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ASSOCIATION for SKEPTICAL ENQUIRY

SCEPTICISM ABOUT SCIENCE

Edited by Michael Heap

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GUIDELINES FOR AUTHORS

The *Skeptical Intelligencer* welcomes formal and informal contributions on any subject within the ambit of the Association for Skeptical Enquiry (ASKE).

Formal articles should be aimed at the intelligent layperson, and authors should take particular care to define or explain unusual terms or concepts. Equations, statistics or other numerical and symbolic tools may be employed whenever required. Articles should be as succinct as possible, but may be of any length.

Authors of contributions to the *Skeptical Intelligencer* should be take care to ensure that texts are temperate in tone and free of vituperation. They should also ensure that arguments are either supported by express evidence/arguments or identified as speculative. 'Do not pretend conclusions are certain that are not demonstrated or demonstrable.' (T.H. Huxley).

Before being accepted for publication, submitted texts will be reviewed by the Editor and any appropriate advisors. Where improvements or changes are desirable, the editorial team will work with authors and make constructive suggestions as to amendments.

Whenever possible, authors should submit a printed, double-spaced, hard copy of their article or letter, together with a 3.5-inch DOS-formatted floppy disk to the address shown on the front cover. Alternatively, contributions may be sent by e-mail direct to the editor at: <m.heap@sheffield.ac.uk>. Texts should in either ASCII text-only; Rich Text Format; or MS-Word.

When referring to another work, authors should:

- Cite only the surname, year, and (where appropriate) page number within the main text: e.g. '...according to Hyman (1985: p. 123), the results of this test were not convincing...' or '...according to Bruton (1886; cited in Ross, 1996)...'
- List multiple references in date order: e.g. '...a number of studies have thrown doubt on this claim (Zack, 1986; Al-Issa, 1989; Erikson, 1997)...'
- In the case of electronic material, give the author and the date the material was accessed on line
- Place Internet addresses URLs in angle brackets: e.g. <http://www.nothing.org>

A complete list of references in alphabetical order of authors' surnames should be given at the end of the article. The list should be compiled using the following conventions:

- *Articles*: Smith, L.J. (1990) An examination of astrology. *Astrological Journal*, **13**, 132-196.
- *Books*: Naranjo, X. (1902) *The End of the Road*. London: University of London.
- *Chapters*: Griff, P. (1978) Creationism. In D. Greengage (ed.) *Pseudoscience*. Boston: Chapman Publishers.
- *Electronic material*: Driscoe, E. Another look at Uri Geller. <http://www.etc.org>. Accessed 21 April 1997.

For further information contact the editor, Dr. Michael Heap at m.heap@sheffield.ac.uk.

For details of back issues of the Skeptical Intelligencer contact the Editor as above. For members, back issues are available in the Members' Section of the ASKE Website

EDITORIAL

Michael Heap

There are a number of strongly related themes in this issue of the *Skeptical Intelligencer*, namely: the formal application of scepticism to science itself; resistance to science within the general public; challenges to mainstream scientific theories by scientists themselves; and scepticism concerning how a number of scientists, who have achieved some prominence, interpret the relevance of scientific findings, notably in the domains of neuroscience and genetics, to matters of profound human concern - consciousness, personal freedom, religion, and other meaning-of-life issues.

This subject matter forces me to come up with an expression that denotes the approach to scepticism that is advocated and discussed in this and similar, though more widely circulated journals, as well as at meetings of 'skeptical' societies, on their websites, and so on. I don't like the term 'scientific scepticism'; the kind of scepticism I have in mind exists separately from science but science is a part of it. The term 'modern scepticism' comes to mind but sounds too general for me. I have chosen the expression 'popular scepticism'. 'Modern popular scepticism' also has its merits. I have given up trying to devise any clear rules on which spelling to use and when; remnants of whatever patriotic or xenophobic inclinations I once held refuse to allow me to abandon the British spelling entirely.

Popular scepticism accepts the premise that there is such a thing as reality – the real world - that exists whether we are there to observe it or not (realism). We can only experience this reality indirectly through its impact on our senses – light (vision) sound (hearing), etc. However we can discover truths about reality by making and accumulating observations – knowledge – about it and the regular and predictable ways in which what we observe behaves. As we do this, over time, we can come closer to describing 'the truth' or (not quite the same thing) what is more likely to be true about the real world and what is not true. We can apply certain rules to make inferences about things we cannot directly observe, such as events that have happened previously that we have not witnessed. Sometimes we say that the evidence is so compelling that we have no alternative but to accept or reject a belief or assumption.

Popular scepticism is very much concerned with countering claims that have no support within, or are contradicted by, our existing knowledge and the rules whereby we account for what we know, particularly in areas of life that are important for us such as health and education.

In the first paper in this issue, Jon Scaife argues for a more traditional and radical scepticism, one that questions the claim that, by the above process, we are moving closer to knowing 'Reality' or 'the truth'. He takes, for example, a claim by Richard Dawkins that convergent lines of research have demonstrated that 'genetic material is organised into stringy clumps called chromosomes' and thus they converge on 'the truth'. This, Jon argues, is a claim that Dawkins is not entitled to make: none of us has direct access to 'god's eye Reality' to confirm whether Dawkins' claim is correct. (I am thinking of the metaphor of our checking our answers with those at the back of the book in our maths classes at school.) One unfortunate consequence of this, Jon points out, is that scientists lose credibility with the public when, as frequently happens, they have to announce that their account of reality has been incorrect. Hence scepticism should extend to scientists when, like Dawkins, they aver that they are revealing real truths about the world.

Following Jon's paper, Steve Moxon provides some counterarguments to his thesis and Jon replies to these. There is then a paper by me (which includes material from papers and talks I have previously given) in which I defend the idea that 'truth about reality' is something we can approach (i.e. come closer to) and on many occasions, for all intents and purposes, we are entitled to say that we have attained this. It seems to me that if we accept the premise of realism, namely that the material world exists, then the more that we observe, the closer we are to establishing 'the truth' about it. I cannot conceive that those who choose to 'leave the cave' are no more knowledgeable about 'the real world' than those who remain inside it! Moreover, our understanding of the world – our explanations for what we observe – changes to accommodate our expanding body of knowledge. It is for this reason we can say they become 'better' – either closer approximations to 'the truth' or more likely to be so. We may alter or discard our explanations but we do not discard our knowledge.

In my paper I argue that all of the above characterises in a significant way, our everyday thinking and interactions with the world, including our intellectual development from our earliest years. It is not just about science. In fact I think it can be unhelpful to perceive science as something that is separate from the rest of human activity and 'scientists' as different from other people. In our everyday life, our assumption that we can, by due diligence and application, come closer to discovering the reality of our world – our neighbours, our community, our house, our car, our garden, our work, the weather, holiday

destinations, etc. – goes largely unchallenged. Much of this activity involves consulting other people. In my paper I ask why this does not apply to the activity of those people we label 'scientists'; why are they singled out for this critique?

Whatever the case, we can probably all agree that scientists are not immune to sceptical scrutiny; and not just when they are …. - I was going to say 'wrong' but that opens up a can of worms. When they are misapplying scientific knowledge? In the Review section there is a positive account by Martin Wallace of *The Moral Landscape* by the neuroscientist Sam Harris. As Martin notes, 'He has shown that the same part of the brain is active when considering scientific suggestions as when considering moral or religious precepts'. Now even those who support the conclusions that Harris makes from this would agree that in order for the observation to become 'an accepted fact' requires that it should be widely replicated and until then we cannot be confident of drawing any substantive inferences. Once this has been achieved the evidence will always be there; it may be ignored but it cannot be discarded. But the main target for sceptics should be the inferences that are often made from this kind of observation. I am very grateful to Brian Robinson for addressing this in his review of *Aping Mankind* by Raymond Tallis, who takes exception to the predilection of some scientists, including Sam Harris, for what he calls 'neuromania' and 'Darwinitis'. This is very much the domain of popular scepticism

There is also a paper in this issue that is an unusual one for the *Intelligencer* in that it involves a critical analysis, by Peter Jackson and John Minkowski, of Einstein's Special Theory of Relativity. One would reasonably expect to find material such as this in a physics journal. The *Intelligencer* is not a peer-reviewed journal, so no claims can be made by the Editor as to the robustness the authors' science. However, the main theme of the paper is what happens when a theory that is accepted, apparently without equivocation, by mainstream science is subjected to a fundamental challenge *from within*, and what the reaction may reveal about 'the scientific establishment' (as opposed to the process of science itself). The authors complain that there are knowledgeable scientists who consider that the Special Theory is fundamentally flawed but they are denied a fair hearing, disqualified from research funding, and even subjected to *ad hominem* attacks and ridicule because, for one reason, there is a vested interest in maintaining the establishment position.

Will mainstream scientific theories and opinion always have their opponents, not just amongst those who have some ideological, personal or financial investment in discrediting them (cf. evolution and climate change) but also amongst scientists themselves who have a purely academic interest? And if so, why? This debate is one that ought to be aired and one with which sceptics should involve themselves. It is a topical issue, given the recent discussion on impartiality and the representation of scientific opinion by the BBC *(note 1)*.

Resistance to science *from without* is the theme of another review, by Alison Campbell. This concerns a publication that defends the scientific method and with which sceptics will find favour.

Finally Mark Newbrook reviews yet another book claiming that the empire Atlantis actually existed. Did Atlantis exist? A realist, and a sceptic, would say either it did or it didn't and we can investigate this question in order to bring is closer to an answer. But first we have to find out more about the question – notably what the enquirer means by 'Atlantis'. And clearly, in the present context this means reading the book.

Notes

1.http://www.bbc.co.uk/bbctrust/our_work/other/science_impartiality.shtml

Call for Contributions

If you have attended a conference or presentation, watched a programme, or read an article or book that would be of interest to readers, why not write a review of this, however brief, for the *Skeptical Adversaria* or the *Skeptical Intelligencer*?

ARTICLES

WHEN SCEPTICISM IS RADICAL

Jon Scaife
Jon Scaife teaches and researches about how people learn. He has degrees in maths and engineering physics and taught in schools before coming to the Physics department at Sheffield University. He now works in the University's School of Education. *This paper is based on a talk that he presented at Sheffield Skeptics in the Pub on July 18th 2011.*

1. How do we get to be knowers?

Something that seems safe to take for granted is that you and I know things; we are knowers. In this brief introduction to radical constructivism, a radical form of scepticism, I want to start by asking, where did this knowledge come from? Was it present in some 'seed-like' form in the sperm and egg from which each of us grew? Are there knowledge seeds for all the things that *Homo sapiens* has done: growing crops, building dwellings, driving cars, developing quantum theory, sending tweets, etc. and for acts as yet unknown? Plato thought so. He had an innatist view of knowledge; he believed that through reincarnation we are born with elements of knowledge from our previous being. Before you scoff, look at the world around us: reincarnation may be largely out of fashion but innatist assumptions underpin many contemporary 'givens' in education, pop psychology and parenting folklore. The idea that people have relatively fixed and knowable abilities, for instance, leads to labels such as 'low ability pupils' in schools. What's the problem? First, ability is *always* inferential, never factual. There's no measure of ability, only of attainment or performance on some task or other. There may be many reasons why you got 35% on your maths test; being born with impoverished 'maths genes' is one of the less likely. Google Helen Keller or Wilma Rudolph and imagine how their abilities would have been described. While at the keyboard, Google Cyril Burt; Burt was so committed to the idea that people had knowable limits to their intelligence that he appears to have generated his own fictitious data to reinforce the point. Despite this, Burt's influence on British schooling has been significant. Second, such labels are destructive. They create negative and potentially self-fulfilling expectations in individuals and in those with influence over them. For recent empirical work in this area see Dweck (2006) and Hart et al (2004).

The English enlightenment philosopher John Locke objected to another implication of innatism, namely that our place in life is determined by our birth. Born to labouring parents? Don't think beyond labour. Born into wealth? The church, the State or the army for you my boy! And by the way, we're all born with original sin. Locke saw these beliefs as profoundly inequitable and deeply damaging. He believed that people could shape their own futures; he believed that people could learn and develop their knowledge and skills. He argued that we are born equal, without innate knowledge, with minds like 'blank slates'. How, then, do we become knowers? Through experience, said Locke. Through learning from others. Experience is our instructor. This is an empiricist view of knowing. Provide a rich experiential environment and people will learn well. This is what sells us those new coloured tactile Mozart-emitting cot-mounted whirlers for baby! And let's have interactive whiteboards in every school classroom – kids are bound to learn better! The empiricist perspective told us that knowledge was a commodity that some people had, that others wanted and that could be transmitted from person to person. It gave us words like 'lecturer' and 'professor' and, since the 1980s, 'deliver' in place of 'teach'. When such words are in regular use they can come to be taken as describing ways of being and doing, with the result that teaching can descend into acts of 'delivering' course material.

