

Charles Whitehead

*Science and Spirit  
in Stockholm*

*Toward a Science of Consciousness:  
Brain; Mind; Reality  
Stockholm, 3–7 May 2011*

*...it is wrong to think that the task of physics is to find out how nature is.  
Physics concerns what we can say about nature.*

Niels Bohr (cited in Petersen, 1963, p. 12)

*My personal opinion is that in a future science reality will be neither  
'mental' nor 'physical'...*

Wolfgang Pauli (1950; cited in Atmanspacher and Primas, 2008, p. 8)

*...this distinction between the mental and the physical is false. It is a  
delusion created by the brain.*

Chris Frith (2007, p. 16–7)

I find it hard to say whether TSC this year was the most balanced or the most biased since the first I attended in 1998. That year there were 35 plenary talks, of which 27 were distinctly materialist — that is, they assumed that consciousness ‘arises’ from ‘physical’ processes in the brain. This year there were also 35 plenaries, with 24 devoted to physicalist accounts. I cannot claim absolute precision for these figures, because it is not always easy to make black-and-white distinctions. Research by Imants Barušs (2008) has shown that many scientists have non-physicalist beliefs but do not say so for fear of jeopardizing their careers. In that case they may present apparently physicalist papers although physicalist assumptions are not present. Others — such as Paola Zizzi who, applying the Orch-OR hypothesis

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to conditions in the early universe, inferred that the entire cosmos had a conscious experience (Abstract 203); or Deepak Chopra who believes that consciousness is the ground of all existence (Abstract 204) — were nevertheless classified in the Stockholm programme under ‘Physical and Biological Sciences’. Some were more difficult to classify. Dick Bierman, for example, suggested that presentience does not necessarily violate physical laws (Abstract 273). He argued that in most physical formalisms time symmetry is theoretically predicted, but not observed in practical physical situations. If you introduce consciousness to a complex coherent system such as the brain, he suggested, time symmetry might be ‘restored’. So anomalous phenomena might be understood without introducing any new element in physics. Bierman went on to present research in which the switching time between percepts of a Necker cube was influenced by future feedback conditions. In the conference catalogue, this paper was classified as ‘Parapsychology’ — that is, as non-physicalist even though the presenter was claiming consistency with physics. On the other hand, a comparable paper by Harald Atmanspacher (Abstract 189) — which also examined bi-stable perceptions of a Necker cube and inferred ‘temporal nonlocality’ — was classified under ‘Quantum Theory’. Atmanspacher did invoke quantum theory, but anyone familiar with his interest in Pauli, Jung, synchronicity, and a psychoid *unus mundus* will know that his views are not physicalist as conventionally understood.

But however you classify these ambiguous papers, the fact remains that plenary sessions in 2011 — as in 1998 — were dominated by neurocentric, cognocentric, and other physicalist presentations. However, as I wrote in a tenth anniversary review of Tucson conferences:

In 1998, speaker after speaker acknowledged that science, as it currently stands, simply cannot deal with consciousness (or, for that matter, provide a seamless account of reality). Rhea White, after blaming many social problems on scientific materialism, maintained that we need ‘a better story to be told’. Frances Vaughan argued for a more contemplative approach to science, and Gregg Rosenberg called for the ‘re-enchantment’ of matter. (Whitehead, 2004)

In fact Rosenberg came out with one of the most (to me) memorable comments in any TSC I have attended. After remarking on the curious fact that so much of the cosmos can be described mathematically, he asked ‘What breathes fire into the equations?’ In other words, what is the difference between cellular automata, such as John Conway’s Game of Life, and a real world where, if you bark your shin against a park bench, you feel the pain? Maybe consciousness *is* the difference

between our mathematical models that describe reality and reality as it really is. Rosenberg argued that

physical facts are not the kind of facts that can lie alone at the foundation of a world, ours or any other. The problem is that they only yield a schema that requires some further content to carry it. Also, if we assume we live in a world with real causal connections, the physical facts leave out certain facts regarding the causation in the world... [F]illing in these causal cracks between the physical facts may be the crucial move needed to close the explanatory gap.

I mention this because Rosenberg's argument strikes right to the heart of the most publicized debate in Stockholm this year — concerning the conflict or compatibility of science with spirituality, personified chiefly in programmed confrontations between Leonard Mlodinow (physicist) and Deepak Chopra (Ayurvedic physician). Mlodinow co-authored *The Grand Design* with Stephen Hawking — the book which probably roused the greatest media uproar of any published in recent years. In an attempt to clarify their notion of 'model-dependent realism' (which is the founding principle of their book and their claim that there is no 'need' to believe in God) the authors devote almost the whole of their last chapter to Conway's Game of Life, which provided the focus for Rosenberg's argument in 1998. They write:

According to the idea of model dependent realism... our brains interpret the input from our sensory organs by making a model of *the outside world*... These mental concepts are the only reality we can know. There is no model-independent test of reality. (Hawking and Mlodinow, 2010, p. 172, my italics)

However, neuroscientific evidence suggests that our brains also model *the inside world* — our minds and other people's minds — in exactly the same way as 'the outside world' — by making predictions and amending the model when the predictions fail (Frith, 2007, *passim*). Such mind-blindness on the part of two elite physicists allows them to claim that M-theory is a Theory of Everything — which means everything except consciousness.

