McTaggart's A and B series and how they relate to modern science and neuroscience in the 21st Century.

Abstract

McTaggart's ideas on the unreality of time as expressed in "The Nature of Existence" have retained great interest for 100 years to scholars, academics and other philosophers. In this essay, there is a brief discussion which mentions some of the high points of this philosophical interest, and goes on to apply his ideas to modern physics and neuroscience. It does not discuss McTaggart's C and D series, but does emphasise how the use of derived versions of both his A and B series can be of great virtue in discussing both the abstract physics of time, and the present and future importance of McTaggart's ideas to the subject of time. Indeed an experiment using human volunteers and dynamic systems modelling which was carried out is described, which illustrates this fact.

"Let's return McTaggart to his final resting place, and let him molder there in peace" (Maudlin)

"No chance" (Me)

In this brief essay I will leave aside the notion that McTaggart's work has been exposed as being wrong, as in Maudlin (2002). Gale's work on "The Philosophy of Time" appeared nearly 40 years ago and much of this work was about McTaggart's approach. In the early summing up of Gale (1968) for example, and often enough elsewhere subsequently, the choice of A series or choice of B series or choice of either A or B series as desired is suggested. The great Arthur Prior, for example, as I remember him, had a clear penchant for the A series - and when I worked with Robin Gandy I remember that Gandy found the A series at least acceptable.

Later workers, particularly in mathematical physics, tend to gravitate to the B series without really paying much attention to abstruse details. Simple special relativity or even simple dynamics will often solve the problems of such workers to date and these kinds of models almost give the impression of begging for the B series - or even simply ignoring McTaggart as a whimsical philosopher - quite wrong in my view. When general relativity or loop quantum gravity rear their ugly heads - variations of simple 3D or 4D (space time) descriptions do not easily let most people pause for an A series. Philosophers can see value in the A/B series distinction in principle but often prefer a form of B series (Oaklander's (2004) "new theory" for example), *(Note 1)*. This approach neatly fits in with conventional physics, but also with the idea that such apparent deliberate blinding to reality is perhaps a neo-Tychonian heresy, Margolis (2002). The problems tend to come out perhaps in psychological rather than clearly philosophical areas and I am thinking particularly of such things as Wason selection and even the work of Tooby and Cosmides. I have looked at these areas *(Note 2)* These matters are worthy of study in more detail and I will come to a few points later.

Briefly what I am saying, and obviously there are many provisos, hedges and restatements, is that I consider a form of A series and a form of B series - but the A series is probably a proper class (like the class of all automata for example is a proper class (Adamek et al, 2004)) and probably cannot be effectively mapped, certainly not one to one, onto the B series. We only need to look at say Goldblatt (1984). In other words time is a rather complicated entity and when we get down to the mathematics or even the logic of time, we are using at least two different and not one to one mappable onto each other (mathematical) categories, A and B say (Note 4). And McTaggart had thus considered that he had found unreality in time when he was actually trying to compare two different things - though it is possibly not necessary to follow through his precise reasoning here, particularly on the C and D series. Clearly when considering a complex entity like 'time', there may ultimately be many more matters to consider but that does not remove the fact that McTaggart had found at least two such entities, the A and the B series.

Again roughly, much of current physics can be described by the B series but human nature - where we

know we each have a past, a present, and a future - can perhaps best be described by the A series. And Yates (2007) has used dynamic systems theory to get working models and to try to obtain specific results for them. The details are a little more devious but I have presented posters at the Salzburg and Budapest conferences on the mind and consciousness this year, and am giving lectures in Mumbai later this year. Some details are in the following URL (Yates, (2007), details start at top of page)

So I got to a point that a reasonable physical assumption seems to be that the A series is a Proper Class. Bays (2001), in "Reflections on Skolem's Paradox " says "if we start with a proper class which "satisfies" some finite collection of sentences, then the Skolem hull construction lets us find a countable set which satisfies the same collection of sentences". In other words, I can use conventional complexity theory mathematics to study the A series as long as I remember that I am no longer in "block time" or B Series time. Now authors like John M. Gottman (2002) have used simple enough mathematics for years to solve psychological problems and seemingly eventually tried to shoehorn their ideas rather without thinking into a "block time" scenario where they will not properly work. And the heartbreaking discussions amongst proponents of tensed and non-tensed time may never again have to carry so much weight, (at Sydney conference, (2006) they mainly did carry weight) in a situation where a tensed time (A series) is used where convenient for people, and a non-tensed time (B series) where convenient for objects. And the maths can be great in both cases. Though of course that does not say it will be straightforward or easy.