When such words are in regular use they can come to be taken as describing ways of being and doing, with the result that teaching can descend into acts of 'delivering' course material.

I believe that we do learn by seeing and hearing others - but not that well. Just ask teachers. Or try learning to swim by watching swimmers or hearing one tell you how to do it. Both innatist and empiricist accounts of how we become knowers have some plausible elements. But it has become increasingly clear over the 320 years since Locke and the 2,500 since Plato that neither account is adequate to explain what we know about knowing. Here's an illustration. A young child playing with a teddy bear might hide the teddy from a parent and say, 'Teddy runned away!' Where did they get the knowledge that enabled them to say, 'runned'? It's highly unlikely that they observed and imitated this, as

empiricism would imply. And it seems implausible that they were born with 'runned' in mind. Much more plausible, in my view, is that the child had learnt the word 'run' and had also observed that the 'ed' sound, when added to some familiar words, did the job of describing something that had happened. The child has these conceptual 'materials' available and, from the hiding game, has the goal of wanting to communicate something that has happened, so uses the materials to construct a word for the intended purpose. And of course it works, although adults will gradually nudge the child towards using 'ran' instead.

The view that we build new knowledge from our current knowledge, usually motivated by a goal or a value of some sort, is known as a constructivist perspective.

The view that we build new knowledge from our current knowledge, usually motivated by a goal or a value of some sort, is known as a constructivist perspective. An easy way to illustrate the explanatory value of constructivism is to present people with the 'same' experience and see what they make of it. I did that in my Skeptics in the Pub (SitP) session with some videos. One was a road safety piece about noticing what you expect and missing the unexpected. The commentary asked watchers to count the number of basketball passes the team in white made. During the action, a character in a black bear costume danced across the screen. People experience the video in different ways: some count passes and get a range of different totals, a few notice the dancing bear and some don't engage with it. Why the differences in the knowledge that people construct from seeing the video? From a constructivist perspective it's because people bring their own, personal, stock of knowledge and values to bear on the experience. There will, though, be plenty in common – it seems safe to say that most people in the group would have had a command of English, would know the vocabulary being used, would be familiar with video material and so on. But each person's life history of experiences is unique, as is their constructed stock of knowledge. You can see why I put the word 'same' in inverted commas above: in general people may not regard their experience as just the same as someone else's and, of course, life is all the richer for that. For more on constructivism as an alternative to traditional perspectives on knowledge and knowing see von Glasersfeld (1995) or online articles by the same author.

2. Why do we know?

Like an increasing number of people in the 'human sciences', I have a constructivist perspective about how people come to be knowers. What's that got to do with radical scepticism? Let's move on from consideration of *how* we become knowers to think about *why* we are knowers. What does being a knower do for me or you? One way to approach this is to think of how things might be if something was a bit different: imagine, for instance, knowing everything that you now know except for one thing: that in some countries people drive on the opposite side of the road. Imagine that you hopped off a plane and struck off towards the city in this foreign land. Upon reaching a kerb you performed your automatic, tried and tested modern urban in-a-hurry repertoire of looking one way, nothing coming, set off and look the other way when halfway across … bang! It came at you from the wrong side! This might seem an unlikely example but I can tell you from first-hand experience that it's not *that* unlikely. So what does that missing bit of knowledge do? It makes us better equipped for a range of possible circumstances and constraints. It makes us better adapted to our experiences – in this case the experience of being somewhere where things go differently. It contributes to our viability as a living, thriving individual. (I'm not arguing that knowledge is necessarily utilitarian. We inherit and construct values – capacities to discriminate between experiences and respond differently to them - in many areas. For instance, while some values relate to basic human needs others reflect aesthetic and moral experience.)

I asked the question: why do we become knowers? My answer, from a constructivist perspective, is that, more often than not, knowledge is adaptive for us in some way – it helps us to meet goals, whether utilitarian, aesthetic, or social. The same applies to other animals. Bees that know how to return to tasty flowers are likely to do better than bees that don't. Animals that can differentiate between potential mates and threats will tend to do better than those that can't. The 'job' that knowledge does for us and other animals is a bit like a satnav; it guides us as we navigate routes through daily experiences. A satnav isn't a replica of a terrain. It isn't in any sense 'complete'. Its basic requirement is to do a job, the job for which it was designed and for which we bought it. That's all there is to it. And here's the first radical leap in this account – it's the same for our knowledge. We make it out of our prior knowledge, our experiences and our goals, and all it has to do is help us navigate under the influence of our goals. We don't need our knowledge to tell us 'everything', only what is sufficient to do the job in hand, just like a satnav.

3. Are we free to construct?

Does that mean we can construct whatever knowledge we feel like? That would be the case if we could arrange to experience just what we wanted. But my experience of life and, I suspect, yours, isn't like that. I would *love* to be able to fly like Superman. OK – what are we waiting for - let's go ahead and construct that knowledge. To do the constructing I need some experiential material to build from, so here goes – lift off! Sadly, no lift off, no

experience of flying like Superman, and so no knowledge of doing it, despite my strong desire. In my knowledge constructing I am constrained by my experiences. If I can experience something I may be able to construct knowledge about it but I'm not simply free to construct anything because my experiences are constrained. I can't walk through walls. Walls constrain me. That is a fact of my experience. I might explain the constraining effect of walls by drawing on knowledge about my physiology, the constitution and structure of walls and the electrical and thermodynamic physics of solids. I might point out that both I and the wall are almost entirely empty space. But the bottom line is that I experience walls as constraints and can't walk through them, no matter how much I might like to.

Constraints are so natural a part of daily living that we normally take them for granted. Occasionally we may be taken by surprise by an unnoticed constraint – I once tried walking through what turned out to be a very clean glass door. Both my nose and my pride suffered but fortunately the door survived. Like Dr Johnson, who contested George Berkeley's idealism by kicking a stone to demonstrate its material qualities, my collision reinforced for me that there is *something*, not nothing, 'out there'. The glass door was part of my reality. There is, though, some property of Reality that results in a glass door being a constraint on my movement. The ultimate constraint is the inaccessibility of a god's eye view. Living within the constraint, I can never have any knowledge of what is without it.

4. What is real?

Take a quick glance at the adjacent picture. What is it a picture of? Your reality probably now includes an experience of seeing an image of a load of coffee beans in this journal. Here's a challenge: can you spot the person's face among the beans? It might take you a while to find it.

Assuming you spotted the face (it's near the bottom), your reality has now changed to include an image not just of coffee beans but beans with a face. I didn't refer to 'reality' (or, as I usually write it, Reality), I referred to *your* reality. By that I mean the totality of everything you can experience, including all your thoughts and feelings and including non-conscious experiences like your autonomic temperature-controlling processes. Von Glasersfeld calls this the person's experiential world. As I have illustrated with the beans, people's experiential worlds can and do change, all the time. We never shut down our experiencing completely except, presumably, when we die. Now it's time for the second radical leap: a person's experiential world, their reality, is everything and all there is for them. It might be tempting to say that that includes everything in the universe, because my imagination is limitless. For instance, I could have imagined a face among the beans before seeing it, in which case my reality didn't change when I did see the face. But that is to equate imagining something with experiencing it. It's easy to think of examples where that patently isn't the case: being thirsty and imagining a drink is not the same as having one! Also, it's doubtful that Plato could have imagined social networking or holograms on credit cards, and so there's no sense in which they were parts of his reality. And with that here's another temptation: one might say, ah, not part of Plato's reality maybe, but we now know they're part of Reality. Not so: you and I know these things are in our own realities. None of us has access to anything beyond our own reality and therefore no-one has access to Reality – the totality of everything. Reality has been called the 'god's eye view' by the philosopher Hilary Putnam. It was the totality of 'things-in-themselves' for Kant and 'absolute reality' for von Glasersfeld. Now here's a further temptation: we might concede that none of us can achieve a 'god's eye view' but still feel that we can know a part of it. The trouble with that claim is that it can never be checked and so we can never know whether we do know anything about Reality. Nobody can suspend their beingness for a moment, step outside themselves to get a god-like vantage point, have a look around to see what Reality really looks like and then return with information about which bits of people's personal realities match the underlying things-in-themselves.

So does this mean that we are living inside worlds of illusion, not reality? Anything but! My reality contains what I refer to as night and day, rain and shine, objects and

images, people and things – all that we would describe and discuss in everyday conversation. What is different is that I would not claim that my reality either matches Reality or matches yours. All it needs to do is to fit adequately with other people's realities and with the constraints that I experience in daily living. For instance if we were eating together and I asked you to pass the pepper, and you passed what to me appeared to be salt, we would have a misfit in our current realities and we would probably negotiate some

kind of adjustments. That is in the nature of interpersonal processes. Neither of us would dream of invoking Reality in a situation like that. It's trickier when there's a serious disagreement, of this sort: 'You said X'; 'No I didn't!' 'You certainly did!' 'You're wrong!' In that situation each party may feel that they have a better contact with Reality than the other, making resolution fairly intractable. If, on the other hand, each sees it as natural that they might know and understand things in different and personal ways, then neither will claim the 'epistemic high ground' and intensity of the situation may be diminished.

5. Solipsism and science

There remain two lines that I'd like to develop briefly from here. One concerns claims to know about Reality, but first I'd like to mention something called solipsism. Solipsism is an extreme form of scepticism that claims that the only thing that a knower can know is that he or she exists. As far as I know there is no *logical* refutation of solipsism. Its problem isn't a matter of logic, however; it's that it is a highly implausible and utterly unfruitful position to occupy. That is why no-one, constructivist or not, is a solipsist. Solipsism is implausible because it would entail me looking at everyone else and concluding that they are all just products of my imagination. But then I look at myself and realise – hang on a minute – I'm pretty similar to all those 'figments' and it's possible, even probable, that they could be thinking things too! It's unfruitful because if I really were the master of all I can imagine I can assure you that I wouldn't have Sheffield United out of the Premier League!

Solipsism may be a dead end as far as scepticism is concerned, but claims to know Reality are alive and well. Who makes these claims? Politicians claim to know what the people want. They often claim to have God on their side. They claim to know who is good and who is bad, and who has - but shouldn't have - weapons of mass destruction. Many religious leaders over history have claimed to know the will of God, which is certainly helpful for investing themselves with divine authority. Plato and the Greek philosophers claimed to know at least some truths about Reality. That was handy for them, for as they pointed out, with knowledge like that they were the right people to be leaders. Some teachers claim to know aspects of Reality and use that claim to impress on their students that that's why they should believe what they say. And of course there is science. In my SitP session I played an audio excerpt from the evolutionary biologist Professor Richard Dawkins, describing how, around the beginning of the 20th century, two distinct branches of biological science converged on the same conclusion, namely that genetic material is organised into stringy clumps called chromosomes. Had Dawkins left his account there he would have been on very firm ground. This would have been an illustration of how science progresses by increasing the scope of its explanatory accounts and reinforcing their credibility through 'methodological triangulation', that is, the convergence of independent lines of research. I have a lot of time for Dawkins but on this occasion I have to chide him because he continued by saying that not only did these two strands converge with each other but they also converged on the truth. I am pretty sure that by 'the truth' Dawkins was making a claim about Reality, a claim that chromosomes are a part of Reality. I hope by now you won't be surprised if I say that chromosomes may be a part of Reality, that they are a part of my reality and I'm sure they're a part of Dawkins' reality. But none of us can ever know whether they're a part of underlying, in-itself, absolute, god's eye Reality, and to claim that they are, if that is what Dawkins was implying, is unjustified. It's also unnecessary! It weakens the credibility of science to make claims about Reality. Far stronger is to say that this scientific account is the best fit, the most credible, the most rigorously tested, that we have yet been able to construct.

Constructivism is a 'bottom up' perspective. It starts from where we are and asks, 'How did we get that way?' Scientific progress, from a constructivist view, is progress from where we were to where we are now.

A question was asked in the SitP session about scientific progress. 'Surely', the questioner asked, 'as science develops aren't we progressing closer towards true knowledge about Reality?' Clearly by any reasonable account science does progress. Einstein's account of dynamics, for instance, has progressed beyond Newton's. If someone believes that Reality is knowable they may well like to think of progress as being towards Reality. To a constructivist that's a circular argument. The person claims to know Reality, they make some progress, and they claim to have got closer to Reality. They just haven't said how they know Reality so that they can check that their progress has been towards it. Constructivism is a 'bottom up' perspective. It starts from where we are and asks, 'How did we get that way?' Scientific progress, from a constructivist view, is progress from where we were to where we are now. It's Newton to Einstein. Progress *from* known to known, not progress towards the unknown.