If their knowledge of neuroscience is limited, their understanding of anthropology is more so. In order to argue that there is no 'need' to believe in God, they set up a straw man — Newton's argument that cosmic order and the hospitable conditions on our planet implicate a Creator God. Since Newton's day hundreds of planets have been discovered, orbiting stars other than our sun. 'That makes the coincidences of our planetary conditions... far less remarkable, and far less compelling as evidence that the earth was carefully designed just to

please us human beings' (Hawking and Mlodinow, 2010, p. 153). Like Richard Dawkins, these authors are assuming that religion is a kind of primitive precursor to science — an attempt to explain the universe in the absence of sufficient data. They have unwittingly re-invented a theory proposed by the British Intellectualists in the late nineteenth century, and long since discredited in social anthropology because it does not square with ethnographic data. Many anthropologists believe that Durkheim was correct in inferring that modern human culture had a ritual origin, and that ritual still serves an essential function in non-industrial societies — for example, as an engine of conflict resolution and adaptive cultural change (Turner, 1982). Religion most probably exists because of the functional importance of ritual, and the noetic nature of spiritual experience — that is, spiritual experiences deliver a self-vindicating sense of truth, one reason why they frequently change people's lives for the better (James, 1902/1985; Hardy, 1979).

Whilst the coincidences of terrestrial conditions can be easily dismissed, the coincidences of the Strong Anthropic Principle (SAP) are much more difficult to discount. Hawking and Mlodinow note that

... a change of as little as 0.5 percent in the strength of the strong nuclear force, or 4 percent in the electric force, would destroy either nearly all carbon or all oxygen in every star, and hence the possibility of life as we know it. Change those rules of our universe just a bit, and the conditions of our existence disappear! (pp. 159–60)

The remarkable precision with which the laws and constants of physics conform to the requirements of life have been taken by some as evidence of a Grand Designer. However, M-theory 'allows for  $10^{500}$  different universes, each with its own laws' (p. 118). Within this vast number of hypothetical universes, our own appears to be a rather paltry and meaningless accident.

Leonard Mlodinow's plenary paper in Stockholm was pretty much a reprise of *The Grand Design* (Abstract 205). However, he was clearly aware that the 'many worlds' hypothesis could look like a somewhat flimsy way of dodging the Strong Anthropic Principle, for he asserted with some emphasis that the hypothesis was *not* a response to the SAP — on the contrary, it followed from 'quite different considerations'. However, M-theory is not just one abstract schema (after the manner of the Game of Life) but several, each of which works part of the time and none of which works all of the time. So the theory explains Everything in a rather piecemeal fashion. Bearing this in mind, the claim that M-theory 'allows for' multiple universes may not

strike everyone as sufficient justification for violating Occam's razor  $10^{500}$  times over.

What was conspicuously missing from Mlodinow's paper, of course, was any attempt to place consciousness in the context of cosmology. During an interview with Christopher Holvenstot (intended for publication), he evaded any attempt to draw him on this issue. However, he did admit that he thought consciousness might never be explained. So it's official — a Theory of Everything (as understood by physicists) is not really a theory of everything (as understood by more literal minded people like myself).

The anti-theological stance of *The Grand Design* was the reason for the media clamour which preceded its publication. But at least one of the authors may be more agnostic than the journalists have assumed, for — in a less formal conversation with Jon Cape — Mlodinow explained that he could not accept religion but was quite happy to entertain the idea of spirituality.

### **Balance**

With such heavyweight physicalist views being expressed in Stockholm, in what sense do I claim it was one of the most balanced since 1998?

Firstly, balance is implicit in the title. 'Brain; Mind; Reality' clearly implies that a solution to the problem of consciousness might radically change our understanding of reality, and with it the most fundamental assumptions of western science. Two eminent mathematical physicists, Leonard Mlodinow and Sir Roger Penrose, were invited to speak in Stockholm. Despite their professed atheism, their presence is an acknowledgment that consciousness and reality may be inseparably intertwined.

Secondly, balance was very evident in the pre-conference publicity. The email flyer kicked off with the conventional physicalist assumption: 'How the brain produces consciousness is an open question', but continued 'as is its place in the universe.' The many problems with the neurocomputational view of consciousness were summarized, followed by an acknowledgment of empirical evidence for non-physicalist views, which deserve to be 'aired and debated'. The Welcome introduction to the conference programme followed a similar template, and even — to my surprise — included a specific mention of anthropology (about which more later).

