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Reflections on a Learning Curve

Abstract: *This paper outlines my personal 20+ year odyssey through consciousness studies and involvement with JCS. Topics and questions that provided my main foci of interest were, in chronological order, ‘quantum consciousness’ theories in general and Orch OR in particular; ‘free will’ issues, an attractor landscape model of ‘mind’ and, currently, issues to do with the physics of temporality. In conclusion I identify three factors which may impede any search for potentially fruitful questions to ask about consciousness. They are the doctrine of causal closure of the physical, computer metaphors for mind, and the urge to explain away anomalous phenomenology.*

1. How I got involved in consciousness studies

Only the vaguest of thoughts about consciousness had crossed my mind before 1990. As a psychiatrist, my job centred on trying to help with the distressing or abnormal experiences that patients described; but the obvious basic question ‘what *is* conscious experience?’ had never occurred to me in any clear form. Then I came across Roger Penrose’s *The Emperor’s New Mind* (1989), quickly followed by Michael Lockwood’s *Mind, Brain and the Quantum* (1989) and a paper by Ian Marshall (1989) about how Bose-Einstein condensates might be at the basis of consciousness. It took me a bit longer to catch up with Douglas Hofstadter’s marvellous account of recursiveness in his *Gödel, Escher, Bach: The Eternal Golden Braid* (1979) which had already achieved cult status. Encountering these wonderful ideas after spending so many years in the relatively constricted world of medicine felt like walking out of a small, stuffy house into a glorious

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landscape. The brave new (to me) worlds of physics, maths, and philosophy that I had been lucky enough to stumble over lured me away from former interests and enthusiasms.

It looked as though Penrose's early hypothesis (about a gravitational criterion for a consciousness-related 'collapse of the wave function') could be tested. Advised by a mathematician and a medical physicist who were also fascinated by these new ideas, I developed a fairly labour intensive approach to testing that was subsequently described in the very first issue of *JCS* (Nunn *et al.*, 1994). Early results suggested that 'observation' of brain function by an EEG machine affected the accuracy of people's decision making on rapid-fire visual choice tasks. Although we had initially supposed that reaction times would be the variable affected by EEG 'observation' if the theory was correct (they weren't affected and, in any case, our original reasoning that they might be was almost certainly wrong), an effect on accuracy was consistent with the Penrose hypothesis but open to many other interpretations. Then, before we could refine the experiment, I got cancer and lost access in the aftermath to resources needed for carrying on with our tests; they had always been an unfunded, spare-time activity and my collaborators weren't able to take over the practical side of testing.

During the next few years, I struggled to develop some sort of half-adequate understanding of the relevant background disciplines, eventually described in a book (Nunn, 1996) which centred on an attempt to delineate the two principal scientific approaches to consciousness that were current at the time, together with some of their possible implications. The first of these approaches (which I dubbed 'PM' for Penrose-Marshall) involved a wide range of speculative ideas about possible connections of consciousness with quantum theoretical processes or phenomena; the second ('HE' for Hofstadter-Edelman) was to do with the emergence of consciousness from recursive neural activity of one sort or another.

The glow of authorship boosted by a few kind reviews was soon extinguished by a vitriolic one in the *Times Literary Supplement*. To digress a little, the author of this (who has since died) was a member of CSICOP (Committee for Scientific Investigation of Claims of the Paranormal, since shortened to CSI; Committee for Scientific Investigation) and I had probably provoked his ire with a brief discussion of possible links between 'PM' theories and parapsychology findings. CSICOP was quite influential at that time in coordinating the vigorous and often vituperative defence of an extreme, arguably long outdated, reductive materialism masquerading as 'rationalism'. Given its title

there is some irony in the fact that, as a body, it appears to have carried out only one investigation that actually met standard criteria for adequate science (Carter, 2007). This was directed at what might be thought on *a priori* grounds to have been a very soft target — the alleged astrological ‘Mars effect’. The CSI authors claimed to have disproved it, but independent analysis later showed they had fudged their statistics and their data actually provided weak support for the supposed effect!