If, like phlogiston and the aether, a scientific theory is later consigned to chapters on the history of scientific thought, that will presumably be because the community of scientists has produced what they regard as a better account. That is, an account that fits more widely or has more predictive power, or supersedes the previous story in some other way. But if the claim had been made, as it too often is in the publicising of science in the mass media, that

we know a bit more about Reality, then when the current account has to change, the credibility of science is diminished. It's easy to see the impact of this on the public: incredulity in the face, as Leonardo da Vinci observed long ago, of 'truths going in and out of fashion'.

References

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Hart, S., Dixon, A., Drummond, M.J. & McIntyre, D. (2004) *Learning without Limits.* Maidenhead: Open University Press.

von Glasersfeld, E. (1995). *Radical Constructivism.* London: Falmer.

Further reading

The following list includes some contemporary scientific accounts in the field of neuroscience that in my view are compatible with a constructivist view of knowledge and knowing. I hope this reinforces the point that the last section above is anti-pseudoscience, not anti-science.

Edelman, G.M. & Tononi, G. (2000) *Consciousness: How Matter becomes Imagination*. London: Allen Lane/ The Penguin Press.

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Varela, F., Thompson, E. and Rosch, E. (1993) *The Embodied Mind: Cognitive Science and Human Experience*. London: MIT Press.

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A RESPONSE TO JON SCAIFE'S ADVOCACY OF 'RADICAL CONSTRUCTIVISM' AS A GENERAL EPISTEMOLOGY
With reply by Jon Scaife

Steve Moxon

Steve Moxon a non-affiliated cross-disciplinary researcher/writer re the biological roots of human sociality (with a particular interest in the sexes) and how this manifests as sex dichotomies.

'Radical Constructivism' (RC) arises from the false view that humans are separate from nature.

A human individual is now understood as a systems-biology entity that has to fit into what, from our perspective, we distinguish as the environment but with which we are integral as part of social groups and ecosystems, being an organism and subject to the laws of physics.

Our knowledge of the real world is therefore along multiple dimensions: it's intrinsic, being implicit in our evolved psychology, and consequently available to us intuitively as well as through explicit cognition; all of which can be cross-checked with any and every other human individual, sharing as we do the same set of evolved decision-rules that make up human psychology. Most formally, this can be intellectually, through science and philosophy. The many converging lines of evidence show huge internal consistency, indicating that what we take to be the real world indeed is so; notwithstanding that there are of course levels within nature of which we cannot possibly be directly aware that indeed do describe aspects of reality, but which, following philosophers, we can regarded as 'category error' – as, for example, when we try to utilise, say, quantum mechanics to describe a species' social system.

The RC notion that the human individual essentially is in a world of its own is through two unwarranted foundational views of the chief architect of this epistemology, Ernst Von Glasersfeld. These he drew from well out-of-date philosophies of science: one from psychology in the days before that field had any biological and evolutionary underpinning and before it could in any way be regarded as a science, and the other from the 19th century.

First and foremost is von Glasersfeld's obsession with Piaget's developmental psychology, popular in the 1960s/70s, which is a theory that we start with the mind as a 'blank slate', which somehow bootstraps itself up to cognitive structures. Piaget's misreading of the unfolding of innate cognitive facility as staged emergence is a discredited denial of human nature that von Glasersfeld in his book states is a requirement of RC; citing Locke in support of the 'tabula rasa' view of the mind, and decrying Chomksy's theory of a 'universal grammar' that, in entailing innateness, consequently precludes any constructivist mechanism.

Second is the 19th century notion of Johannes Müller that humans are incapable of perception, because in detecting any stimulus, for example light, it is translated into electrical impulses in neuronal activity, thereby recording 'how much' but not 'what'. Müller simply failed to understand that sense organs are distal parts of the brain that, through integration with other neural processes, place detection of stimuli in their context. This false separation amounts to a denial that perception can occur even in principle.

That RC focuses on human idiosyncrasy is surely not least an artefact of human psychology, a strong component of which is that we perceive and cognise individual differences in a way that very greatly exaggerates them and in a prejudicial (anti-male; specifically anti-low-status-male) way. This is through the core function of social system to maximise reproductive-efficiency. Males are polarised in a hierarchy in respect of minor individual differences through the male 'genetic filter' mechanism [see Artmar (1991) and Moxon (2008, 2009)]. A discussion here would be tangential to the topic at hand; suffice to say that there are major ramifications in our social psychology, giving us a mind-set of seeing difference instead of similarity.

That ultimately, even with endless cross-checking and internal consistency, we can never be absolutely sure that the world we perceive is 'real', is not at issue, being the common if pedantic thread through philosophy since the Greeks. This can equate to a reading of RC in its 'weak' form.

A 'strong' form, though far from being 'radical', is a standard reversion to Cartesian dualism and the discredited idea that mankind stands apart from nature; this being at root through perennial human motivations (that always end up in the elitism and separatism), themselves key facets of our fit into nature that RC denies.

Where RC *does* make sense is in pedagogy in respect of difficult abstract concepts such as in physics – which, tellingly, is Jon Scaife's own field (training physics graduates to become physics teachers) - because this requires chains of reasoning and use of metaphor, giving considerable leeway for divergence in how individuals indeed *construct* their own understanding. An RC perspective can then be asserted as a corrective beyond this sort of narrow context, but it is hubris to extrapolate so far from this rarefied arena and type of knowledge of the world as to arrive at a general epistemology.

Philosophers are ever keen to invent problems they claim for themselves as individuals and for their in-group of fellow philosophers, as understandable only by philosophers….

Philosophers are ever keen to invent problems they claim for themselves as individuals and for their in-group of fellow philosophers, as understandable only by philosophers - along with RC there is 'free will' and 'consciousness' - and in this they are practising the usual core male behaviour of status-seeking in the pursuit of sexual access and consequent reproductive advantage, that perennially gives rise to the aforesaid elitist-separatism. There is of course no better way to engage in elitist-separatism than to pretend otherwise – as we see so very clearly in 'political-correctness' and positions deemed 'post-modernist' (or related labels). The assertion of RC as a general epistemology looks like just such a self-effacing feint that actually is meta-functional in fulfilling ubiquitously manifested biological imperative! And the evidence for the ubiquitous manifestation of biological imperative is the many converging lines across disciplines and epistemological modes that defeat the RC challenge that they are non-real.

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Reply by Jon Scaife

Thanks for your comments Steve – interesting as always. Below are my thoughts about some of them.

Re: 'Radical Constructivism' arises from the false view that humans are separate from nature.

I regard human beings as a part of nature so I'm not sure what part of my account Steve is connecting with here.

Re: being an organism and subject to the laws of physics.

'Being an organism and subject to laws of physics' seems to me to be a good working definition of an individual organism. The biologist Humberto Maturana defines a living creature as being a self-regulating system (he called it being in a state of autopoiesis). Every aspect of the organism's being is a part of its self-regulating system. That includes its knowledge. That view is compatible with my account of RC.

Re: Our knowledge of the real world is therefore along multiple dimensions: it's intrinsic, being implicit in our evolved psychology…

About the 'real world', a RC account asks how do we come to have knowledge, and then what is it knowledge of? When he refers to 'our knowledge of the real world' Steve is bringing these two aspects of knowledge together and in doing so he's making the assumption that knowledge can be about Reality. The ancient Greek sceptics' refutation of this has never been overturned.

There's no sense in which any evolved characteristic can be claimed to be 'optimal' or to 'match Reality'; it just has to be adequate for the survival in the lineage this far.

About being 'implicit in our evolved psychology', we can be sure that every evolved characteristic of every living creature had to permit the creature's lineage to be viable up to the present. That's all it has to do. There's no sense in which any evolved characteristic can be claimed to be 'optimal' or to 'match Reality'; it just has to be adequate for the survival in the lineage this far.

Re: we start from the mind as a 'blank slate'…

My account of RC rejects a blank slate assumption so I'm not sure what aspect of my account Steve is addressing here.

Re: This false separation amounts to a denial that perception can occur even in principle.

I wouldn't dream of denying the possibility of perception. For interesting and independent accounts of the construction of perceptions from sensory recurrences see the cyberneticist Heinz von Foerster, the neuroscientist Gerald Edelman and the constructivist writer Ernst von Glasersfeld.

Re: A 'strong' form, though, far from being 'radical' is a standard reversion to Cartesian dualism.

My account of RC is monist (and materialist, as it happens).

Re: Jon Scaife's own field

Just to clarify, my field has been constructivist accounts of knowing and learning for the last 20 years. Physics specialists constitute maybe 2% of the people I teach. I haven't come across a context in which RC isn't applicable.

Re: it is hubris to extrapolate so far from this rarefied arena and type of knowledge of the world as to arrive at a general epistemology

We're learners – sometimes we learn physics, sometimes music and so on. In the middle is the learner – irrespective of the content being learned. RC describes how the learner builds knowledge – any knowledge.

Re: The assertion of RC as a general epistemology looks like just such a self-effacing feint that actually is meta-functional in fulfilling ubiquitously manifested biological imperative!

RC is something of a wimp in this respect. It doesn't claim to be true and it doesn't argue that any other perspective is wrong. My article on RC just says, see what you think of this way of looking at knowing, compared with traditional realist ways, and judge for yourself; no-one else can judge for you.

SCIENCE, REALITY AND EVERDAY LIFE

Michael Heap

Michael Heap is a self-employed clinical forensic psychologist in Sheffield and chairman of ASKE.

Summary

Unlike classical scepticism, modern popular scepticism assumes that the material world – reality - exists (though we are part of it), even though we can only know that world through the medium of our senses, and that as our observations of the world accumulate we come closer to knowing and understanding the nature of the 'real world'. New knowledge may confirm our explanations or understanding of the world, but also drives the search for 'better explanations', explanations that account for the sum total of our existing knowledge. This characterises our psychological development as individuals and the way most of us go about our everyday business: we are all 'seekers after truth'. It also characterises the scientific method. Hence there is nothing essentially different about how scientists approach their work and how we are all able to successfully conduct our daily life. Yet we tend to perceive scientists and their activities as separate from that of the rest of society and some people afford them special derision for claiming that they are discovering the truth or reality of our material world, rather than their own version of it. I suggest that this may have something to do with the power and dominance that scientists have in our society and the need by others to oppose that power.

The earliest scientists

When human beings first looked up at the sky on a clear night they would have seen, of course, thousands of points of light, most of which we now call stars or galaxies. They would have wondered what these points of light were, and one of the things they would immediately observe is that they vary in brightness from clear to very faint. They would have been curious about this and would have asked why this was so. They would want to *explain* what they observed.

What explanations would these people have come up with? Bright stars are bigger than faint ones or they are nearer to us, or both. These explanations would be the most obvious to the observers and find most agreement amongst them. Why would that be so? Because they are consistent with what those people had already learned about their world: nearer objects and bigger objects, in general, *tend* to appear brighter.

Let us allow our ancestors to continue their nocturnal explorations. As they continued to gaze at the stars they would soon realise that everything was moving across the sky. How would they explain that? As simply as possible in terms of what they already knew. Either the stars orbited around the Earth or the Earth itself rotated. They would also observe that a handful of 'stars' moved in rather eccentric ways. They called these objects 'planets'; they would continue observing them and they would attempt to explain their motion from their existing knowledge and understanding, eventually concluding that the planets, including the Earth, orbited the Sun.

To achieve all this and much more, it is important that there were people around who had the motivation and the curiosity to observe everything about the world.

To achieve all this and much more, it is important that there were people around who had the motivation and the curiosity to observe everything about the world. They must also have had the motivation to *wonder*, to ask questions about what they observed and to search for answers and explanations. Moreover, they must have attempted, whenever possible, to base those explanations upon what they already knew and understood about the world and only to infer the existence of other, unobserved entities and processes when there was no alternative. Finally it was necessary that they kept observing – collecting more and more evidence – and checking whether the evidence was consistent with existing explanations and, if not, amending these so that they *were* consistent with the evidence.

There is also something more fundamental behind all of this. Our ancestors would at an early stage have been implicitly aware that what each of them saw when they looked up at the night sky was also seen by everyone else with intact vision. And another thing they would quickly surmise was that the external world existed when they were not around to experience it. For one thing the night sky would still be there the next time they looked, and for another, many things that did disappear would reappear later – viz. the Sun, the Moon, the stars and other heavenly bodies. Also when they weren't attending to it, other people evidently were:

Ug to Umph: 'Did you see the Moon last night, Ug?'. Umph to Ug: 'No, Ug, I was too busy sharpening my flint stones'. Ug to Umph: 'I saw it. It's getting smaller again!'

Was the Moon in fact as Ug described it? Perhaps he was dreaming, or lying or getting confused with the previous night's sighting. If Umph had such doubts he could ask other people who were also star-gazing that night. Like everyone else, Umph had learned he could have more confidence in 'a statement of fact' about the world if other observers corroborated it.