Thirdly, on the CCS website and in email publicity, there was uncusomary emphasis given to the 'special pre-conference workshop... by

the famed Deepak Chopra'. I was somewhat unsure why any workshop should be described as 'special'. Later, it was described as a 'celebrity workshop'. I was slightly rattled that I had not heard of this famous person so I looked him up on Wikipedia and learned that his fame may be relatively recent and indigenous to the USA. Apparently, reacting to the death of his friend Michael Jackson, Chopra 'came to widespread public attention in July 2009 when he criticized the "cult of drug-pushing doctors, with their co-dependent relationships with addicted celebrities"'. However, according to the programme, Chopra is also author of 'over fifty-five books with eighteen New York Times best sellers' and Time Magazine heralds him as 'one of the top 100 heroes and icons of the century'. Chopra derives his views and medical practice from Vedic science. His workshop was entitled 'Consciousness: The Ultimate Reality?' My main point is that this non-physicalist workshop was treated as an important event by the conference organizers.

Fourthly, the Chopra workshop was followed by a Public Forum on 'Science, Consciousness and Spirituality'. I quote from the pre-conference flyer:

Descriptions and teachings of spiritual phenomena have seemed irrational, pushing scientists toward atheism or dualism. However non-locality has entered brain biology, and end-of-life brain activity defies conventional explanations. Can quantum physics bridge science and spirituality?

Of four papers presented at the Forum, two of them were concerned with quantum physics.

This is one instance illustrating my problem in distinguishing balance from bias at this conference. Yes, spiritual and non-physicalist approaches to consciousness were well represented in Stockholm, and given promotional emphasis. But why focus especially on quantum physics? From the Enlightenment onwards there have been and still are scientists with deeply spiritual beliefs, who have expressed no sense of conflict between science and spirituality. I happen to think that all aspects of physics, including quantum physics, must have relevance to understanding consciousness, and arrows of causality may point both ways. But there are other issues that should have been addressed, such as an historical account of the *origins* of conflict between science and spirituality. Why did the Pope require Galileo to revoke his claims? Was this motivated by a concern for truth, or a concern for the political authority of the Church? When the senior editor of *Nature* declared that Sheldrake's book *A New Science of Life* should

be burned, the reason he gave was that it was ‘heretical’, and stated that his motives were identical to those of the Pope in denouncing Galileo — in this case, putting politics before the empirically testable. We might also ask what motivated the Counter-Enlightenment? Was that a political issue, or was it revulsion at the dehumanizing implications of scientific reductionism? Does CSI (formerly CSICOP) debunk paranormal phenomena for ideological reasons, or because of a sincere concern for scientific integrity? There are good reasons for wanting to expose fraudulent mediums or quack medicines, but not for dismissing out of hand all research which appears to support mediumistic phenomena or therapeutic benefits from alternative medicine. There is a considerable anthropological literature on the ideology of science, including the political origins of physicalism and the conflict between science and religion. This is important because physicalism is the precise cause of the so-called ‘hard problem’ of consciousness.

Fifthly, I was struck by the fact that Peter Fenwick, at the plenary level, was given the first and last word at this conference. That is, he gave the first talk in the Public Forum (‘End-of-Life Conscious Experience’) and the concluding plenary paper (‘Death and the Loosening of Consciousness’). From an impressive base of retrospective and prospective studies, as well as over 1500 accounts by respondents following media discussions, he presented a surprisingly rich tapestry of possible and likely experiences, including premonitions of one’s own death; apparitions of dead relatives who promise to return soon to accompany the dying person on their journey; transitional experiences between this world and another consisting of love, light, and compassion; light surrounding the body or shapes leaving the body at the time of death; deathbed coincidences such as clocks stopping; and paranormal contact with distant loved ones — possibly including animals who show distress at the time of death. I found both talks moving, and suspect many others did also, like Stuart Hameroff who said (quoting from memory): ‘I don’t often get choked up during conference papers, but this one got to me.’ I can recommend Fenwick’s latest book *The Art of Dying* (Fenwick and Fenwick, 2008).

Sixthly, there was a fair number of non-physicalist papers, as already mentioned — many of which were centrally placed in the programme (Plenaries 6, 7, and 8). In Plenary 7, one highlight for me was Mario Beauregard’s talk on neurotheology (Abstract 100). He began with Ramachandran’s observation that people with temporal lobe epilepsy are often highly religious, which led to speculation about the role of the temporal lobe in transcendent experiences (TEs) and media excitement about a ‘God spot’ in the brain. He then

discussed Michael Persinger's research with the 'God helmet' which delivers weak fluctuating magnetic fields to the temporal lobes. According to Persinger, around 80% of participants report quasi-religious feelings whilst wearing the helmet. However, it is more accurate to say that 80% experience a 'sensed presence' in the room, and only around 1% attribute a divine or demonic quality to that presence. Beauregard pointed out some of the weaknesses in Persinger's protocol, which had no double-blind control, and recruited his own psychology students who had first been screened for hypnotic suggestibility.

