presentation argues against the theory of apparent mental causation, which is a proposal that was made by Daniel M. Wegner (“The Illusion of Conscious Will”). The focus of Terry’s argument is that an acceptable theory of consciousness must have neural correlates. His presentation evaluates the results in a study review by Patrick Haggard “Human volition: towards a neuroscience of freewill” which demonstrates that the pre-supplementary motor areas in the human brain show connections between action and thought. Therefore, this poster presentation proposes, freewill does have causal power, which has neural correlates. Consequently, according to this presentation, the theory of apparent mental causation must be rejected.

Ben Bendig: Plant Sensitivity to Spontaneous Human Emotion.

Ben is a doctoral candidate at UCLA. His poster presentation discussed electrical activity in plants in response to human activity. This was unique as there were no other posters or verbal presentations that discussed this type of topic. His research involved attaching galvanic skin response (GSR) sensors to the leaf of a plant and then recording the electrical changes in response to human emotional responses or setting e.g. talking or playing music. Some of the human activities elicited electrical changes from the plant and some did not. The results suggest that the plants may be sensitive to human emotion or activity, which can be detected in electrical changes from the leaves of a plant.

Edward Close: The Triadic Dimensional Distinction Vortical Paradigm (TDVP): A Consciousness, Infinity, and Dimensionality Paradigm Shift.

Edward is no stranger to the TSC conferences and he is the author of *Transcendental Physics*. This poster was coauthored with Vernon Neppe who was unable to attend the conference. Edward stated that “Physics talks about a theory of everything, but you can not have a theory of everything if consciousness is not factored in”. Essentially, consciousness must be included in order to accurately describe reality. To accomplish this goal his poster presentation proposes that “the calculus of distinctions”, which is based on the work of George Spencer Brown, should be factored in order to bring consciousness into the equations and create a real theory of everything.

Mark McMahon: Sound, Voice, and Awareness of Awareness.

Mark has a doctorate in dentistry but he also spent two and a half years traveling Central and South America. He is the author of *Driving to the end of the world*. This presentation illustrated his methodology in where he attempts to get people to heal themselves using the sound of their own voice. He states that this is similar to chanting but is focused more on targeting on a specific frequency that feels good on a specific injury or ailment. Meaning that a different frequency may work for a shoulder injury and another frequency may work for neck discomfort. In addition to having a poster presentation to look at, Mark also did several demonstrations for conference attendees and displayed how to actually apply this method.

It can clearly be seen by this small sample of poster presentations that there were many very good presentations from several different areas in the field of consciousness studies at the TSC conference 2012. The other advantage that I found to attending the poster presentations is that you receive the unique experience of a one-on-one with the presenter. A personal touch!

Concluding Remarks

Overall the TSC conference 2012 was an explosion of consciousness with a wide variety of presentations related to consciousness. The war of the worldviews was an interesting introduction to the conflict mounting between the spiritual and material accounts of consciousness, but in the end there was a sense that more effort should be placed on establishing some common ground. Deepak has made many statements that science has no testable theory of consciousness (bold statements from the former endocrinologist) but yet the title of his preconference was “Eastern Philosophy and the Science of Consciousness”. If science has no testable theory then how can you call the second half of a presentation *the science of consciousness*? I am not trying to be hypercritical but I also believe some of the conflicting statements need to be reevaluated as well.

There was a great deal of focus on neurology and NCC. This is likely due to the advances in the field of neuroimaging that allow the localization of brain function and the effects of connectivity. These concepts were seen in Melanie Boly’s work on patients with disorders of consciousness, George Mashour’s work on anesthesia, and Steven Laureys’s keynote presentation and his clinical correlations, which was superb.

This conference also featured a new marriage between consciousness and fractals. Researchers such as Biyu He showed that SCP and SFBA can possibly account for dimensions of consciousness that may have correlates that can be studied with fMRI and intracranial EEG. Others, like Peter Walling discussed the fractal nature of EEG and how attractor dimensions may be important to evolution. Stuart Hameroff discussed how microtubules may have fractal-like properties that underlay sub-neural functioning during consciousness.

New modalities of consciousness were also seen by Daniel Kish and others in the echolocation plenary session. There was also interesting research presented by Daryl Bem on precognition. In addition, there were many new and exciting topics in the poster presentations which ranged from quantum physics to plant sensitivity to human emotion. So overall, this was a well organized conference with many excellent presentations from many different areas that are moving toward a science of consciousness.