In a sense we can argue that people have been misled by the B series followers - the 'soul-less' physical scientists - whose methods undoubtedly work excellently in simple dynamic or relativistic situations - into thinking that the B series really is all there is to be used, and that results have to be niced down to fit in with B series dogma. In this regard one could almost place such people as neo-Lysenkoists - with equal certainty of failure in the long term, though minor agreement with facts if the mathematical models are not too bad. One is not speaking polemically, merely stressing the fact that a modern version of the Tychonian heresy brings many problems.

So now comes the crunch: Where are there, in the known physical or biophysical world, clear distinctions between A series and B series results but that A series triumphs ? To narrow down the field, first we may ask why we need the A series anyway if we are doing physics. One simple answer is that when physics added wave/particle duality to its toolbox, it became apparent that it did not describe the world as we know it. We know that people would take an entity to be either a wave or a particle, not both. Simple tricks like the Copenhagen Interpretation cover up the cracks. Certainly, but the cracks are still there. More complex ideas like many-worlds-interpretation may eventually lead to the discovery of alternative universes, but right now these haven't been found and the new worlds of science are already not the worlds of human beings. There is worse to come. And that is chaos theory and non-linear equations. After the work of May, Lorenz and many others, we know now that even classical predictability is uncertain. As they say, the change in the direction of a butterfly in Santiago today can change the weather in Toronto tomorrow. And there is not way that we can, or indeed probably want to, change such minutiae. There is, though, a gleam of hope! We can make predictions about the duckrabbit in Note 2, for example. The duckrabbit problem has been solved to the point of quantitative assessment! The details are in Sprott & Aks (2003) and it has been done for the Necker cube. So these 'psychological' techniques are going to work quantitatively.

An objection could be that we don't care, that we see lots of optical illusions. What we want is a 'real' phenomenon that can be really observed. I have considered many possible phenomena of this kind. A good example, though, is hypnosis. Apparent visual and other mental phenomena which individuals claim to perceive under hypnosis are legion. These are sometimes bizarre and well outside the laws of physics, yet they are there - as Galileo said in his alleged historical quip "it (the phenomena) still moves (still is observed) ". Normally other people who are not hypnotised do not see them, but often enough, appearances to those who do can go against the present laws of physics for a long time. Now for years many people didn't believe hypnosis is anything other than a simple artifact of the mind. But recently Kosslyn (2000) showed, using PET brain scans, that 'something' (physical) is happening in the mind when hypnosis is carried out, and that 'something' can, for example, change the appearance of a Mondrian style picture to the hypnotised viewer. So we have a 'real' phenomenon that can be 'really' observed, by one or more real persons. Now to say that does not count, it is only in the mind, simply places the burden of

doubt somewhere else. In terms of physics it is as 'real' as anything else. PET scans prove it.

We could have a grim choice of discounting observations coming from the area of the human skull as being 'unphysical', or alternatively placing them in a new class of mental-but physical phenomena. It did not perhaps much matter if we assigned such observations as 'unphysical' when there were many fewer quantitative and accurate measurements of what goes on in the brain, but now, with fMRI and other new techniques, it does matter. It is also plain that the provenance of all sensations, real or imagined, should be regarded as suspect. The era of Dr Johnson kicking a stone with his foot as a way to disagree quickly and reasonably adequately with Bishop Berkeley is, for good or ill, now long gone.

There are clearly other many other such cases arising. In my blog I try to consider some of them. Near death experiences are perhaps one of the most controversial of these. Dreams are the most common example, perhaps, and for the moment it may be easier to manipulate or create these than to change other human sensations or to look for difficult cases, though needs must. For example Quinton (1973), when he criticises Kant, for example, specifically makes use of thought experiments on rather unusual and somewhat obsessive dreams. I must point out that whilst dreams are not the precise lychpin of Quinton's argumentation, at least they are an important part of the argumentation's thrust, so dreams definitely cannot be ignored as an arena for philosophical work of this nature.