Beauregard went on to discuss his own and Andrew Newberg's research with Carmelite and Franciscan nuns, which implicated several brain regions in addition to the temporal lobes. EEG studies further showed a dominance of theta waves during religious contemplation, as opposed to gamma waves during control periods. Such findings may challenge Hameroff's view that gamma synchrony is the (only?) neural correlate of consciousness.

Neurotheological research has led many scientists to conclude that religious experience and faith in God must be evolutionary adaptations, shaped by natural selection through gradualistic point mutations. However, when a normal healthy person thinks about God, or has a TE, this must have a neural signature which is likely to be similar across individuals — regardless of whether religion 'evolved' or not. Reading and writing consistently activate specific brain structures, but no one concludes that literacy evolved genetically. Too many scientists feel competent to venture their opinions about religion without troubling to read the relevant ethnography or consider the cross-cultural evidence for the nature and function of religion. I should note that neither Newberg nor Beauregard subscribe to such views.

Finally, Beauregard discussed near death experiences (NDEs), and two cases which might represent the most important data presented at TSC Stockholm. One was the case of Pam Reynolds, who in 1991 had a basilar artery aneurism which would have been inoperable without inducing hypothermic cardiac arrest and having the blood drained from her brain. Anaesthesia began at 7.15am. Reynolds had her eyes lubricated then taped shut. Headphones delivered a continuous succession of loud clicks to her ears so that brain responses could be measured. At 10.50 her body temperature began to drop due to bypass cooling. Fifteen minutes later, her heart stopped and her EEG was flat, with zero response to the loud clicks. After recovery from anaesthesia, she recalled a typical NDE, with accurate and highly detailed out-of-body observations of what was happening in the op room, what was said, and the highly specialized tools that were being used whilst

she was clinically dead. She also ascended a tunnel with a brilliant loving light at the end of it. 'Everything in existence', she said, 'is created from this light.' If there is no model-independent test of reality, I wonder if claims of this sort are more or less trustworthy than M-theory. Is it more or less rational to believe in one alternative universe we go to at death, or  $10^{500}$  universes, the vast majority of which are dead and meaningless?

I have already mentioned Bierman's paper from the subsequent Plenary 8. Bierman was followed by Moran Cerf (Abstract 101), with a talk entitled 'How Many People are There in Your Brain?' I sat up at that point because 'theatre of mind' falls within my research area, and is largely ignored in cognitive science. However, Cerf went on to discuss recordings from individual neurons whilst people called thoughts to mind and made decisions. He concludes that multiple thoughts compete for access to consciousness. This is a different phenomenon from theatre of mind, which involves dissociated *personae* (the 'toy people' who appear in your dreams and daydreams). There is some evidence that these 'toy people' have minds of their own, which raises the question of whether they also have multiple competing thoughts. It is a pity that Cerf did not attend the concurrent session in which my own paper addressed the topic of daydreaming and its implications. In fact, it is a pity that no one attended that session, other than one delegate and the six speakers, who included the very dynamic moderator, Natalie Geld. Geld has persuaded Bernard Baars and other important consciousness scholars to form the Why Consciousness Organization (WhyCon.org), which 'is building [an] international community for scientists, educators, students and citizens to communicate, collaborate and synthesize past, present and developing science in the field of consciousness studies' (Abstract 299).

The reason we had an audience of one may be because the session comprised a mismatched group of papers that the organizers didn't know what else to do with. I always disguise my TSC submissions to hide the fact that I am really talking about anthropology, since I don't want to be placed in the dubious category of 'Culture and Humanities'. On this occasion I called my talk 'Mind Wandering, Happiness, and Human Spirituality' — because mind-wandering was a hot topic at TSC 2010. The main thrust of my talk, however, was anthropological evidence that spirituality is neither cultural nor biological in origin — but a 'third force' influencing human behaviour (Abstract 164).

There was also a seventh feature of the conference which could be mentioned in the context of balance. Though not exactly a new departure for TSC, there was more than the usual emphasis on altered states

of consciousness, with at least 19 papers on various aspects of ASC. Besides the plenary session on Religious Experience, there was a plenary paper on ‘The Psychological Flow Experience’ (Fredrik Ullén, Abstract 185), and three concurrent sessions on ‘Altered States’. There was also a post-conference workshop associated with the launch of a new two-volume encyclopaedia: *Altering Consciousness: Multidisciplinary Perspectives*, edited by Etzel Cardeña and Michael Winkelman (2011). I do have a chapter (but no financial interest) in this work.

### **Political and Economic Base**

The distinctive cocktail of balance and bias in Stockholm warrants some explanation. I am no Marxist, but I think the theory of historical materialism (Marx and Engels, 1889/1974) is often of heuristic value. Accordingly, it is worth considering the economic and political ‘base’ underlying the ideology which gives shape to any conference, especially in a field as challenging and contested as consciousness studies.