Now these ways of understanding and explaining the world did not simply operate for the purposes of gazing at the night sky. They applied to all daily activities. Our ancestors would come to understand that some things that they saw, heard, smelt, tasted and touched, such as the thoughts in their head or the dreams they had when they were asleep, were experienced by no one else, but that most of what, to them, existed in their external world was experienced by other people also. Indeed if they did see or hear something that was denied by everyone else, they would doubt its existence and believe instead that they were probably mistaken in some way.

Thus, *in general* they would understand that the material world existed independently of them: there was such a thing as 'external reality'. Indeed, had our ancestors behaved *in the main* according to other principles it would often have been at the expense of their very survival. Instead of this, they were 'seekers of the truth' about their world, and the best means of doing this would be by the process outlined earlier, namely continually observing the world, gathering more and more information – *knowledge* – about it, sharing it, and attempting whenever possible to explain and predict it on the basis of what they already knew and understood. And this applies to human behaviour to this day.

'Isn't all of this far too idealistic?' you may say. Isn't it the case that people think and behave much of the time in irrational ways? What about religious beliefs and practices, political ideologies, supernatural ideas, superstitions, prejudice, and intuitive thinking? All of these refer to significant ways in which people think about the world and explain and predict what happens in it, but in many ways they are not underpinned by the assumptions and rules outlined in the previous paragraph. My point is that most of us *are* competent to think and behave in the manner described. We do so implicitly much of the time and this is to our advantage, but there are occasions, for example where we rely on 'intuition', when it may not offer us the best way of dealing with a situation.

The rise of 'scientists'

We left our ancestors still gazing in wonderment at the sky and arriving at the point of realising that one aspect of reality is that the Earth is part of what they came to call 'the solar system'. Thus, this process of making observations, explaining what is observed, and putting the explanations to the test continued down the centuries. For example, we now know that there are in the universe billions of stars that cluster in billions of galaxies and, most recently, that many stars have their own planetary systems.

It is this increasing accumulation of knowledge about the world that drives the search for 'better' explanations.

Now, before people ever reached the point of even establishing the existence of our solar system, important changes had been taking place. The pivotal and most far-reaching of these was that the observations that were being made became more and more detailed. This process accelerated when the means of making the observations became increasingly sophisticated, notably by the construction of telescopes that became ever more powerful (and, for observing small things, microscopes). *It is this increasing accumulation of knowledge about the world that drives the search for 'better' explanations.*

The second development inevitably follows from the above. The means of arriving at the explanations to account for the expanding body of evidence became increasingly complex, requiring not just everyday reasoning and logic but highly sophisticated mathematics. The same applies to the explanations themselves.

There is another inevitable development. To begin with, like our friends Ug and Umph, nearly everyone could gaze at the sky and understand that the varying brightness of the stars might be due to their size, distance or both, observe their movement and wonder whether they were orbiting the Earth or whether the Earth itself was rotating, and so on. However, most people would not have the time to pursue this activity in any great depth. Like Umph (Ug appears to be more fortunate in this respect) they would have more pressing demands on their time, such as ensuring they had enough food to survive. Likewise, as the explanations for what was happening in the world became increasingly complex, fewer and fewer people would have the ability and the knowledge to devise them, fully understand them, and engage in the painstaking task of evaluating their validity. (In passing it may be noted that certain spheres of scientific enquiry, such as astronomy, palaeontology and ornithology, attract many 'amateur scientists'. Their activities characteristically involve a great deal of observation and the collecting of information rather than providing explanations to account for the information gathered.)

Accordingly, these activities gradually came to be confined to a smaller proportion of the population (the

descendants of Ug maybe), particularly as the spheres of knowledge became more and more specialised. Thus we see the gradual rise of an important minority, a group of people in our community whose activities we call 'science' and whom we call 'scientists'.

Science and 'common sense'

There is yet another significant development to note. The explanations and theories offered by scientists became not only less obvious to most people but also sometimes even at odds with their everyday experience and understanding of the world ('common sense'). For example, at least until relatively recently, the daily experience of most people did not immediately suggest that the Earth on which they lived was a sphere that rotated on its axis and orbited the Sun. In fact it would seem to people (because it was consistent with their everyday understanding) to be more likely that the Earth is flat and stationary: if it were round and spinning, surely we would feel it?

The body of information that science has to account for is far greater than that available to us in our everyday life.

There is much more. Surely objects differing in weight fall to the ground at different speeds? What about a massive object made of solid steel that's put to sea? Surely it would immediately sink to the seabed? As for such an object being able to leave the ground and stay in the air, until relatively recently no one would ever have given this a thought! In the time scale of the history of our species, only the equivalent of a second ago have we become able to have a conversation with another person beyond a short distance. Before then, the notion would have been incomprehensible to any person.

All of this seems to contradict what I said earlier, namely that the means that people - not just scientists - have adopted for establishing 'reality' is to attempt to explain their world from their existing knowledge and understanding. It appears that there is a gaping chasm between everyday 'common-sense' ways of thinking about the world and the scientific method.

This apparent contradiction may be resolved as follows. Any theory must explain, or be consistent with, as much of the knowledge and information that is available at any time. Now the body of information that science has to account for is far greater than that available to us in our everyday life. Consequently it is not always immediately obvious to us why we should accept what scientists say is likely to be true, especially when this contradicts ideas and beliefs that have stood us in good stead as we go about our daily business. Even so, through the dissemination of scientific knowledge generally and its everyday applications, we have all indeed come to view our world in ways that go beyond what would in previous times have been sufficient for our basic requirements. For instance, nowadays many of us are able to have the experience of long-distance travel, likewise to see for ourselves photographs of the Earth from satellites and spaceships that confirm to us that it is indeed a rotating sphere. Moreover, for human beings in the modern world to function effectively, one requirement is the constant movement of people and commodities between places as far apart as the planet allows. For this to happen, with all of the benefits it bestows upon us, we cannot afford to believe that the Earth is flat and at some stage in our travels we risk falling over the edge. Similarly we would be restricted in what we could achieve in our lives if we continued to believe that a heavy metal object could not float on the sea or travel vast distances in the sky. The belief that it is possible to converse with another person beyond a short distance is not something that would have had any relevance to our ancestor's survival. But now, even as children, we soon learn that this is an everyday reality and brings us many advantages. Indeed it does sometimes have survival value, as on those unfortunate occasions when we have to telephone the emergency services.

Even so, scientific claims continue to contradict our everyday experience, viz.: that we can deduce the chemical composition of stars - something that the philosopher Auguste Comte (*The Positive Philosophy*, 1842) predicted would never be possible; that an object with mass warps both space and time around it; that a solid object like a brick consists almost entirely of empty space; and that before it is observed, a subatomic particle may be in more than one place at the same time, or indeed everywhere.

It is certainly true that scientific enquiry demands that the methods prescribed be rigorously applied and other ways of thinking that are common in everyday life – religious, supernatural, superstitious, prejudicial, and so on – be rejected.

Such claims are the inevitable consequence of the relentless accumulation of knowledge about our world and the efforts of scientists to account for all that is known, but not the consequence of their adopting methods of thinking that are particularly unusual or different from everyday methods. Nevertheless it is certainly true that scientific enquiry demands that the methods prescribed be rigorously applied and other ways of thinking that are common in everyday life – religious, supernatural, superstitious, prejudicial, and so on – be rejected. That our knowledge of our world advanced so

slowly through centuries can be seen to result from a failure to do this and even now, these impediments are at times in evidence.

Science and power

From all I have said it would appear that scientists are an elite group who claim the expertise and the knowledge to inform us of important truths about the world we live in, about ourselves, about how we originated and what is our place in the Universe, what is its likely destiny, and very importantly what *isn't* true about all these things. This claim to be able to interpret on our behalf our world, our lives, our experiences, what is best for us, what is wrong with us when we are ill in mind and body, what the remedies are, and so on is a claim to **power**. And scientists now are very powerful.

Consider the following. I say to you that I believe in the Big Bang theory of the origin of the Universe. I also believe in the theory of evolution by natural selection. In both cases I have done my best to understand what these theories are saying and how they have been derived and tested and I have found nothing that contradicts my very limited knowledge of relevant matters. Nevertheless I have to admit that what really persuades me to accept them is the fact that the overwhelming consensus amongst scientists is that in general terms they are almost certainly correct. It is also clear to me that many other people think in the same way as me. So, you might say that for most of us, science is a matter of faith; we put our trust in the scientists as individuals and we trust in the validity of their observations and their methods of interpreting them.

One may want to add to this that scientists have ***power with accountability***. The world community of scientists is large enough to ensure that, through the process of constantly putting theories and explanations to the test, eventually the ones that are most likely to be valid will be the accepted ones, while those that fail are discredited and discarded.

Science and reality

How can we be confident about the above assertion? This is not a question I shall address directly here. For present purposes I am making the case that there is nothing so special about science that it has to be treated as something different from the rest of human activity or that unique criticisms apply to those thus engaged. I am particularly interested in why some people are so keen to doubt the claim that scientific enquiry progresses towards a better understanding of reality.

As I have stated we all assume that there is a material reality that exists independently of us and is present when we are not around to observe it. As we grow up we observe more and more of the world - directly, or indirectly from others. We make the reasonable assumption that the more we observe of the world the closer we are to discovering 'the truth' about it - what is real and what isn't. Unless what we learn about the world contradicts what we previously understood about it – how we have explained it – we tend to hold on to our explanations; otherwise increasing knowledge forces us to search for better explanations, those that account for the sum total of our existing knowledge. Thus our explanations of our everyday world are not, if we think about them carefully, just like pieces of flotsam, tossed here and there, willy-nilly, by the winds and tides of social convention, attitudes and fashions. Any movement is in response to increasing knowledge; and although as a result we may leave some of our ideas and beliefs behind us, we carry our knowledge with us, or at least we should do.

We constantly rely on other people for information when they have greater knowledge than we do and, in that sense, are in a position of 'power' vis à vis ourselves.

I am talking now not just of 'science' but of everyday life. Much of the time we are all trying to establish what 'the truth' is: what is reality. Implicitly or explicitly we are constantly asking ourselves and others questions: 'Has the postman been yet?; 'How much have I in my bank account?'; 'Has Joe Bloggs left his wife?'; 'What is that curious noise my car is making?'; 'Is crime on the increase in my area?' and so on. And we set about seeking answers to our questions.

Now, have you ever been to Madagascar? No? Are you seriously concerned about whether it really exists? Maybe if you're a philosopher you are, but the rest of us are happy to accept that it does, even though we have never been near the place. Others have. They bring back pictures and films of it and geographers put it on every map that you see. The best sense that I can make of all this is that there is indeed an island called Madagascar off the east coast of Africa. It's 'reality'.

We constantly rely on other people for information, including answers to our questions, when they have greater knowledge than we do and, in that sense, are in a position of 'power' vis à vis ourselves. If I want to know if Joe Bloggs has left his wife I ask those who have seen him recently. If I want to know what's wrong with my car I consult a car mechanic, if it's my boiler I'll ask a plumber, if it's my electricity supply, an electrician, and so on. Many people earn their living by seeking or communicating 'the truth' in areas in which they have more knowledge than most: teachers, journalists, policemen, lawyers, doctors and allied professionals, estate agents (oh yes!), and historians, to name but a few. Of course we do not say they must therefore always be right. We have the reasonable belief that they are better able than us to establish the truth and that what they tell

us is likely to be 'closer to reality' than what 'non-experts' say and indeed it may be, for all intents and purposes, 'reality'. If those with superior knowledge on some matter disagree amongst themselves (as they often do) we don't assume they are all correct; we ask, 'Who is right and who is wrong?' If, say an electrician tells me that the fault with my boiler lies in my water system and, having already consulted a plumber, I am satisfied that this is not so, I disagree with him on the assumption that his knowledge of my boiler is incomplete or faulty in some way. This was indeed the case on one occasion I have in mind when, eventually, a 'second opinion' electrician detected and rectified the problem.

Popular scepticism assumes that there *is* such a thing as objective reality and we are able to move closer to understanding and explaining it by acquiring more information about it and making logical deductions from what we learn.

There is nothing deeply philosophical about this little domestic drama; I did not feel it relevant to engage the first electrician in a discourse about the meaning of reality. He was wrong and the plumber and second electrician were right (at some cost, I may say, to our household finances!).

Conclusions

We can ask interesting questions about whether ultimately there is a material world that would still exist if we were not present. We can acknowledge that we only ever experience that world through our senses and ask if there is a reality that therefore escapes us. There are people whom we deem to be out of touch with reality because something in the way their nervous system is structured or functions is different from 'the normal brain', and then ask how we know that 'the normal brain' is itself 'in touch with reality'. We can ask if we are like virtual reality machines (as when we are dreaming), 'reality out there' being an illusion, and if so, how we would know. We can be aware of how different societies and communities have differing ideas and beliefs about 'the real world' and ask important questions about our own interpretations about 'the real world'. Classical scepticism would ask these questions but they are not usually the concern of modern, popular scepticism.