Be that as it may, at least some of the reviewer’s criticisms were apt for I had written the book prematurely before getting a proper grip on many of the issues involved. There was an urge to get my message across before the cancer got me, which was both unwise and unnecessary as it turned out. The book proved lucky in one respect, however, because it put me back in touch with Anthony Freeman, *JCS*’s managing editor at the time. In due course I became a screener of some of the unsolicited papers submitted to the journal, and also book reviews editor for a time. Both functions helped a great deal with my further education in matters of consciousness, as did lengthy online discussions, particularly those with people listed in the ‘acknowledgments’, though many others were also involved and I’m very grateful to them all.

2. Evolving concepts

My introduction to consciousness studies had made me especially enthusiastic about ‘PM’, quantum consciousness notions, particularly the Hameroff/Penrose OrchOR theory (e.g. Hameroff, 1994) which had been the focus of my experiment with its ambiguous outcome. It was the most fully developed of such ideas at the time — and indeed still is. There was much discussion in the early 90s of ‘wave-function collapse’ and how best to resolve the ‘Schrödinger’s cat’ puzzle. A range of competing theories about the causes and duration of collapse were vigorously debated. It wasn’t implausible then to suppose that superpositional states — in microtubules or ordered water or whatever; there were a whole range of apparently plausible suggestions — might underpin consciousness. Gradually, however, plausibility eroded while empirical support remained elusive.

One class of mechanisms (the Frohlich, ‘pumped phonon’ ones on which Ian Marshall’s original proposal had been based) turned out to be probably incapable of producing the sorts of coherent state required by theory. The argument (due to Chris Clarke; personal communication) is too technical to summarize here but the conclusion was that, if one removed certain simplifying assumptions that Frohlich had

made, a phonon condensation would be very unlikely to result in the required *single* coherent ground state. Then, with the advent of decoherence theory which was becoming influential by the mid-1990s, it became possible to calculate the probable lifetimes of any of a wide range of hypothetical superpositions in the brain. Except for ones involving Nambu-Goldstone bosons, these turned out to be many orders of magnitude briefer than the timescales on which consciousness operates. Proposals for circumventing this problem came across, to me at least, as more than a little unconvincing. The principal N-G boson proposal, on the other hand, ran into problems with its likely viability because it apparently made assumptions about the required vacuum state that differed from those specified by Nambu himself as necessary for the manifestation of his bosons.

On a more personal note, I had come to disbelieve Penrose's Gödelian argument that the truth content of consciousness sometimes exceeds the computational abilities of any Turing machine. His argument didn't work, I thought, because it is always possible to evolve additional implicit or explicit axioms to allow computational solution of problems inaccessible on the basis of a previous axiom set; the correctness or otherwise of such solutions being subject to further 'evolutionary' selection. My take-home message from this was *not* the obvious one (i.e. that conscious minds might be Turing machines after all). Rather, it was a feeling that all computational approaches to mind, whether quantum or classical, might prove to be blind alleys; a general loss of confidence in that sort of theoretical approach.

Around the turn of the century, therefore, I was getting increasingly unhappy with the notions that had especially appealed to me hitherto, but was uncertain about where to turn next. Daniel Wegner's *The Illusion of Conscious Will* (2002) provided the nudge needed to get me out of my conceptual rut. There was a whole lot that was right about Wegner's thesis but the overall picture didn't quite gel, I thought. So I got into 'free will' issues. Actually there are two rather separate sets of issues here; those relating to neural determinism and those relating to social determinism. The first set, discussion of which often revolved around Benjamin Libet's work (e.g. Libet, 1999), was the main focus of Wegner's book. He had convincingly shown that the *feeling* of 'I did that' is the product of a late and sometimes fallible assessment by the brain of its likely responsibility for an outcome. However, he hadn't shown that conscious choices are entirely down to neurology; that was where Libet's findings about the neural activity preceding consciousness of choice came in. The second, socio-cultural, set of issues is in a way more subtle since the conscious 'selves' who believe they

are responsible for their volitional choices are in large part social constructs. It involves somewhat nebulous questions to do with archetypes and culture that I had written about previously in *JCS* and elsewhere (e.g. Nunn, 1998).