The first point I noted, on receiving my programme, was the long list of sponsors. Top of the list — after CCS — were the Perfjell Foundation and the Chopra Foundation. Furthermore, these two each had the equivalent of a full-page, full-colour ad toward the end of the programme, accompanied by formal statements of thanks. CCS thanked Christer Perfjell for making the conference possible, whilst CCS and the Perfjell Foundation thanked Deepak Chopra for participating.

It is not easy to find much information about Christer Perfjell on the web. The CCS website simply tells us that he is ‘a primary reason’ why TSC came to Sweden. According to his own website *Mind Event*, Perfjell wants to highlight consciousness issues both from ‘a spiritual and scientific perspective’, but the conference programme has him saying ‘a philosophical and scientific point of view’.

At one point during the conference, the Swedish television producer and host Annika Dopping (who acted as moderator throughout) invited Perfjell to the stage. She explained that he had been a highly successful business entrepreneur and accomplished athlete until he broke his neck in a skiing accident. This led to extensive surgery and a long period of convalescence. However, it also led to a number of extraordinary experiences. According to Swedish newspaper *Svenska Dagbladet*, Perfjell could now ‘know the condition of other people and his intuition had significantly increased’. Neurologists and psychiatrists could not explain his experiences. He decided to try hypnosis and ‘Suddenly he was in a different location’, a world that is more

real than our familiar world. Following hypnosis, he can now leave his body at will, travel outside space and time, or be in two worlds at once ‘as if I were using someone else’s eyes and looking out’. He adds: ‘When I’m “there”, whatever “there” is... It is a fantastic place... So peaceful, loving, friendly, caring — all the things we all wish that life would be, still. I almost cry when I have to leave.’ In his quest for scientific understanding of such experiences, he visited the University of Arizona, and also met Dean Radin, Senior Scientist at IONS. YouTube has a video of Radin discussing the remarkable EEG recordings taken from Perfjell, presumably when he was ‘out of body’. This shows long sequences of gamma waves synchronized in both brain hemispheres, interspersed with violently chaotic activity. Radin comments that if such chaotic activity were to continue, the brain ‘would burn out’. He also states that he has only seen such extremely fast gamma waves in Tibetan monks, who had meditated for many years, when in deep meditative states.

I think a valuable opportunity may have been missed here, particularly in view of Hameroff’s interest in gamma synchrony as a likely neural correlate of consciousness. If Perfjell can leave his body at will, and assuming he was willing to do so on stage, surely some kind of demonstration could have been set up — if only to have him describe what was happening as he experienced it. Instead, Annika Dopping called Deepak Chopra to the front to comment. After a couple of words, Chopra turned his back on Perfjell and announced that he knew all about such phenomena, and that they precisely illustrated his work at the Chopra Center. I have no problem with Chopra using the conference to promote his own objectives — we all do that kind of thing — but I thought he was a little quick to steal Perfjell’s limelight.

That two top sponsors of the conference have strong spiritual convictions may help to explain why non-physicalist approaches were given more emphasis than in previous years. In fact, noting the involvement of Deepak Chopra sparked a further line of thought. Based on my experience at TSC 2009 in Hong Kong, I began to wonder if consciousness conferences might achieve more balance and less bias if there is top level involvement of Asian scholars. I am not implying anything to do with ethnicity here, but simply considering differences, well established by research, between the ways westerners and easterners perceive, feel, and think about selfhood, relationships, and reality (review: Chiao *et al.*, 2008). I should explain that, since 2003, I have made a number of attempts to persuade the directors of CCS that social anthropology has an essential contribution to make to understanding consciousness, and have explained my reasons many times

in *JCS* and at TSC conferences (e.g. Whitehead, 2010). I am aware of only two anthropologists (other than myself) who have been members of TSC Program Committees. One of these has told me that he complained to the Directors about not being consulted on conference programmes, and of having all his recommendations ignored. An Associate Director of the CCS advised me that any plenary proposal I made involving anthropology was unlikely to be accepted by CCS. So, in 2007, I dropped all mention of anthropology, and proposed two plenary sessions for the following year on ‘social approaches to consciousness’. These were rejected, though a proposal for a workshop on ‘the social brain’ — which made no mention of social approaches or anthropology — was accepted. At TSC 2008, I also met Gino Yu who was planning the Asia Consciousness Festival in Hong Kong, which would include TSC 2009. He immediately saw the relevance of social approaches to consciousness. I think it is no coincidence that China has fostered social understandings of the self and consciousness since Confucius and Lao Tzu (Chiao *et al.*, 2008). Gino Yu invited me to organize a one-day conference on ‘social approaches’ in Hong Kong, and also persuaded Stuart Hameroff and David Chalmers to include a TSC plenary session with the same title.