What the latter should and, in fact, does acknowledge is that many so-called 'factual' questions that are posed about human behaviour and experience are indeed loaded with cultural and socio-historical assumptions and would not be asked, or would be expressed differently, in other societies or at other times, past and future, in our own society. For example, recently I have been asked, 'Can hypnosis make you do things against your will?' The most sensible response to this kind of question is to deconstruct it and try to understand how people come to ask it in the first place, an exercise that would probably fill an entire book. Similar questions and statements from my recent professional work are: 'Is ADHD a genetic disease?'; 'Cognitive therapy for chronic fatigue syndrome'; and any sentence containing the expression 'autistic spectrum disorder'. It is concerning these kinds of issues that what I have said about science and objective reality becomes untenable and which require a sceptical analysis (see also Brian Robinson's review of *Aping Mankind* in this issue).

In summary, popular scepticism assumes that there *is* such a thing as objective reality and we are able to move closer to understanding and explaining it by acquiring more information about it and making logical deductions from what we learn. This applies to each individual as he or she grows and matures and it applies to the way we go about our daily business, pursue our interests, carry on our work, and so on. It applies to science as well. Hence there is nothing essential about science and scientists that is discontinuous with everyday life. Why then the urge to challenge the idea that scientists endeavour to discover the truth about our material world? I think part of it may relate to what I said earlier about scientists now being a very powerful elite. Inevitably, people will want to oppose that power and they will do so for good reasons and bad. This becomes very obvious with matters that are of profound relevance to our beliefs about the origins of life and the universe itself, and thus impinge on matters of religion and personal philosophy. But more of that at another time.

SUBJUGATION OF SCEPTICISM IN SCIENCE

Peter A Jackson. RIBA, FRAS and John S. Minkowski, MD

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Scientists are concerned about scepticism and public respect. Aside from climate change, do scientists mostly deserve public trust and respect? We look into the core, at theoretical physics, to see how well the 'scientific method' is used and respected. Einstein said, '*We don't yet understand 1,000th of 1% of what nature has revealed to us*', so we're not testing or judging knowledge, but skills and honesty from naïve but intelligent overview. Einstein also said, in pre-'PC' days, that '*Physics should be explainable to a barmaid*', and can be termed as the search for simplicity from apparent complexity. Was he right? Are we really doing the best we can? Have superluminal neutrinos proved Einstein's theories wrong? History has taught us that most current theory will be proved wrong. Neutrinos have only brought a starting postulate of Special Relativity (SR) into question, and much money is on the finding being a mistake.

Sir Roger Penrose noted (BBC 'In our Time') that the 'chasm' between classical physics (SR) and Quantum Mechanics (QM) is as wide as it was 100 years ago.

Sir Roger Penrose noted (BBC 'In our Time') that the 'chasm' between classical physics (SR) and Quantum Mechanics (QM) is as wide as it was 100 years ago. Looking closer, we find that it is not just physics that is divided but also physicists, largely between supporters of SR and 'dissidents', and perhaps quite evenly, with many websites and organisations such as the National Philosophical Alliance and many hundreds of credible scientists, including many PhDs, sceptical about the ruling paradigm and the persistent apparent paradoxes it contains. Are the skeptics tolerated and published? Hmmm. Apparently largely not, they claim, and many other doubts about bias and the scientific method also exist.

Scientists rely heavily on the public purse. Stories are still around from the 1920s and 30s of the 'adoption' of SR into education, when consistency was felt needed to secure funding, and those with other opinions felt 'purged' and lost posts, positions and influence. Eddington wasn't sure SR was even understood 'by three people' but if all students are taught that a theory is correct, then leaps of faith can cease to be recognised as leaps. Yet dissidence is, if anything, becoming stronger.

Special Theory of Relativity

For those not familiar with SR[1], it was largely formulated to try to explain why we find light travels at a constant speed ('c') in a vacuum, irrespective of the emitter's or receiver's motion. And in air, if a car is approaching you, or you are approaching or receding, you will always measure its light at precisely the same speed. SR says that uniform 'motion' in a vacuum can only be discerned relative to another body, not with respect to any background 'medium'. As velocity = distance × time (v = dt), if we take away the 'medium' then light must be particles. But how then can observers moving at all different speeds always measure 'photons' at 'c'!? That is the 'light paradox'. Einstein (1920)[2] said '*Space without ether is unthinkable*', yet the ether as an 'absolute' background reference frame had to be irrelevant to light propagation speed measurement for SR to work. Lengths of objects also had to 'contract' on 'transformation' (acceleration) between different 'inertial frames' (states of relative constant motion). But this is a vast simplification and different understandings exist! The real point is that SR never had any physical or ontological basis or mechanism but is based purely on a mathematical construct. Even time is treated very differently in QM, but paradoxes abound there as well as in SR. Current 'continental philosophy' is moving towards realism and the proper analysis of problems[3], moving away from the philosophies of current problematic physics, perhaps at a good time.

Alternative Explanations

No logical and falsifiable alternative explanation for observation has emerged for the 'Chinese puzzle' of light always being measured at c, locally and 'across a space', irrespective of the motion of source or receiver. We here set this as a puzzle of logic, and invite solutions. An assumption of science is that when a more successful solution comes along it will take over from the old ruling paradigm. But is that true with SR? Would any alternative even be looked at? Is there a war going on at public expense with each side entrenched and ignoring other's theories? Or are scientists all healthily sceptical and open minded?

There are indeed many other proposed theories on the web, but these are ignored, dismissed or attacked purely for challenging SR, and even with talk of anti-Semitism!

There are indeed many other proposed theories on the web, but these are ignored, dismissed or attacked purely for challenging SR, and even with talk of anti-Semitism! Dissenting theories virtually never get published in peer-reviewed journals. Is the job of editors and reviewers to judge theories on merit, or to judge solely against ruling paradigms, which may be different older physics? It is human nature that they will do mainly the latter - judge against their own knowledge - when humankind needs to trust them to do the former. How can science progress if the mainstream cannot think outside its own box? It's a Catch 22. A clearer view of this responsibility is needed. It is essential to examine and publish both established and more 'speculative' science. This would allow the new seedlings to grow. Distinctions can simply be drawn. Only peer-reviewed journals are supposed to matter, so it is currently they who control what becomes published 'mainstream' science, not a true cross-section of scientists, and certainly nobody sceptical of mainstream views.

The problems of publishing

Meanwhile, real research results are largely inaccessible to the public. Authors pay journals to be published, then well after publication we still 'pay to view' most papers before we even know if they're useful for research!! The Cornell University run arXiv archive[4] is overwhelmed and now simply rejects most non-university papers (a trick it learnt from 'Nature Physics'). The arXiv needs proper management, funding, expansion, and far broader validity as a science paper data base. Publishers have to make a profit (and do so), so is it also right that they have so much control over published science? Houston we have a problem. In a discipline based on advancement it seems a 'Code of Practice' is needed, to remind reviewers that their task ***is not*** to propagate their own or mainstream opinion. A proper filter system for quality of work is needed, which will emerge from the basic essential, a science review board system to allow each theory a hearing and assess falsification. A very cheap solution.

Dissidents are accused of 'cherry-picking' evidence, and many do, but that sounds awfully complacent when we find that mainstream does the same, and often far worse! Many discoveries were actually made and dismissed years, often decades before eventual acceptance. We are told; 'Yes ... but the system works because they emerged'. That lack of logic is frightening! How many have not emerged? The 2011 Nobel Chemistry Prize winner Daniel Shechtman is typical. He was ignored, ridiculed, pilloried, called a 'quasi-scientist' by a mainstream 'authority', and sacked. But he had far more guts and drive than average and fought on and on. Eventually he found someone open-minded, and many years later, now at 70, is awarded a Nobel Prize. The comment from the President of the American Chemical Society was, '*This is how we make progress in science*'. It is unfortunate that this is true and astonishing that it is accepted. We suggest the method is unacceptable, and that plenty could be done with less complacency at 'the top'. Are dissidents and those who do not follow mainstream views any less 'biased'? Of course not: dogma and indoctrination pervade all humanity. Most dissident theories ignore inconsistencies and are unfalsifiable, but many forget that new viewpoints are still, by definition, where all change (i.e. progress) comes from! Knowledge must advance, but, when asked, academics ask for 'stability'! This betrays troglodyte thinking. Sir William Bragg said '*The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them*'. Science now rejects new views. It covers a massive range of subjects, but to be expert in one's field, most scientists can only really know a tiny sliver of nature, no bigger than the 'slit' electro-magnetic frequencies visible to the human eye. The ability to see the big picture and find new connections is essential and needs the genuinely different 'ways of thinking' that mainstream views stifle.

What was Einstein's view?

Astronomer Hilton Ratcliffe author of *The Virtue of Heresy* (2007) wrote of a supper with Professors Alley, Yilmaz (Princeton) and Harold Puthoff, director of the Institute for Advanced Studies. Distressed at the conversation he was told, '*You don't have to hide under the table. It's no longer controversial to say that Einstein made mistakes. Most physicists accept that quite openly now*'. Yet very many still do not, ignoring the 'scientific method' and contrary evidence to trust beliefs. SR is called the 'best evidenced theory ever' but being honest,

it is apparent that the 'evidence' is evidence only for the 'Postulates', even themselves now challenged by neutrinos. It is therefore logically possible that another theory or re-interpretation may also derive the Postulates and observed effects. So would any such theory be considered by the mainstream? We believe not in the current climate, and there is the essence of the problem. Einstein himself was not at all satisfied that his work was complete and was still looking for a unified field theory and 'Local Reality' right up to his death. Are there any current theories or developments which deserve consideration? How on earth would we know? When considering the fundamental questions of light and relativity, should Einstein's SR really be completely unquestioned? His own views were clear. In his Nobel Lecture in Gothenburg in 1923 he said: '*Yet it was **not entirely satisfactory**, quite apart from the quantum problems*', and: '*So far also relativity theory **has proved ineffectual** in relation to this most profound physical problem of the present time*'. Famously also: '*The important thing is **not to stop questioning***', and in letter to Born in 1944: '*I hope that someone will discover a more realistic way, or rather a more tangible basis than it has been my lot to find*'. He also saw the conflicts with his gravity field based General Relativity: '*For the time being, we have to admit that we do not possess any general theoretical basis for physics, which can be regarded as its logical foundation. The field theory, so far, has failed in the molecular sphere.*' (1940); and '*The general theory of relativity is **as yet incomplete**…*'. So should the public be happy to trust a mainstream which has cherry-picked Einstein's views to arrive at one so different? How can any intelligent member of the public be expected to do so? If continued public support for science funding is to be expected, 'mainstream' attitudes must change! But Universities can only play the game, the government sets the rules, so change must come from the funders.

The evidence

H.A. Lorentz was a sceptic. His name is on the mathematical transformation between inertial frames (acceleration), used for SR but the banning of apparent 'velocity addition' (seeing light go through a passing train at 'c' plus train speed 'v') implicit in SR, he called, '*a restriction which cannot be accepted without some reservation*' *(1913).* Yet an extreme element of SR support betrays the majority, and science itself, with accusations that those sharing Lorentz's reservation are all 'crackpots' or 'kooks'.

The mainstream view of Einstein's 'Twins Paradox' (a travelling twin 'stays younger' than the one left behind) is that it is logically resolvable. The Natural Philosophical Alliance issued an open invitation for consistent resolution, but none succeeded. Cameron Regibsol put up $50,000 for a disproof of his mathematical disproof of SR. It was not claimed. But worse still keeps emerging. 'New evidence' for SR came in 1961 with the Lincoln Lab's radar signal that was sent close past the Sun and bounced off Venus, (co-ordinated with a Russian station). The reported results gave a space-time curvature delay of 200 microseconds at light speed, just as SR predicted. So! A victory for the scientific method, renewed trust in scientists and faith in SR. Well...unfortunately not. The speaker giving a talk on the results at the Fifth Texas Symposium on Relativistic Astrophysics pulled out and was replaced by the eminent Professor R.H. Dicke, who referred to 'doubts' and 'systematic variations' in the data. Investigating these past events raises serious concerns about subsequent mainstream assumptions. The Lincoln Lab results had been systematically changed to remove 'errors', including the very significant but estimated effects of ionospheric (plasma) diffraction. Only then did they match SR's prediction. Others such as J. Evans[5] and the Russians (S. T-Murri)[6] later showed that the Lincoln results were 'inconsistent', but corrections were never published. Old papers are hard to find but not all are destroyed. Another speaker at Texas, B.G. Wallace[7,8], quantified the variations, eventually published in a minor journal with a fuller account in a 1993 book[9] including evidence of conspiracy!