Assertions about neural determinism ultimately turn on the doctrine of ‘causal closure of the physical’. But how applicable is this to brains? Physicality also depends, to the best of our knowledge, on the natural laws that enable and constrain physical processes but often appear to be outside the remit of ‘causal closure’. Within brains, memories (whether of genetic, personal, or socio-cultural origin) play a role corresponding to that of natural laws in a wider context. Whatever consciousness is, it is clearly intimately bound up with early stages of memory processes. Therefore, although Wegner was right to say that the *feeling* of conscious will is illusory, it doesn’t necessarily follow that consciousness and conscious volition, whatever their bases may be, have no independent effect on physical outcomes in the brain. My argument was not unlike that previously offered by David Hodgson (1999), though it focused on the role of memories rather than on the conscious ‘judgments’ that Hodgson regarded as mediators of ‘free will’.

I described all this in a short book (*De la Mettrie’s Ghost*, 2005) that also explored some of the issues to do with social determinism. My conclusion was that consciousness does have the ability to influence its future content along with the behaviour of ‘its’ brain and may sometimes achieve a degree of independence from socio-cultural contexts too. Free will, in the sense of a capacity to influence future outcomes that is in part at least down to the volitional content of consciousness, exists independently of the validity of any ‘I did or chose that’ feeling. The probability of making some particular volitional choice is a function of a very long history of recursive interactions between conscious experience moulded by social contexts and ‘neurology’. Since conscious experience itself (including experience of prior choices) contributes to outcomes, volitions possess a degree of independence from purely physical determinism. Social contexts and individual responses to them, on the other hand, can be chosen to some degree, thus allowing people a certain amount of voluntary wiggle-room within any given set of socio-cultural influences.

Thinking about socio-cultural determinism naturally led to ‘extended mind’ concepts similar to those so well described by Andy Clark (2011) and then to questions about how ‘mind’ could best be pictured and how it could be instantiated in brains. The picture I eventually arrived at, thanks mainly to the ideas and influence of some of

the people listed in the ‘acknowledgments’, was of attractor landscapes in vast *classical* dynamic state spaces, the dimensions of which are contributed by events in the environment as well as those in body and brain (Nunn, 2007). The attractors themselves are equivalent to particular memories, while the whole ‘landscape’ is likely to be represented in fractally or pseudo-fractally ordered, wavy brain activity. The notional ‘landscape’ is vastly high-dimensional and no non-fractal, real-world dynamic structure could be expected to map its complexities. Electrical and ionic fields, especially perhaps fields of calcium ions (because of their intimate connection with early stages of memory processes), are the most plausible candidates for the physical basis of mind, so I thought.

One specific implication of this picture was that astroglia must have essential roles in mental function, not just the ‘brain housekeeping’ functions traditionally assigned to them, because neurons alone could not support the larger temporal and spatial scales of fractal order that the picture required. Astroglia, on the other hand, were known to be capable of harbouring larger scales of order, at least in the case of calcium ion waves. There is ever increasing evidence now that astroglia do indeed have essential parts to play in mind (see, for example, Pereira and Furlan, 2009, or Fields *et al.*, 2013), though how best to characterize their roles is still a wide open question.

Nearly ten years on, this still seems to me quite a nice overall picture in its way. It not only predicts the types of brain dynamics that may turn out to be most immediately relevant to ‘mind’ (i.e. ionic fields demonstrating spatial and temporal fractality) but can also be used to construct ‘Just So Story’ accounts of all sorts of phenomena ranging from why sexual reproduction is a good idea, through why we need to sleep, how we can learn to use tools so readily and how ‘group minds’ may form, to why democracy seems to work better than other socio/political systems (Nunn, 2007; 2011). However, it applies equally to both conscious and unconscious mind. Does this mean that consciousness itself is no more than a sort of decorative add-on or even an epiphenomenon?