Dreams are also of great interest in neuroscience as for example, it is now possible to preprogram people's dreams in advance, at least to a limited extent, as Stickgold (2005) has shown. A simple computer program using Berkeley Madonna was therefore used to set up a model to describe this effect, and the results are shown on my blog at http://ttjohn.blogspot.com/ . Now the philosophical problems involved in predicting the future using a B series representation and such a model could be endless. A lot of counterexamples (Note 3) could readily be set up, in some cases at least reasonably convincing, in block time. But in the A series we have the luxury of not having to bother to do so, even though real restrictions will undoubtedly be likely to be apparent to its actual physical (not just philosophical) use in the long term. So for the A series we just need to consider a person at some phase, with a past, present and future which has no known necessary call to alter other bit of the A series, as yet unexplored, and to record dreams before and after a Stickgold perturbation. Then the same Berkeley Madonna model with slightly different parameter values allows precognition within the model, which also occurred for our test case. In other words the unexpected dream 'prediction' of playing a game of Tetris occurred before the stimulation was made, by a subject unaware of the nature of the exercise.

Repeatability: I would consider the Milgram (1974) experiments to be perhaps the best experiments ever done in recent years in experimental psychology and they are highly predictable, over many experiments by many people. I am hoping for that level of predictability but so far we have only catalogued one test subject (of Indian origin) and will be looking for more suitable subjects in India during (2007/8). The Berkeley Madonna results suggest that quite tiny parameter changes could greatly affect results and therefore these experiments may take a long time and if necessary co-ordinated with other related matters, and different experiments. What we do have, however, would seem to be a proof of concept in that ordinary modern mathematics can be used, and possibly ordinary experiments will lead to useful results. I claim only proof of concept so far. Out of interest, the present work is very recent but a patent on time travel was taken out by me on the topic, probably covering basic points, about 25 years ago, and I have let it lapse, so I trust that most serious future work may effectively remain open source, at least in the U.K.

References

Adamek J., Herrlich H., Strecker G.E. (2004), "The Joy of Cats", p15, John Wiley , and katmat.math.uni-bremen.de/acc/acc.pdf

Bays T., (2001), Ph.D. Dissertation. "Reflections on Skolem’s Paradox" p86, UCLA Philosohy Department.

Gale R.M. (1968), "The Philosophy of Time", p65 et seq, Macmillan

Goldblatt R, (2008), "Topoi", p10, Dover

Gottman J.M., et al., (2002), "The Mathematics of Marriage", MIT Press , ISBN : 0-262-57230-3

Goguen J. (2006), "Mathematical Models of Space and Time",
http://www.cs.ucsd.edu/~goguen/pps/taspm.pdf

Kosslyn S. M. et al, (2000), "Hypnotic Visual Illusion Alters Color Processing in the Brain", Am J Psychiatry 157:8, August, 1279

Le Poidevin R., (1991), "Change, Cause, and Contradiction", p34-37 inter alia, New York, St. Martins Press.

Margolis H, (2002). "It started with Copernicus", McGraw Hill

Maudlin. T. (2002), "Philosophers 'Imprint, Vol.2,No.4, "Thoroughly Modern McTaggart ". In that article. Maudlin says "Let's return McTaggart to his final resting place,and let him molder there in peace". Earman (up to a point) disagrees. And so it goes on. Works like the Stanford Encyclopedia of Philosophy still publish disagreements either way or any way. But the point has to be made that not all philosophers agree on the relevance of McTaggart's work, though that does not of course imply that counterfactual arguments will easily bear fruit.

Milgram, S. (1974) "Obedience to Authority", Harper & Row, USA

Mortensen, C., (2006),"Change", The Stanford Encyclopedia of Philosophy (Winter 2006 Edition), Edward N. Zalta (ed.), URL =

Oaklander N., (2004), "Freedom and the New Theory of Time" p337 - "From The Ontology of Time", (Amherst, NY: Prometheus Books, 2004)

Quinton, A, (1973), "The Nature of Things", p164, inter alia, Routledge & Kegan Paul, London.

Ryberg et al (2006), "The Repugnant Conclusion", The Stanford Encyclopedia of Philosophy (Spring 2006 Edition), Edward N. Zalta (ed.), URL = .