In 1925 Eddington famously wrote to W. Adams at the Mt. Wilson observatory, asking him to check the Sirius B 'Einstein shift' and giving him an estimate of the shift. Adams results agreed with the estimate. Later measurements showed this was wrong by a factor of over 4!

This behaviour, along with the assumption that all those questioning Einstein are crackpots, seems to be endemic. In 1925 Eddington famously wrote to W. Adams at the Mt. Wilson observatory, asking him to check the Sirius B 'Einstein shift' and giving him an estimate of the shift. Adams results agreed with the estimate. Later measurements showed this was wrong by a factor of over 4!

Plasma, considered here mainly as free electrons, has high coupling with electro-magnetic waves (or photons for those who prefer them). Plasma makes up reputedly 99% of all the matter in the universe, including in dense shocks and 'plasmaspheres' around the Earth and Sun. The interaction slows down light propagation, which, by diffraction, gently turns or 'curves' the signal. So, if Venus were a clock face, it would be seen as slow, distorted and out of position. When Jupiter was used for

a similar test controversy arose as the figures did not compute without further 'massaging'. Radio signals are now used for ranging, as long waves couple far less with plasma than light! 'Lensing' delays from bodies many light years away are now seen regularly and measured precisely with spectroscopy, the same emission arriving twice, one curved and delayed. Longer delays were predicted, but not quite the 3+ year arrival difference found at the Abell cluster.[10] Of course solutions are always suggested, which some consider as 'patches' repairing old theory, in this case 'light wells' near black holes, though galaxy mass estimates from lensing are well known to be anomalously high. Perhaps this is just part of the '999 thousandths of 1% we don't understand', but if so, we never will understand if mainstream theory stays so 'unchallengeable'.

It seems that some science may have to change its way of thinking and open its mind, or face even bigger problems. And someone needs to start being honest with the Emperor about his new clothes.

Similar issues arose with Hafele & Keating's much cited atomic-clocks-around-Earth evidence[11], where the 1972 paper was not published until amended so the figures and analysis matched SR's predictions even if not entirely consistent with the raw data.[12] Hafele himself said, '*The difference between measurement and theory in Figure 4 is disturbing*'. Peter Hayes (2009)[13] talks of '*the gatekeepers... winnowing out...*' any dissent or discussion of relativity theory to avoid '*the embarrassing question of why* [any errors] *had not been noticed earlier*'. Such practices, even if by only a minority, could not only seriously choke advancement but could destroy the public's faith in science as a whole. Suppressing or ignoring the problem may be a far worse crime against humankind. We suggest that those with such biased or dishonest attitudes must be pro-actively searched out and removed as 'cancers' and the damage repaired. Brian Martin (1999)[14] highlights the scale of the problem and considers the dynamics and sociological aspects. Kuhn exposed the social influences on science, and Martin (2004)[15] gives the comments '*rather than being judged on logic and evidence*... new ideas are... *rejected out of hand because they conflict with current models';* also how '*Ego not merit*' dictated science (Tom Van Flandern, 2002); and '*To say that the established scientific world is prejudiced against new ides is an understatement, it is paranoid about them'* (B. Harvey 2002). To use students to propagate these views is close to criminal. We must surely revert to teaching them that all theory is provisional.

But back in Texas, Professors Dicke and Brans found a solution explaining the real Venus results, now called the Brans-Dicke relativistic theory of gravity, where electrons are particles with mass, so the dense clouds or 'shocks' found in space around moving mass have gravity as well as curving light by diffraction. Coincidentally, in QM, electrons are also particles with mass. And mass of course has gravity. If we check at the Large Hadron Collider, we also find these 'parasitic virtual electrons' build up in the vacuum subject to particle velocity in the electro-magnetic field, acting like a speedometer. Hmmm. So did mainstream consider, develop or test the Branse-Dicke[16] gravity theory, based on the actual raw Venus data? No. Perhaps it lacked quantitative proof or an explanation for our conundrum about the speed of light but perhaps ineptitude, prejudice or worse were also involved. Confusion and passion remain. We can't criticise lack of knowledge and honest errors, but 'belief'- based science, dogma and dishonesty destroy trust and must be seen to be attacked. Where scepticism is crushed, respect will also be lost, and perhaps funding should also be lost. It seems that some science may have to change its way of thinking and open its mind, or face even bigger problems. And someone needs to start being honest with the Emperor about his new clothes. As Einstein himself said, '*We can't solve problems using the same kind of thinking we used to create them'*.

Conclusions

So the real question is, can scientists think in a different way as Einstein suggested, not just with abstract numbers, points and lines, which mathematician Charles Dodgson (aka Lewis Carroll) pointed out were so unreal. This means thinking dynamically, and outside Einstein's 'box outside the smaller box'.[17] A bit like SR, the peer-review system is recognised as faulty, but not considered 'broken' as no replacement has been derived. It is a 'check and balance' but may 'check' any real advancement far too well. How can peer reviewers and editors prove they're not over-prejudiced towards ruling paradigms? Can they ever be held to account? Is there any other way that advancement can be enabled? Where is the 'authority' in science? Are any eminent or authoritative physicists available and willing to check out possibly promising advances? We recently tested this to find out, by initiating contact across a broad spectrum. From top to bottom and side to side the answer seems emphatically no, no response or interest. It's another Catch 22; unless you already *are* an eminent mainstream scientist you are now excluded as you cannot possibly contribute anything worthwhile, despite all the historic evidence to the contrary.[18] We suggest that funds should be diverted into properly organised, open assessment, perhaps via a revitalised National Physics Laboratory,

with progress, not maintaining the status quo as its aim. Experimental science, too, has had serious problems, even including fraud, but some problems must be expected there due to the ethos of new discovery, and the issues have been faced. The honest here can only be discredited by dishonesty and ego in other branches. Some sciences seem to have evolved, on public money, to produce 'academics' only to produce more academics with the same beliefs, or worse, to squabble in battles for fame and prizes. Many seem to feel consideration of nature should stay entirely within the domain of those who have been taught past theory, yet this can imply perpetuating indoctrination. Max Planck said science only changes when '*opponents gradually die out*'. Now that the old academics control the thinking of the new, can that mechanism still work? Knowledge and beliefs are imprinted in our, mainly western and 'anthropocentric', thinking patterns, and as Galileo discovered, belief is hard to change. Can we trust all science to be holistic, impartial, open-minded and accessible? If not, and change is not embraced, does science deserve to keep so much public trust and money? UK science minister David Willetts agrees with wider funding criteria and that taxpayer funded research should be publicly available. Astronomer Royal Martin Rees supports broadening research funding but neither Rees nor the Royal Society help or can help exposure of new theory. The small measures proposed will not affect the fundamental problems of attitude, born of fear of reduced funding. The dichotomy is of a discipline whose prime task is to challenge assumptions and find new ways of looking at things to advance humanity, yet institutionally suppressing and rejecting change, new ways of thinking and scepticism. Most dissident theorists do not want funding, just a fair hearing, not presently given. Having to post theories on the web or in obscure journals in the hope someone may read them is well short of adequate. The old system is overwhelmed, and now prevents the cream rising to the top. Just making connections between science disciplines can be of immense value but is rejected by each 'side' at present. 'Joined up' science is one valuable target increasingly ignored. Papers passing review would be published as new proposals which universities could easily be encouraged to research, because money talks. All the power lies with the government, and there is little to lose and everything to gain. Less than 1% of funding given to a review process may uncork a flood of valuable advances, giving far better value for money than the old system, apparently of 'jobs for the boys', and producing only students who 'comply'. Einstein again, with a cherry left on the tree by mainstream: '*The important thing is not to stop questioning'*.

Do give us your own views and ideas, and any other examples of ignoring advances and, 'massaging' or misinterpreting evidence to fit and maintain established beliefs.

For one possible falsifiable solution to the 'Light Paradox' at the foundation of Physics see 'Part 2' on the next page.

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Part 2. Light Paradox: A Logical Solution

Why do we all find that light moves at a constant speed 'c' (186,200 miles/sec) whatever speed we or the emitter are moving at? Nobel Laureates Sir Chandrasekhara Raman and Richard Feynman both unwittingly uncovered a solution, in 1922[i] and in the 1950s respectively. In Raman atomic scattering (coupling), loosely equivalent to Feynman's 'quantum electro-dynamics' electrons absorb photons (or waves) and also emit them at light speed 'c'. However, the only 'c' any electron knows is with respect to itself, whether the electron is in space or the surface of a lens, ***and if 'moving' or not***. Then, whatever the relative photon approach speed or 'rate', the re-emitted photons travel at the LOCAL 'c', with respect to the electron's own 'medium' - i.e. its speed changes. In a vacuum? The photon/signal just keeps going until it meets an electron. We find plenty of free electrons around and at the surface of all mass. So if free electron 'ions' then 'bound' the local region around all matter they will change the relative approach speed to the local 'c' of the receiver. Herman Minkowski and Einstein's *'infinitely many spaces in motion relatively'* (1908 & 1952)[ii] then form a 'discrete field' model by means of atomic scattering, thus giving the process its missing quantum mechanism. So, in this case, nothing travels faster than 'c' locally anywhere, electromagnetic signals change speed to 'c' on arrival at all 'mass' (electrons) and the SR postulates are correct. Minkowski space-time is more simply re-interpreted using 'proper time' (clock rate reading is only accurate if you're not rushing past at high speeds!). Also, as most barmaids understand, if light takes 1 nanosecond to go through a pint of beer (or a vacuum) it does so whatever speed the glass is sliding along the bar.

If you got, or even just understand, that solution, congratulations, your logic is good. If you have another, do write in. Yes, it is important. No, it is not mainstream science, and No, at present it could never be.

Notes

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BOOK REVIEWS AND COMMENTARIES

The Moral Landscape: How Science can Determine Human Values by Sam Harris. New York: Free Press, 2010. ISBN 978-1-4391-7121-9

Martin Wallace

This article appeared in the Autumn 2011 issue of the New Zealand Skeptic (No. 99). It is reprinted here with the kind permission of the Editor and author.

If faith is belief without evidence, then it is not open to scientific enquiry by a weighing of evidence. This attitude was supported and promulgated by Stephen Jay Gould. He claimed that there is a 'non-overlapping magesteria of science and religion [NOMA]'.

However, what if it could be shown that there are events in the world of human brain physiology which can account for such 'religious' activity as a sense of moral values?

This question is discussed brilliantly in this new book by Sam Harris. He says 'Questions about values are questions about the well-being of conscious creatures.' A sense of well-being is dependant in sentient beings like us on cerebral events and is therefore open to scientific investigation.

Well-being is engendered for example, by happiness, kindness, and compassion.

Harris is a neuroscientist and has studied brain function by magnetic resonance imaging while subjects consider propositions. He has shown that the same part of the brain is active when considering scientific suggestions as when considering moral or religious precepts. The process of belief is the same, irrespective of content.

The part of the brain involved is that where activity can be seen with the placebo effect.

Harris makes interesting comments about the damaging effects of religion and politics on our sense of well-being. Given his past writing, we can expect some acerbic comments: 'For nearly a century the moral relativism of science has given faith-based religion — that great engine of ignorance and bigotry — a nearly uncontested claim to being the only universal framework for moral wisdom.'

He dismisses 'cultural relativism' as a creation of academics. Well-being is shared by all members of all human cultures given the same conducive surroundings, as is our shared physiology.

He also is very firm about 'scientific relativism' and the inhibitory effect it has had on human well-being. There can be no such thing as Christian physics or Muslim algebra!

The text of this book is accompanied by an expansion of the arguments in extensive Notes which are listed in the Index. There is also an extensive list of References.

This book answers the question my mother put to me sixty years ago. 'It is all very well to talk about your lack of belief in religion, but what will you put in its place?'

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Aping Mankind: Neuromania, Darwinitis and the Misrepresentation of Humanity

by Raymond Tallis. Durham: Acumen Publishing Ltd, 2011; pp. 388, references pp. 16, index pp. 9. ISBN: 978-1-84465-272-3.

Brian Robinson

Retired medical doctor and lauded polymath Raymond Tallis has long been waging a seemingly one-man battle against the current fashion, to be found from the most rarefied academic levels to the most pop of the popular press, for considering that everything that we can know about ourselves as human beings can be explained by a combination of contemporary neuroscience and hefty doses of neo-Darwinism.

Tallis is a self-declared atheist, humanist and committed Darwinian but for long has considered that misconceptions about the nature of human consciousness and about what constitutes the very essence of being human have misled us into what he has dubbed 'Neuromania' (as when 'neuromaniacs' tell us that 'You are your brain') and 'Darwinitis' (as practised by 'darwinitics': he is especially hard on the philosopher of evolution Daniel Dennett, and is even more harsh on the philosopher John Gray, whose 'self-indulgent and lazily fragmentary' book, *Straw Dogs*, was 'probably decisive' amongst many similar 'moments of exasperation' in spurring Tallis to write *Aping Mankind*. Tallis is almost as hard on those members of the intelligentsia who received Gray's book 'rapturously', thus revealing 'much about the current *zeitgeist*').