Trying to get to grips with this question has led me back to physics and to currently unanswerable questions about the nature of time. Basically, within any sort of monistic world-view, there are only two possible accounts of consciousness; one is to regard it as a new, emergent property of very complex processes, as in the ‘HE’ theories that figured in my first book; the other is to regard it as an inherent property of the world that is somehow elaborated and focused by brains. Although, following my loss of confidence in ‘PM’ theories, I used

simply to assume that only the first option makes sense, reports of anomalous phenomenology have made me change my mind. There is ever accumulating evidence from many sources (ranging from cases of severe, chronic hydrocephalus who function normally to reports of near death experiences, for example) that elaborate conscious experiences can occur in highly compromised brains. This is very hard to explain in terms of neural emergentism ('HE' theories) alone.

The second, panprotopsychoist option now looks much more plausible to me. My new picture depends on a concept of broken symmetry in an original consciousness/matter monism; the break possibly occurring co-incidentally with energy eigenstate manifestations. It can be linked to the attractor landscape picture of mind to give a refutable (in principle) account of our conscious experience as a modulated 'temporal field' that maps some of the complexity of neural activity (Nunn, 2011; 2013). Our elaborate conscious experience is envisaged as assembling itself from elementary 'Scintillae of Subjectivity' — the acronym SOS (Save our Souls) is quite serendipitous perhaps! The overall picture offered is of a translation of the 'objective' spatio-temporal world into a 'subjective' tempero-spatial format. It's a view that provides a natural explanation for temporal, and possibly also spatial, binding along with hints as to how one might begin to account for some aspects at least of anomalous phenomenology.

The view I've arrived at doesn't say anything definite about the epiphenomenality or otherwise of consciousness itself (i.e. the basic panprotopsychoist entity), as distinct from 'mind' in general (which clearly is efficacious) and also as distinct from the sort of 'consciousness' to which we ordinarily refer. The latter is necessarily recallable or introspectible (if we can't remember it, we can't discuss it!) and must therefore be efficacious by virtue of the fact that it is embodied in memories. However, the theory hints at transcendental functions for consciousness-in-itself that we (or at least I) can hardly begin to conceptualize adequately at present. Of course, the whole model may eventually turn out to be no more substantial than a house of cards when it is tested properly. Nevertheless the winding path towards arriving at it has taught me lessons about conceptual obstacles to reaching a comprehensive theory. I'd like briefly to describe some of these obstacles next because I believe they have bedevilled quite a lot of recent and contemporary thinking about consciousness.

3. Room 101

There's a British television programme where panellists compete to have their pet dislikes consigned to oblivion in 'Room 101'. I have three prime conceptual candidates for oblivion since I think they are major impediments to progress when it comes to developing adequate theories of consciousness. They are:

- A. The doctrine of 'causal closure of the physical'
- B. Computer metaphors for mind
- C. The urge to explain away anomalous phenomenology

'A' is true enough in relation to physical processes involving conservation of energy, but these types of process don't cover every aspect of the 'physical', although many authors write or wrote (especially in the 80s and 90s) as if this were the case. The circumstances that enable, constrain, and channel the operation of physical processes are also 'physical'. Conservation of energy is only one example out of a wide range of such circumstances. One has only to ask what energy is and why it manifests in the forms that it does to see that 'causes' other than those deriving from energy conservation must be relevant to the 'physical'.

'Mind', of course, has to do with meanings, affordances, innate urges, perceptions, intuitions, aesthetic preferences, etc. As noted earlier, all of these aspects are dependent on memories, whether genetic, personal, or socio-cultural. But, as instantiated in brains, memories *are* enablers, constrainers, and channellers of the operation of neural processes. The origins of particular memories are not fully constrained by energy conservation because so many vastly elaborate, looping processes go into memory formation, many of which are likely to be energy-equivalent to potential alternatives. In any case, minds are open systems just as capable as are bodies of sucking in extra energy and reducing entropy according to need. Applying the doctrine of causal closure to 'mind' is a particularly egregious example of a category error; one that is unfortunately implicit, and occasionally explicit, in the writings of many neurophilosophers and neuroscientists.