### **Bias**

Which brings me to the issue of bias in TSC 2011.

I am not complaining about the preponderance of physicalist approaches now. That cannot be blamed on CCS — physicalism is a bias originating in western culture and influential worldwide. Those with a professed physicalist outlook get vastly more funding, are more numerous, do more research, and make more discoveries — which are of course interesting and useful in their own right. On the other hand, for example, psi research is badly funded and carried out by a very small number of researchers whose findings are largely ignored or hotly denied by people who seem to have dug themselves into such a deep hole that they can never see out of it.

I am referring to something else entirely, which is the way TSC conferences are put together. Consider that, of 301 abstracts in the conference programme, 35 were plenaries — that is, 11.6%. More than one third of the plenaries (13) were classified as ‘Anesthesia’ (4), ‘Cellular and Sub-Neural Processes’ (2), and ‘Quantum Theory’ (7) (not counting four plenary papers which addressed quantum theory but were not so classified in the programme, and two quantum papers in the Public Forum). But the total number of abstracts classed under

these three headings was only 25 (made up of five anaesthesia, four sub-neural, and sixteen quantum). That is, 52% of papers in these categories were plenaries, as opposed to 11.6% of all papers. As a footnote, I might also point out that in the category ‘Culture and Humanities’ — which curiously includes anthropology but not philosophy — there were 25 abstracts, none of which were plenaries.

There is only one way to account for these disparities. Concurrent and poster papers are submitted by delegates, whereas plenary papers are invited by the organizers. Since there are more delegates than Program Committee members, it may not be surprising that delegates propose a broader range of topics. But the Program Committee seems remarkably single-minded — there is one axe they want to grind more than any other. Checking through the list of Committee members reveals that they are by no means a set of clones. Deepak Chopra is on the list, and Christer Perffjell was Co-chair — though I attribute their influence to sponsorship rather than membership. I find myself wondering how many Committee members were consulted when planning the programme. I was on the Committee for TSC Hong Kong, and was only consulted on one art installation. I have already mentioned the case of another anthropologist who was not consulted. So perhaps it’s just the anthropologists who get ignored. But when I mentioned this to Max Velmans, he retorted that the reason he runs CEP conferences is because psychology is not fairly represented at major consciousness events.

I am no advocate of democracy in science. The popularity of an approach or theory hardly guarantees its utility; and, especially in a field as difficult as consciousness, is more likely to reflect cultural bias. The point I want to make is that if you keep digging in the same hole, it had better be the right hole. But what are the chances of that? All theories — at least according to Karl Popper — are either wrong or potentially wrong. And if you consider the rate at which scientific world-views have been toppled in the twentieth century, the prognosis for major theories — including M-theory — does not seem good, and Orch-OR may fare no better. Furthermore, major paradigm shifts usually come from people new to science — people you have never even heard of (Kuhn, 1962/1970). Einstein was only 26 years old in his ‘miracle year’ — when he published the four papers dealing with the photoelectric effect (which led to quantum theory), Brownian motion, the special theory of relativity, and  $E = mc^2$ . Unable to get a teaching job, at that time he was an Assistant Examiner within the Swiss Patent Office, being passed over for promotion until he had ‘fully mastered machine technology’ (Galison, 2000).

Many of the plenary papers appeared to have been invited because of their relevance to, or potential to feed into, the Orch-OR hypothesis. Several talks were immediately followed by a question from Hameroff, such as ‘Is there room for quantum theory in your view?’ I happen to share Hameroff’s belief that quantum theory, gamma synchrony, and microtubules are important, interesting, and of probable or possible relevance to understanding how consciousness interacts with the world ‘out there’. But the danger is that major new insights are likely to come over the horizon from unexpected directions. Obviously there are discoveries, developments, and ideas which demand inclusion in any conference. But in the final analysis, a policy of choosing plenary speakers by invitation only is at risk of becoming despotic.

In Stockholm we learned many interesting things about electromagnetic fields, mechanical waves, neuronal ignitions, neuronal avalanches, electrodynamic signalling within neurons, quantum states in microtubules, gamma synchrony, etc. But as yet it is not clear just how you join up all the dots or arrive at any big picture of brain function, let alone its relationship to consciousness. Whether consciousness resides in, derives from, or influences the brain in any functionally useful way, is still controversial. It is not even clear that a correlate of consciousness should satisfy any particular criterion for causality — especially if causality can act backwards, at a distance, in violation of the inverse square law, or otherwise behave as weirdly as quantum phenomena.

What was clear from the conference was that the conflict between physicalist and non-physicalist views is not necessarily hostile. During the Public Forum, Deepak Chopra raised a laugh when he accused Leonard Mlodinow of ‘chickening out’. But in fact Mlodinow was present in the auditorium and, when he came on stage, it was soon evident that the two had a jocular relationship and tended to hug each other after each spat of disagreement. In other confrontations, however, sparks did fly — confirming the fact, first pointed out by William James, that a person’s sense of self extends beyond the body to include wealth, possessions, accomplishments, and — evidently — beliefs about consciousness and reality (*cf.* Barušs, 2008). When such fundamental beliefs are challenged, people respond as though this were an assault on their person.