I confess that although I have been hearing about Tallis's considerable output for some time, especially his books *Why the Mind is Not a Computer: A Pocket Lexicon of Neuromythology* (originally 1994), *The Kingdom of Infinite Space: A Fantastical Journey around your Head* (2008), as well as the trilogy *The Hand*, *I Am* and *The Knowing Animal* (2003-5), I have only just caught up with him, and what a joy it is to meet such a mind. But although the topics in the present book are ones that Tallis has written on before, he has said recently that *Aping Mankind* is really the book he has wanted to write all his life.

Not that it is always an easy book: for example the chapter dealing with 'Neuromania' contains many technical philosophical and neurophysiological terms, although the author does explain these. Even so, much of the philosophical argument can be subtle, as for instance in the final chapter in such sections as the one headed, 'Rethinking matter, brain and consciousness'.

'The purchaser of "Chez Nous" is little different from Pleistocene man chasing a mammoth or, perhaps, requisitioning a cave with an en-suite midden'.

However, although you have to work quite hard as a reader, the effort is thoroughly rewarding, because not only is Tallis a superb writer of immense erudition (he's also a poet and philosopher), he is frequently laugh-out-loud funny. For example, criticising an over-enthusiastic application of Darwinism to one aspect of modern urban living he summarises the thinking in parodic irony, 'The purchaser of "Chez Nous" is little different from Pleistocene man chasing a mammoth or, perhaps, requisitioning a cave with an en-suite midden'.

He is highly critical of the way sloppy use of language (one chapter is headed 'Bewitched by language') has served simultaneously to 'downtalk' humans and 'uptalk' animals, thus dangerously reducing our sense of our humanity at the same time that it obscures the real differences between ourselves and other animals.

As one example of this, he deplores the way in which the word 'grooming' has been used

> *to encompass what I do when I brush my teeth and what the cat does when it licks its bottom with its tongue. The fact that my grooming involves toothpaste, which I have remembered to buy and pack, and which has been sold to me on the basis of its superior ability to prevent tooth decay itself validated by knowledge*

about dental biology, puts it at some distance from the cat's stomach-churning auto-attentions.

Non-human animals do not in this way transform their needs into commodities obtained through complex systems of exchange. In such ways, Tallis insists, humans did not simply become 'very bright chimps'. When he acknowledges the famous 98% figure for the number of genes we share with chimpanzees (although he questions the precise significance of this), he does not join those who celebrate the remaining 2% by pointing to people who 'write symphonies and sonnets'. After all, he points out, relatively few of us engage in those activities, and the true differences between us and animals are to be found in more everyday affairs: for instance we all, beast and man, go to the loo but no non-human animal buys toilet paper.

In Tallis's account, hominids very gradually became less organisms *living lives and more embodied subjects leading lives.*

And whereas Richard Dawkins may say (and Dennett, Pinker et al. agree) that he and the rest of us are African apes, Tallis will have none of it.

In Tallis's schema, what 'came to make us so different' was the upright posture together with the development of the opposable thumb and the enlarging brain, evolving together in what he envisages as a dialectic. His approach differs from the more usual emphasis on our bigger brains compared to those of the great apes, specifically on our larger frontal cortex. He writes:

My starting point ... directly affects the whole body and its relation to the external world and, even more importantly, to itself ... the upright position that liberates the hand so that it could turn our animal — primate — consciousness upon itself.

He argues that the hand made our hominid ancestor uniquely aware of its own actively engaged body. In Tallis's account, hominids very gradually became less organisms *living lives and more embodied subjects leading lives.* What Tallis calls 'the existential intuition' was the awakening of the dim awareness 'that I *am* this body', and it was the interaction of the hand with the outside world that set this development in motion.

The *opposability* of the thumb (to a degree unique to humans) plus the ability of the fingers to move independently, are what made the hand such a versatile organ for interacting with the world. But not only was this invaluable in tool creation and use; the hand also, so Tallis argues, *addresses itself*, and so became available as a *proto-tool*. With it, the emerging person (no longer a mere organism) could *point*, and point at other conspecifics to follow the simultaneously evolving *gaze* (already present in primates, but without the *intentionality* that made its significance so radically different for humans — see more on this below). And so we had the origins of a gestural *proto-language*. These developments laid the groundwork for a growing awareness of *agency*, of the possibility of choice, of liberation from mere instinct and from stereotypical stimulus-response behavour patterns; in other words, as Tallis would have it, for our *humanity*.

Tallis says, whimsically, that the chimps 'were *so* close' but they simply didn't manage to make that extra leap. And it is because *Homo sapiens* did manage it that Tallis comes down so heavily against those who mistakenly speak of human and animal use of tools as if they were of the same nature. The behaviours with tool-like implements may often look the same superficially, but closer consideration reveals that they are very different.

No non-human animal uses tools to make other tools and no such animal has, as humans have, the concept of *tool*. Insofar as chimpanzees can be said to have a technology, for example using a stone to crack a nut, this method, to the extent that one can tell, has remained unchanged since its inception, has never led to innovations, and appears to be of the same nature as the 'stereotyped tricks' that other animals perform with sticks, stones and thorns.

Whereas, quite differently from what occurs in animals, 'human tool use ... is anchored in a full-blown sense of the body-as-instrument'.

But what of the brain? Tallis writes:

The most fundamental and pervasive difficulty facing a brain-based theory of consciousness is that it requires a material object — the brain, or parts of it, or events in parts of it — to be 'about' events other than itself, and out of that aboutness to create a world in which the brain's owner is explicitly situated'. (p. 353)

'Neuromaniacs',

obsessed with what lights up in the darkness of the skull [as in fMRI and CAT scan investigations discussed in the chapter, 'Science and Scientism'], ['neuromaniacs']seem unable to appreciate that brains by themselves are pointless. [S]ome of them even think that a human being may as well be 'a brain in a vat'. But brains have point only if they are attached to organs that deliver behaviour ... Only when [thumb] opposability gave the hand the potential for its unique dexterity was there any point in increasing complexity of its neural control.

And because hominid tools were

not completely assimilated into the body image or schema, as they are in animals ... [but were] explicitly extra-corporeal ... [they could therefore become] manifestly signs of themselves ... *[and] consequently*

ripe to be used as signs ... [and further develop] proto-linguistic' *[attributes]*. (p. 227)

One of his key arguments for rejecting the notion that 'our minds are our brains', as in neurodeterminism, hinges on a quite technical discussion of the philosophical / phenomenological term *intentionality*, too lengthy and complex to summarise here, but essentially concerning the inability of physical science to account for that aspect of our perception encompassed by the word *aboutness* (pp. 103-111). I return to this point later.

Light reflected from an object reaches my retina, triggering nerve impulses that reach my occipital cortex; so far physics has no problem explaining this, says Tallis. But I also have beliefs *about* the object, I realise it is separate from me and that it has aspects that I cannot currently see: in other words, as Tallis puts it:

The gaze looking out is another matter entirely. It is different from causation and it is in the opposite direction *[to the causal effects of the light's interaction with object and retina] ... Nothing in physical science can explain [why or how] ... neural activity [reaches] causally upstream to events that led up to themselves ... We not only register events, but [are also]* aware *of them as 'over there' ...'* (p. 106)

The argument is much more complex than I have space to do it justice here, but suffice to say that it leads Tallis to dismiss any view that 'the brain (and hence the mind) [is] a mere causal way station, linking inputs into and outputs from the body'. He insists (and I personally find this line of reasoning the most difficult to grasp in the whole book) that,

We shall find, again and again, that we cannot make sense of what the brain is supposed to do — in particular postulating an intelligible world in which it is located — without appealing to talk about people who are not identical with their brains or with material processes in their brains.

Again, more on this later.

Tallis's polymathy is especially evident in the chapter, 'Defending the Humanities', where he pours scorn on what he dubs 'neuro-evolutionary pseudosciences' and demolishes the misconceptions behind 'neuroaesthetics' (e.g. looking for an orbito-frontal 'beauty spot'); on 'Neuro-lit-crit', where he castigates, although very respectfully, because 'she's read the theories ... with care and attention', the novelist and critic A.S. Byatt for falling into 'neuro-speculation rather than neuroscience'; and on 'evolutionary criticism' ('A gaze that assimilates monkey behaviour to the appreciation of Shakespearean comedy would, it seems to me, be more than somewhat blurred').

None of the arts, he tells us, 'is safe from the attention of the neuro-evolutionary critics'; but

No one, surely, will suggest that Beethoven's late quartets had a net effect in promoting social cohesion — and hence the replicative capacity of the genome — either when they were written or even subsequently.

Music can alienate people as much, or more than, it can bind them together.

We are condemned to be deployed in a world made up of small spaces and tiny moments, in which we pass on from one thing to another, without ever being entirely* in *any of them.

Humans do not create or respond to art simply as a means of maximising inclusive fitness. Tallis depicts art as being connected to two linked features unique to human consciousness. The first is awareness of our own mortality, and the second is a sense of dissatisfaction arising out of our 'having woken' from our state as an organism, only to find ourselves tantalisingly aware that our understanding of our fellows and of the larger world is incomplete:

We are condemned to be deployed in a world made up of small spaces and tiny moments, in which we pass on from one thing to another, without ever being entirely in *any of them. It seems almost as if we are fated to die without ever having been* fully there *or ever having fully grasped our being there.* (p. 305)

It is this sense of incompleteness accompanying our engagement with the world, says Tallis, that

leads us to seek ... a kind of consummation of consciousness *... the mystic idea of supreme mindfulness, or a hunger for ... some kind of ultimate cognitive arrival. It is this hunger that art may address.'*

'Neuro-law', with its built-in tendency to expand notions of diminished responsibility ('My brain made me do it') also comes in for heavy criticism. Tallis notes wryly that 'my brain made me do it' tends to be very selectively applied.

I am far more likely [to say it] when I drink fourteen pints of beer in a pub and then reduce the establishment to rubble because I have been denied a fifteenth than when I have one pint of beer and talk to my friends about epistemology'.

There follows a remorselessly logical analysis of 'my brain made me do it', much of it to do with what can (a person) and what cannot (a brain) be an agent.

An entire section of the chapter on the humanities is devoted to 'Rescuing Ethics', leading Tallis to conclude that 'ethics seems even more unlikely to emerge from matter than consciousness is'. 'Neuro-economics' too 'seems to be booming' and Tallis has fun parodying the theses, for example as here, with a neuroeconomist called George Loewenstein who is quoted as having written that credit cards take advantage of a dangerous flaw built into

the brain, the emotional brain '[overvaluing] immediate gains at the expense of future costs [because] it doesn't understand things like interest rates or debt payments or finance charges.'

Tallis consistently criticises the methodology of those neuroscientists who claim large conclusions from laboratory studies bearing little or no relation to what actually happens in the world outside.

But as Tallis comments, 'most people, most of the time ... *do* understand these things ... but presumably they are able to override their brains, although with what is not clear'. One of the themes pervading this book is the way Tallis consistently criticises the methodology of those neuroscientists who claim large conclusions from laboratory studies bearing little or no relation to what actually happens in the world outside. One such case is that of a neuroscientist called Cohen at Princeton, who claims to have uncovered 'the circuitry of temptation, identifying the brain regions responsible for "the allure of credit cards" and (who would have guessed it?) of those notorious sub-prime loans'.

Tallis devotes seven pages to an examination of the theory of memes, declaring sardonically that

> *even Darwinitics can't help noticing that there is a gap between themselves and chimps ... [and that] the land-fill devised to obliterate the great ditch between animals who merely live and humans who lead their lives actively and self-consciously ... was invented by Dawkins ... in* The Selfish Gene'.

Meme theory became 'central to one school ... of evolutionary psychology ... which aims to explain ... the speed of cultural development ... [and] the diversity and ... unique richness of human life'.

'The memophilic' Dennett comes in for some severe words, as does Susan Blackmore. Tallis writes that although the idea is 'reminiscent of the wilder shores of scholasticism (how many memes can dance on the head of an evolutionary psychologist?) [he will nevertheless give the idea] the courtesy of critique'. Which he proceeds to do with the by now familiar philosophical rigour, finding the whole notion not merely flawed but 'daft ... the extension of evolution from genes to memes props up [Dennett's] exaggerated assessment of the scope of Darwin's great theory'.