'B' is also apt enough in a limited domain. Computer metaphors for mind are helpful in relation to aspects of neuron function that can be modelled digitally, as were Charles Sherrington's telephone exchange and 'enchanted loom' analogies in relation to neural connectivity, or Rene Descartes' hydraulic model in relation to cerebro-spinal fluid flow. But all these models and metaphors confuse when extended

beyond their proper domain. The *meaningful* information in which ‘mind’ deals is meaningful only in relation to particular historical, physical, and cultural contexts that are entirely outside the ken of computers. ‘Computations’ carried out by minds involve constant, memory-enabled resonances between environments and brains that, in computer terms, would have to be pictured as dependent on subtle, ever-changing, context-dependent, looping adjustments to both software and hardware. Any attempt to apply the computer metaphor to mind becomes so complex and convoluted as to lose utility; it serves only to get in the way of seeing what ‘mind’ is actually doing.

‘C’ is the most controversial candidate for oblivion because there is so much *sturm und drang* surrounding the issues involved. Around twenty years ago I noticed that the statistical and anecdotal evidence for the occurrence of various types of ‘psi’ phenomena was considerably stronger than the rather similarly based evidence for the efficacy of the antidepressant medications that I had spent much of my professional life prescribing and researching. Ironically enough, evidence for ‘psi’ has continued to accumulate over recent years (see Radin, 2013, for a very readable and fair overview of the current evidential state of play with regard to psi), while that for the efficacy of antidepressants is looking rather more shaky than used to be the case (probably because of contemporary over-prescription). Nevertheless I don’t doubt that antidepressants do sometimes work and it would thus be inconsistent for me to doubt that psi phenomena sometimes occur — Bayes’ theorem and related considerations notwithstanding. Bayesian statistics can mislead in this sort of situation because they can be manipulated to provide spurious support for pre-existing prejudice; after all the prior probability assigned to psi by a member of the CSI or other committed sceptic is going to be zero, so no amount of statistical evidence that it exists is going to convince him or her if Bayes is given a look-in. However, psi phenomena seem to relate to ‘mind’, and often to unconscious mind rather than to consciousness *per se*. Denying them is wrong but perhaps it is reasonable to ignore them, in the context of consciousness studies at least, until we have some theory that they can help to illumine. At present they offer only hints that time and space are not as we ordinarily conceive them to be, which is something that is already becoming clear in the context of fundamental physics (e.g. Smolin, 2000).

The situation is very different in relation to anomalous experiences such as NDEs (e.g. van Lommel, 2011; 2013), certain types of death-bed experience (e.g. Fenwick and Fenwick, 2008), and some psychedelic experiences (e.g. Shanon, 2002), for these are elaborate, vivid,

specifically conscious experiences that somehow get burned into memory in circumstances often conducive only to haziness and confusion. The numerous attempts to explain them away that have been made come across, at least to me, as often bordering on psychopathological denial now that their occurrence has been so well established by so many independent researchers. The fact that these experiences are probably incompatible with all of the simpler theories of consciousness that are currently on offer (including Cartesian dualism by the way, which has major problems when it comes to accounting for their memorability) has to be accepted as a consequence of the way the world actually is, however much some people might wish that reality were otherwise. To deny or try to explain away these phenomena entails turning one's back on what could prove to be one of our best guides to, or constraints upon, developing adequate theories of consciousness.

4. Conclusions

My personal 20+ year involvement with consciousness studies and *JCS* has been hugely educational. It has led me away from a blanket attempt to find *the* answer to what consciousness *is*, towards a search for potentially fruitful questions to ask about it and the 'mind' in which it is grounded. This is progress of a sort, often dependent on first abandoning pet notions that have proved wrong or inadequate (something that can be harder to achieve than the subsequent finding of more satisfactory replacements!) My impression is that it matches a lot of what has been going on in the field of consciousness studies generally, in all sorts of varied contexts. And the big bonus is that it has all been a lot of fun — especially the involvements and exchanges with so many thoughtful, impressive, and interesting people. The search for good questions to ask about consciousness is likely to be never ending; finding them and trying to provide answers promises a happy future for us all.

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