The first such outburst occurred during a talk by Giuseppe Vitiello, following one by Luc Montagnier, who shared a Nobel prize for discovering the AIDS virus. These two speakers presented evidence that some bacterial and viral DNA can emit radio signals, and continue to

do so in extreme aqueous dilutions where no actual DNA is likely to remain. I heard several scathing comments about this. At least three delegates walked out in disgust, and one very rude person shouted ‘A load of b\*\*\*\*\*s!’ Hameroff intervened, saying that controversy was welcome at TSC, but not discourtesy. I thought Hameroff handled this rather well, and he also proved himself skilful — or at least decisive — in sorting out disputes during the penultimate plenary on ‘Anesthesia and Consciousness’.

At least three people got annoyed with each other during this session. I should explain that, throughout the conference, Annika Dopping asked each plenary speaker, before the beginning of their talk, ‘What is consciousness?’ The multifarious and conflicting answers to this question were to be made available on the CCS website, though I have not been able to find them yet.

The first speaker was Nick Franks. In reply to Dopping’s question he simply said that he didn’t know and didn’t really care. He was an anaesthetist and didn’t need to know about consciousness. This planted the seed for one of the arguments during the session.

Franks then reviewed his earlier research which showed a potency-response correlation between anaesthetic gases and light emission from luciferase protein in fireflies. He argued that anaesthetics act on specific proteins in the brain, located in certain membrane receptors and channels. His talk provoked anger from Konrad Kaufman, who had not been invited to speak at the conference, and who objected that his own research showed a lipid-based mechanism of anaesthetic action. As Franks and Kaufman each claimed to have disproved the other, and Kaufman refused to relinquish the microphone, the argument seemed set to continue indefinitely. So Hameroff grabbed the microphone from Kaufman, and declared that he entirely agreed with Franks on this point, though he disagreed with almost everything else Franks had said.

The final speaker in this session was Hameroff himself, who began with the standard definition of anaesthesia as (1) immobility, (2) amnesia, and (3) unconsciousness — objecting to the way many researchers ignore point (3), in part because it cannot be measured. However, he did not mention the further problem that if patients cannot remember what happened during anaesthesia (2), then they cannot remember whether they were conscious or not (3). Hameroff then noted that 30,000 patients each year experience inadvertent consciousness during anaesthesia. Surely, he said, that makes consciousness relevant to anaesthesia. This was a second dig at Franks, fanning a spark into a flame. He then reviewed evidence of anaesthetic effects

in microtubules, and quantum effects of anaesthetic binding in proteins (fundamental assumptions of the Orch-OR hypothesis). He rejected Franks' view that proteins in neural membranes are the relevant binding sites for anaesthesia, nominating the Penrose/Hameroff choice of microtubules as the site of quantum processes supporting consciousness.

Nick Franks became quite angry following this talk, and accused Hameroff of being 'obsessed with microtubules'. There is solid and mounting evidence, Franks said, for a small number of neural targets — all of them ion channels or receptors. There is no convincing evidence supporting microtubules. Hameroff retorted 'At least we have a theory of consciousness', and that Franks studying anaesthesia 'without a clue about consciousness' was 'like one hand clapping'.

### Two Core Issues

The only Keynote talk at TSC this year was given by Sir Roger Penrose, OM, FRS — co-proposer of the Penrose/Hameroff Orch-OR theory. First let me applaud Penrose for rejecting peer pressure to use PowerPoint. In fact he got applause — or at least appreciative laughter — when he switched on his two projectors and revealed two densely written overhead slides in barely legible handwriting. Quite a contrast from a TSC presentation by a British professor some years ago, when the audience jeered his use of overheads. This rather diffident fellow mumbled an apology and acknowledged that it was time he learned to use PowerPoint. I wished he had shown more fire! It has been estimated that there are more than 30 million PowerPoint presentations every day (Weinstein, 2006), and they are (almost) conditioning the world to perceive the ultimate building blocks of reality as bullet points. Hardly a good thing in consciousness studies, where our assumptions about reality demand rigorous scrutiny (*cf.* Tufte, 2006, who blames the Columbia disaster on PowerPoint, or Norvig, n.d., who has wittily transcribed Abraham Lincoln's Gettysburg Address into six PowerPoint slides).

Penrose certainly impressed his audience. I heard several comment on the brilliance of his mind. This is beyond doubt — among other prestigious awards he shared the 1988 Wolf Prize with Stephen Hawking for their contribution to our understanding of the universe. Penrose first turned to quantum computation because of Gödel's theorem, which states that 'for any potential algorithm for determining mathematical truth, no matter how intricate, there must be propositions whose truth it cannot determine' (Penrose and Clark, 1994).

