

Self-Organised Criticality - a possible tool for the MBI

(1) Some neurological notes on our method of approach

First some brief details of current results in cognitive dissonance.

Children and monkeys both show 'cognitive dissonance', which has been - and still is in some theories - perceived as being very complex.

Given alternatives A and B and both of equal value (details in Egan's paper) they were asked to make a choice on the basis that they were not of equal value. Then they tended to derogate unchosen alternatives, when faced with a selection of a third item C in place of either the chosen or the unchosen alternative.

There is some white noise in the choice but overall the results were reasonably good.

When the choice is between A and C or B (not-A) and C, a simple computer could give the expected result for the derogated alternative.

Complexity of neural pathways in adults allows more mentally complex thoughts, perhaps, which simply overlay the above simple idea.

So in that sense, relatively simple 'computer-like' choices can be made for a brain model - in fact we had previously used 'Berkeley Madonna', and some results are online at <http://ttjohn.blogspot.com/> (RSS feed available) and on a compact disc.

But if, for example, in the simple choice alternatives above, we had used instead a multiple procedure of choice with sophisticated undergraduates, the experiment would have led to some very different statistics, as in Eisenstein's example. There, there are clearly sophisticated reasons not found in the basic example.

A particular other case would be sarcasm - apparently a highly sophisticated mental process. According to the results of Shamay-Tsoory we should be able to put this into a suitably revised version of our Madonna program.

i.e. To interpret a statement literally, the right hemisphere is used (it is averred), the frontal lobes process the emotional content whilst the prefrontal cortex intreracts with both. This was found out partly because posterior brain damage seemed to have little effect, and from other such clues. Whilst there are only 25 full studies reported, there would be further anecdotal evidence. All this seems to fit in with a basically simple 'Madonna' model still being satisfactory.

But we can go further and consider episodic memory. Rosenbaum's work seems to indicate that theory of mind (ToM) can work independently of episodic memory. Results come from participants with strongly impaired memory. There were so far only two good subjects but Tulving is a co-author of the paper and even one result would almost do. And also effects like sarcasm were still there in the chosen cases. It amounts to enough empathy to put oneself in someone else's shoes.

In fact Rosenbaum even said that "If you try mentally to put yourself in someone else's shoes, you do not even need to put your own shoes on, mentally speaking".

So a very simple theory involving a brain working like a computer with no long term memory provides a model.

Now we can use a simple 'Madonna' model to describe the brain mathematically in one of our 'bubbles', in the so-called 'pseudo A series'.

We do not need even to consider to begin with the work of Honderich, Libet, Klein, Trevena, Haggard and the like. And of course we have dealt with McTaggart's paradox in the MBI.

And it is hoped that we may be able to reach a basic philosophy of approach as simple as as, say, Winfree's, at least to start with.

(2) Some philosophical notes on our method of approach

According to Itano (2006), Zeno of Elea (490-430 BC) said that 'an object can only be in one place at one time. It cannot be in two places at one time. But to be in one place at one time is to be at rest. Therefore, the object is at rest. Therefore, motion is impossible'.

Strangely, Zeno's paradox has echoes of McTaggart's paradox in this framework, and the super-Zeno effect (Dhar, 2005) seems to mirror this idea.

I have tried to roughly indicate in previous blogs how the results of both Kwiat and Dhar are perfectly lacking in mystery and philosophical paradox in the MBI approach. Indeed these could lead in time to the building of a successful quantum computer, and help in many mathematical problems (e.g. Wigderson, 2006).

We also have a case already laid out in the MBI to look at some of the viewpoints of Hansen (2004) who points out that current physics special relativity has philosophical problems with regards to both Zeno and McTaggart. We point out a general way in Note 1 how such problems evaporate, as does the mystification with them, in the MBI.

At this point perhaps we should ask. Exactly what are we doing ? Well Frigg (2002) perhaps gives some pointers as to that. Frigg takes the view, for example, that the sandpile model, as such, does not fully describe the space-time view. He says, quoting references and reasons, "I don't think we are entitled to say that real sand-piles do exhibit Self-Organised Criticality". Well, whatever view is taken on that statement we are certainly only making sketches which can misdescribe at their extremes and give only a (useful) impression of reality. This is perfectly in accord with the thinking of the MBI. Frigg in fact says "often when a model is presented, only the briefest suggestive remarks are made about its bearing on the world ... one has to start somewhere, and quite often a false model may provide a good point of departure. The strategy then is to ameliorate the false model and to build a better one on its basis. Iterating this procedure leads to a series of models in which every one is an improvement of its predecessor. In this way, a simple and false model can initiate a series of models of ever increasing complexity and accuracy..... a model, even though clearly false, may lead us to think differently about certain problems, motivate new questions, shed a different light on some issues, and finally make it easier to adopt an altogether different point of view. In doing so, the model acts as an antipode to stagnant assumptions, undercuts too readily accepted hypotheses, and helps to 'de-familiarise' deeply entrenched styles of reasoning. In short, a false model can indicate alternative ways to deal with a phenomenon".

In other words, in the MBI we are acting more precisely by effectively specifying that we have a "pseudo A-series", which from earlier notes we consider we can use up to a point to mirror the A series using effectively B series mathematics. And in knowing what we are doing, we are more likely to be able to put matters right if and when the proposed mathematics goes astray with respect to physics as it really describes the world, or as we try to make the physics do.