Stickgold R., (2005), "Sleep-dependent memory consolidation" , Nature, Vol 437, p1272

Swartz N., (2001) "Beyond Experience: Metaphysical Theories and Philosophical Constraints", Second Edition free at http://www.sfu.ca/philosophy/beyond_experience

Smith Q., (1993), "Language and Time", Oxford, Oxford University Press ; an important and additionally elucidatory discussion in Swartz (2001).

Sprott J. C., Aks D. J., (2003), "The Role of Depth and 1/f Dynamics in Perceiving Reversible Figures", "Nonlinear Dynamics, Psychology, and Life Sciences, Vol. 7, No. 2, April 2003

Stevens J. C. , (1984), Ethics, Oct;95(1):68-74

Sydney conference (2006), "Time and consciousness Conference",
http://fragments.consc.net/djc/2006/07/time_and_consci.html

Tooley M., (1998), "Time, Tense, and Causation", Oxford, Clarendon Press.

Tooley M., (2006), http://spot.colorado.edu/~tooley/LectureforExercise4Phil3480.html

Yates J., (2007), http://ttjohn.blogspot.com/2007/07/2007-tsc-qmind-conferences-my-abstracts.html#links

Note 1

Two important recent books which illustrate this fact are Smith (1993) and Tooley (1998), both of whom seek to escape from the strictures of McTaggart, but in different ways. Very briefly, Smith uses a changing present which needs peculiar tensed (past/future) facts which change relative to their successive "presents". In short it is almost an A series. Tooley's accretion of times seems to require an infinity of instantaneous accretions of times for any finite change, or worse, a finite number of "timed" accretions of times. So Tooley, like Oaklander, is very nearly a B theorist. All these ideas are philosophically interesting but to me they don't trump Prior. Le Poidevin (1991), for example, speaks of Prior's "temporal solipsism" but nonetheless points out that Prior's tense ontology is, in his view, perhaps the most plausible way to avoid McTaggart's contradictions while maintaining McTaggart's intuitions of the significance of tensed propositions. The newest relevant commentary may be Mortensen (2006).

Note 2

In my blog at http://ttjohn.blogspot.com/ in the article "Are Physicists suffering from the Tychonic Illusion ?" I place the incisive comment of Margolis "So are cognitive illusions likely to occur and be hard to correct beyond the narrow contexts of psychology experiments? I think that is inevitable, so that it is important that we come to understand these illusions. Careful thought about simple puzzles like Wason can help illuminate what happens in vastly more consequential realms." To put it crudely, it is almost as if the solar system were just a large duckrabbit unclearly unidentified or a Wason card test unsolved. [A duckrabbit is a picture which seems to mentally alternate during viewing between looking like being a duck and a rabbit].

Note 3

The question of counterexamples and paradoxes is a major one for time travellers, and has filled many encyclopedia pages. We are left with problems with counterexamples of any type. Those commonly given by Tooley (2006) on other topics for example, have been disputed, often for possibly good reasons or sometimes apparently for unphilosophical ones, Stevens (1984). We are fortunate that counterexamples are not so prevalent so far in the A series. And indeed some would say that counterexamples go in our favour here, as even one example of time travel proves that it happens and we now have one example - which I mention in this essay and give details of in my blog. I would say that in principle there is a strong counterexample here, but in my view we do need more cases to pursue a convincing program. And I have come across many general problems with this "one example proves it" approach when considering the synaesthesia work of Jeffrey Gray with him, also discussed briefly at http://ttjohn.blogspot.com/ A further angle to the McTaggart work is of course ethics and the "repugnant conclusion" (Ryberg, 2006) as well as relating to the work of Parfit, which has to be omitted for the moment since we are largely pursuing the physical/mathematical side of the paradox in this brief essay.

Note 4

Of course category theory is at the crux of a proper mathematical explanation of the paradox, as Yates (2006) duly notes elsewhere. In a somewhat similar instance, the Buddhist Monk puzzle, perhaps first described by Koestler and mentioned by Fauconnier and Turner, a category theoretic explanation comes closer to the light of day in the mathematical discusion of Goguen (2006). Fauconnier and Turner use a network model which would need re-examination to apply to the present context. And indeed, for a spiritual interpretation, real Buddhist monks are at work right now but for present purposes we stick to mathematics, physics, neuroscience and philosophy for the moment.