Human minds, however, can perceive such truths, and so Penrose rejected neurocomputational theories of the human mind. In *The Emperor's New Mind*, Penrose 'tried to demonstrate that... our mathematical understanding cannot be reduced to any such set of clear, specific rules or mathematical beliefs'. In *Shadows of the Mind*, he presented a further argument, concerning the problem of building a robot with human-like abilities, using only computational algorithms. He says that 'the Gödel argument... is concerned with the question of the *meanings* of the symbols, which is a dimension that a computational system does not have; a computational system just has the rules which it follows. What one can do in mathematics is, by understanding the meaning of the symbols, one can go beyond the formal rules, and see what new rules must apply from those things, and one does this by understanding their meanings'. And hence, a computational robot could never be humanly conscious.

Penrose has in the past made two highly original suggestions relating to the problem of consciousness, and these were brought into his talk. First, he suggested that we should not think in terms of two worlds (the mental world arising from the physical) but three — the physical world is rooted in the Platonic world of mathematical truth, the mental world appears to be rooted in the physical world, and the mind is capable of grasping mathematical truth. The relationship appears to be circular, and the links between all three worlds are equally mysterious. Second, he did not adopt the view that we might turn to quantum theory to explain consciousness. He proposed that we have to go *beyond* quantum theory, since it is obviously incomplete (it fails to explain the behaviour of the classical world). He felt that conventional views of quantum collapse ('subjective reduction') — according to which Schrödinger's cat can be alive and dead at the same time — were insufficient. Rather, he suggested that quantum collapse must eventually occur, even if there is no influence from the environment, such as an attempt by a conscious observer to measure it. This he called 'objective reduction' (OR), and considered it as a candidate substrate of consciousness, being neither random nor computable. He was not sure how a sufficiently large quantum object could form in the brain, until Hameroff suggested to him that microtubules provide a credible structure.

The Penrose/Hameroff Orch-OR theory came from this conjunction of ideas. It rests on three basic assumptions: (1) objective reduction must hold true; (2) there must be large-scale quantum-coherent processes in the brain which can remain appropriately isolated from decoherence (collapse/reduction) until they reach the level where OR occurs in a

reasonable fraction of a second; (3) neuronal microtubules play a major part in these processes (Penrose, personal communication).

Quantum computation enables the large-scale quantum coherence in (2) to be highly organized, so that OR is non-random. However, I am not clear as to why quantum computation should enable OR to be non-computable. I have a number of other problems with this hypothesis — or rather, with its motivation. Is Penrose correct in inferring that a non-computable brain process is needed to explain mathematical insight? Computers do not understand the meaning of symbols because they do not have embodied experience of living in the world — experiences of pain, pleasure, loathing, and love. Penrose’s Platonic world seems to make meaning the cause rather than the consequence of experiential consciousness. Be that as it may, Penrose and Hameroff have published twenty testable predictions of Orch-OR, some of which have been validated and none refuted, and recent research has generated an abundance of evidence in its favour (Hameroff, personal communication). The value of any theory does not so much reside in whether it is true or false, but in its capacity to stimulate research and discovery.

In his Stockholm talk, Penrose described another of his highly original ideas — a different kind of ‘many worlds’ hypothesis. Based on families of concentric circles in the cosmic microwave background, revealed by the WMAP probe, Penrose inferred that the universe cycles through an infinite series of iterations, each beginning with its own Big Bang singularity, followed by an infinite future expansion. Though Penrose describes himself as an ‘atheist’, he nevertheless believes that the universe is somehow purposeful, by which I think he implicates the teleological power of an archetypal Platonic world.

This brings me back to the central issue debated in Stockholm this year — the question of science and spirituality — and to the theme of my own paper, mainly based on Victor Turner’s research into cross-cultural experiences of *communitas*. I gave a version of this talk to the Radical Anthropology Group in London. After my talk, a Marxist anthropologist in the audience commented, with a puzzled frown: ‘That was all very interesting — but why do you have to get all mystical about it and drag in spirituality?’ The obvious answer is that this was the conclusion reached by Turner based on ethnographic evidence. However, I would add that the querent’s use of the words ‘have to’ is on the button. As an anthropologist, spirituality is one of the dozen or so human universals I feel able to assert with confidence. We all have it, whether we acknowledge or deny it. But if we deny it, we may be impelled to seek Gods in wholly inappropriate objects. The

Marxist anthropologist's God is a true Communist revolution, leading to a permanent state of joyful *communitas*. The generic God of western science is fundamentalist physicalism. I have to say, I much prefer Penrose's Platonic world of Truth and Beauty.

I thoroughly enjoyed this conference. But let me conclude with one comment which I think sums everything up. Many westerners think the mind is in the brain. But everything we can know about the brain is in the mind. There is no conflict between spirituality and science. In fact, the one probably motivates the other.

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