(3) Some further possible work (potentially in progress)

(a) We can now consider further simple ideas like using the sandpile analogy as it has been tried, for example, with software development, without the physics actually disappearing from the system as the actual software used for development does in the paper (Wu, 2002). That contained an excellent analogy:

Driving force / sand drop / change request
Response / sand slide / change propagation
System state / gradient profile / release, iteration plan
Relaxing force / gravity / stakeholder satisfaction

but plainly "the mathematics was not the territory" just as "the map is not the territory" to a geologist. Even if a geologist goes along with the mathematical fractals approach, it does not get the dirt under his fingertips. But with the MBI approach in physics, we seem to be as close to a physical simulation of the real world as we can be at the moment. Importantly, for example, we have not simply beaten off McTaggart's paradox but on the contrary, we we have used it as strongly as we can.

This may well give us the ability to prepare a more precise or even a new and better Madonna model than the model N003b suggested in an earlier entry, using for instance some of the methods of Dhar (2006) particularly as described in Dhar's section 3 onwards and other such SOC methods, as well as what we are using to date.

(b) We know that Stickgold discovered a postcognitive effect by studying dreams, and used it in a very simple way, by stimulating the subject through the game of Tetris, and thus in turn controlling his future dreams. Our studies indicated that there is a retrospective effect as well, but existing models like N003b suggest that the effect will need to be finely tuned, with due consideration of the model used. At the moment a further simple test of individuals is planned, but the so-called precognitive results may or may not arise quickly. In the light of some field studies I made with some of Jeffrey Gray's allegedly mildly synaesthetic patients, of informal discussions with Colin Blakemore and Simon Baron-Cohen, and other matters, the conclusion was reached that right now mildly anomalous but indicative effects like popout synaesthesia are often hard to achieve and detect. Indeed Blakemore (2007) indicated that he only knew of two popout synaesthetic cases in the entire world, one of which was also known to me, and both of these cases are being studied in America. That would confirm my results on the matter of synaesthesia so far.

The present work does not seem as if it needs special subjects, in fact we are more or less using any generally suitable subject at this time but it has become clear that a carefully planned model may be needed to enhance the reverse Stickgold effect. Results for both the forward and reverse Stickgold effect should be of interest in neurophysiology and both come under our remit as scholars. The fate of the MBI does not depend on the success in discovery of a reverse Stickgold as the MBI proves itself already as outlined above, but it would be a unique prediction for the model, confirming yet again its relevance.

(4) Easier observation and/or enhancement of Stickgold effect and reverse Stickgold effect

From a purely mathematical point of view, one could perhaps include in a more detailed way in N300b the fact that there could be tiny pushes and impulses to the mind at a given time, from both past and future stimulations, but that at a particular time the mind is in some kind of dynamic balance which Stickgold has altered in the 'Tetris dream' by a push from the past, relatively easy in

retrospect. In my case I alter the position of the push from the past to the future, and this worked too. There is also plenty of anecdotal evidence for so-called 'prophetic dreams' but I have had discussions with Susan Blackmore and we are both of the same mind that this is not followed up with adequate statistics. But here we have a mathematical model which can be improved, applied to pushes from the future, and even checked by known pushes from the past which were confirmed to work at Harvard by good and acceptable research. We got the future pushes from my model which is still in a period of development.

Some kind of sandpile model might give further success. Obviously my preliminary Madonna model can be much improved. The earlier work is already on my website at <http://ttjohn.blogspot.com/> and a CD and notes are available.

Simple attempted enhancement of these MBI models like N003b must be possible also by, for example, playing Tetris on a series of nights and trying longer and shorter times of play and times of day. There are other forms of stimulation which can be used. 'Alpine Racer', a skiing game of the early 'virtual reality' type, seems to have worked even better for Stickgold, perhaps because of the controlled switchback effect of such sports games and other factors. It is clearly important what effect on the visual field particular modes of presentation can have, but other factors such as the time in advance or after of the stimulus to the dream must be important. Also there is the level of dream recall by the subject, and the time of the dream during the sleep.

References

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Note 1.

As pointed out earlier, without even invoking quantum theory, Quentin Smith (2002) explains how some models of the A series can seem to have B series concomitants, even in special relativity. In

fact if we wish, we could consider our A series bubbles corresponding to different T_m values to be linked to one another by a spider web of gossamer chains. The spider web could now seem to be very clearly savouring of the B series, although we had started with a model based on the A series. Given suitable provisos, that spider web might well suit STR (Special Theory of Relativity). Now to quote Hansen: "One of the central theories of modern physics has particularly fascinating consequences when compared with concepts of time reflecting ordinary daily life experience: the Special Theory of Relativity (SR). The way SR is at odds with the classical idea of dynamic time or passage of time is not by implying that ideas of change or passage are themselves self-contradictory, as in the classical atemporalist arguments from Zeno to McTaggart. Rather, SR dissolves a necessary condition for the classical idea of passage: the existence of a unique order of the events of the universe, the allocation of every event to a point or interval on one axis of time over which the passage of the now might take place. (Or, with the equivalent inverted metaphoric of passage preferred by some, what is dissolved is the sequence of 3-dimensional "pictures" constituting a universal movie which might pass across the "projector" point of temporal presence.) In SR's reorganized grammar of spatiotemporal relations, events can no longer be said to be placed in such a 1-dimensional continuum of time and in a separate, independent 3-dimensional continuum of space, rather they are placed in a 4-dimensional continuum of spacetime allowing for a multiplicity of equally valid formulations of timelike and spacelike orderings, relative to velocities. This reorganization seems to complete what Bergson aptly phrased "the spatialization of time" so that the passing of the "now" becomes not only foreign and irrelevant in the physical universe but even cannot be formulated coherently in the context of physical theory. Apparently the result is a direct contradiction between our systematic knowledge of time as part of the structure of the physical universe and our intuitive notions of time, based on whatever unsystematic and perspective-dependent view of a fraction of the physical universe our immediate experience covers." Clearly this problem does not arise if we use the MBI.