> *[M]emes, which have the character of being replicators that use us as mere vehicles to ensure their own transmission, are an extension of the biological story of ourselves as essentially automata, passively and indeed helplessly acting out a predetermined script ... Meme theory is an example of the kind of prestidigitation needed to present an image of us as biologically programmed in the face of overwhelming evidence that everyday human life is utterly different from the reflex-, tropism-, instinct-driven life of animals.*

And then there's 'Neuro-theology', or the search for the brain's 'God-spot'. There are nine pages on this, beginning with Tallis's, so to speak, confessional declaration:

> *Things must be pretty dire when even an atheist like me wants to rescue, if not God, at least the idea of Him (or Her or It). But it's true. Neuromaniac and Darwinitic approaches to religion do such inadequate justice to the most profound, and possibly the most terrible, idea mankind has ever entertained, that I feel almost protective towards the Old One*.

He accuses 'deicides' such as Sam Harris and Richard Dawkins of '[having] their own fundamentalism, namely biologism'. He writes,

> *It is as if a consistent atheism is obliged to tie itself to the anti-humanist view that we are, at bottom, just organisms. This brings atheism (and mankind) into disrepute and should be equally repugnant to believers and disbelievers. It is because I do not believe that rejecting a divine origin of the universe ... or of us ... necessarily leads to a naturalistic account of what we are that I have written this book.*

He criticises a recent study by Harris using fMRI scans to compare the brain activity of 15 committed Christians and 15 non-believers while they evaluated the truth or falsity of a number of religious propositions. Tallis again points to its methodological flaws, but adds that 'it is also obvious, once the glamour of high science is removed, how little they tell us ... [seeming] like yet another dose of the bleeding obvious'.

But it is not so much what neuroscience can or can't reveal about religious belief that is significant, as rather the motivation of investigators such as Harris and 'some other neurotheologians', namely 'to cut religion down to size'. Why is this sort of thing dangerous, as Tallis considers it?

He reviews a number of such neurological investigations (V.S. Ramachandran, Michael Trimble, Dimitrios Kapogiannis and Mario Beauregard).

> *Beauregard's God-spot was all over the brain: more like a rash than a single spot ... [and] Kapogiannis [amongst others] have ... also given God more spacious accommodation, encompassing not only the parts of the cerebral cortex unique to humans but also less salubrious locations in the more ancient parts of the brain shared with other primates.*

This last alone makes Tallis doubt the relevance of the findings, as he quips, 'There is a great distance between Church primates and jungle Primates'.

All this, says Tallis, is dangerous because neurologizing and Darwinizing the vast edifice that comprises religion, its literature, symbols, practices, music, Councils, wars and the rest of it

> '*is to deal not only religion but also* humanity *a terrible blow ... it is the supreme expression of a devastating reductionism that disgusts even an atheist like me. In defending the humanities, the arts, the law, ethics, economics, politics and even religious belief against neuro-evolutionary reductionism, atheist humanists and theists have a common cause and, in reductive naturalism, a common adversary: scientism.*

Where, not in the end but so far, does all this leave us? Tallis writes:

> *Those of us who are not brainwashed into thinking that they are brains washed by the laws of physics might be tempted to hazard a daring suggestion: that it is a* person, *or something like a person, that looks out at, peers into, interprets and shapes the world.*

He insists that neuroscience alone cannot account for the phenomenon of intentionality that is so integral a part of the human gaze.

So if not neurobiology, what? Towards the end of the book, addressing the reader directly in a chapter entitled 'Back to the drawing board' he writes: 'Okay, you might say, you have told us what is wrong with the biological account of human beings ... Now tell us what you will put in its place', and he immediately confesses,

> *The truth is I don't know; but I am sure that no one else knows either ... [T]he problem of human consciousness is not one that can be solved by further empirical research in the biological sciences ... Demolishing Neuromania and Darwinitis is a first and ... much-needed step ... [but I admit] that my argument has been mainly negative, focusing on the fallacies of neurologizing our minds, Darwinizing our lives and biologizing the human world.*

In his defence, he cites John Locke and Thomas Hardy, submitting that in order to make progress it is necessary to clear away the rubbish first. By the end of the book, Tallis is arguing that

> *those who believe that consciousness is to be found in the stand-alone brain subscribe to a 'body-body' dualism, with the brain being a 'mind-body' and the rest of the body being just a body*

and suggests that this is 'no advance on the traditional Cartesian mind-body dualism that neuromaniacs see as the primitive mindset that they have grown out of'.

He suggests that one way forward is to acknowledge, with the 20th century philosopher Maurice Merleau-Ponty:

(a) that the brain is situated in a body from which it cannot be separated; (b) the embodied brain is inseparable from a biosphere; and (c) in the case of humans, we are inseparable from a community of minds and the worlds that its component selves have built. (The argument is considered in pages 350 seq.)

Tallis states that there is increasing acceptance of the view, as expressed by Evan Thompson that 'The roots of mental life lie not simply in the brain, but ramify through the body and the environment ... beyond the surface membrane of our organism ...' (p. 351). Tallis finds 'some surprising converts', citing the 'MITniks' from 'the capital of mind-brain identity theory', the Massachusetts Institute of Technology, singling out Alva Noë for his 'excellent work' (*notes 1*):

> *The locus of consciousness is the dynamic life of the whole, environmentally plugged-in person or animal ... Human experience is a dance that unfolds in the world and with others. You are not your brain ... The phenomenon of consciousness, like that of life itself, is a world-involving dynamic process* (note 2).

Tallis also praises Andy Clark *(note 3).* Clark is one of

> *a loose coalition of philosophers who subscribe to dynamical, embodied, extended, distributed and situated (DEEDS) theories of cognition. They seek to develop a cognitive science in which brain, body and world intertwine, and 'beyond-the-skin' factors are accorded fully paid-up cognitive status.*

Tallis also quotes W Teed Rockwell, who writes of 'the brain-body-world nexus' *(note 4).*

I believe that this is a hugely important book which should be cited and quoted to counterbalance every occasion that the views it critiques are promoted unchallenged in academic papers, in newspapers, in broadcasts, in ordinary conversations. Despite its difficulty, it is astonishingly refreshing, and can leave even a pessimistic old cynic with misanthropic tendencies (believe me) with a somewhat unfamiliar and most welcome feeling of optimism for the future of mankind. After a near lifetime's overdose of Samuel Beckett, Freud and the likes of Schopenhauer, this reviewer can give it no higher praise. Do read it.

Notes

1. http://philosophy.berkeley.edu/people/detail/16
2. Quoted from A. Noë (2009) *Out of Our Heads: Why you are Not Your Brain, and other Lessons from the Biology of Consciousness*, NY: Hill and Wang.
3. See:http://mitpress.mit.edu/catalog/item/defaultuu.asp?ttype=2&tid=5494 for the MIT Press page on *Being There: Putting Brain, Body and World together again* (1998).
4. See Rockwell's *Neither Brain nor Ghost* at: http://mitpress.mit.edu/catalog/author/default.asp?aid=28081

RESISTANCE TO SCIENCE

Alison Campbell

This article appeared in the Autumn 2011 issue of the New Zealand Skeptic (No. 99). It is reprinted here with the kind permission of the Editor and author, who is a lecturer in the Biological Sciences Department at Waikato University, New Zealand. She writes Bioblog: http://sci.waikato.ac.nz/bioblog/.

(Editor's note: This is a review of a paper by P. Bloom & D.S. Weisberg (2007), a modified version of which can be accessed at: http://www.edge.org/3rd_culture/bloom07/bloom07_index.html)

One of the topics that comes up for discussion with my Sciblogs colleagues is the issue of 'resistance to science' - the tendency to prefer alternative explanations for various phenomena over science-based explanations for the same observations. It's a topic that's interested me for ages, as teaching any subject requires you to be aware of students' existing concepts about it, and coming up with ways to work with their misconceptions. So I was interested to read a review paper by Paul Bloom and Deena Weisberg, looking at just this question.

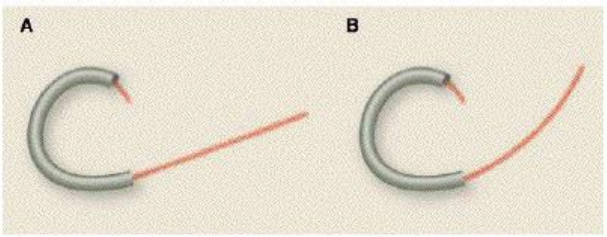
Bloom and Weisberg conclude that there are two key reasons why people can be resistant to particular ideas in science. One is that we all have 'common-sense intuitions' about how the world works, and when scientific explanations conflict with these intuitions, often it's the science that loses out. The other lies with the source(s) of the information you receive.

And they suggest that 'some resistance to scientific ideas is a human universal' - one that begins in childhood and which relates to both what students know and how they learn.

Before they ever encounter science as a subject, children have developed their own understandings about how the world works, based on their own experiences of that world. (This means that they may be more resistant to an idea if it's effectively an abstract concept and not one that they have experienced - or can experience - on the personal level.) Bloom and Weisberg cite research showing that the knowledge that objects are solid, don't vanish just because they're out of sight, fall if you drop them, and don't move unless you push them, is developed when we are very young children. And we develop similar understandings about how people operate (for example, that we're autonomous beings whose actions are influenced by our goals) equally early.

Unfortunately for science educators and communicators, these understandings can become so ingrained that if they clash with *scientific* understandings, those particular science facts can be very hard to learn. It's not a lack of knowledge, but the fact that the students have 'alternative conceptual frameworks for understanding [these] phenomena' that can make it difficult (maybe sometimes impossible?) to move them to a more scientific viewpoint. The authors give an example based on the everyday, common-sense understanding that an unsupported object will fall down - for many young children, this can result in difficulty seeing the world as a sphere, because, after all, people and objects on the 'downwards' side should just fall right off. And this idea can persist until the age of 8 or 9.

Another example: offered the following diagram *[and asked which path a ball will take when released from the curved tube]*, many college undergraduates will pick the 'common-sense' option, B over the correct answer, A. Interestingly, in this case, real-world experience can change this - if asked instead about the path of water from a curved hose, most would pick A (Bloom & Weisberg, 2007). (Maybe textbook authors need to think carefully about the analogies and examples that they use to illustrate concepts...)



Source of image: an on-line modified version of Bloom & Weisberg's paper (see Editor's note)

And it seems that psychology also affects how receptive people are to scientific explanations. When you're 4, you tend to view things 'in terms of design and purpose, which means (among other things) that young children will provide and accept creationist explanations about life's origins and diversity. Plus there's dualism: 'the belief that the mind is fundamentally different from the brain' (Bloom & Weisberg, 2007), which leads to claims that the brain is responsible for 'deliberative mental work' (*ibid*.) but not for emotional, imaginative, or basic everyday actions. This in turn can mean that, as adults, people can be very resistant to the idea that the things that make us who and what we are, our personality

and our very selves, can emerge from basic physical processes. And that shapes how we react to debates around such topics as abortion & stem cell research.

We live in a society where 'alternative' explanations are routinely presented by media in a desire to present 'balance' where there isn't any, or indeed, without any attempt at balance at all.

In other words, those who resist the scientific view on given phenomena do so because the latter is counterintuitive, although this doesn't really explain the fact that there are cultural differences in willingness to accept scientific explanations. For example, about 40% of US citizens accept the theory of evolution - below every country surveyed with the exception of Turkey (Miller *et al.* 2006). Part of the problem seems to lie with the nature of 'common knowledge': if everyone regularly and consistently uses such concepts, children will pick them up and internalise them (believing in the existence of electricity, for example, even though it's something they've never seen). For other concepts, though, the source of the information is important. Take evolution again: parents may say one thing about evolution, and teachers, another. Who do you believe? It seems, according to Bloom and Weisberg's review of the research in this area, that it all depends on how much you trust the source.

The authors conclude:

These developmental data suggest that resistance to science will arise in children when scientific claims clash with early emerging, intuitive expectations. This resistance will persist through adulthood if the scientific claims are contested within a society, and it will be especially strong if there is a nonscientific alternative that is rooted in common sense and championed by people who are thought of as reliable and trustworthy.

Yet we live in a society where 'alternative' explanations are routinely presented by media in a desire to present 'balance' where there isn't any, or indeed, without any attempt at balance at all *(see note 1)*. And the internet makes it even easier to present non-scientific views of the world in an accessible, authoritative and reasonable way. As science communicators and educators, my colleagues and I really are up against it, and I would say there's a need for Bloom and Weisberg's findings to be much more widely read.

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Bloom, P. & Weisberg, D.S. (2007) Childhood origins of adult resistance to science. *Science*, **316** (5827), 996-7 PMID: 17510356.

Miller, J.D. Scott, E.C. & Okamoto, S. (2006) Public acceptance of evolution. *Science*, **313**, 765-766. doi: 10.1126/science.1126746

Notes

1.http://sci.waikato.ac.nz/bioblog/2010/11/astrology-can-help-achieve-pre.shtml

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The Lost Empire of Atlantis by Gavin Menzies. London: Swordfish, 2011; pp. xxvi + 374. ISBN 13: 9780857820051, ISBN 10: 0857820052.

Mark Newbrook

The expansive claims of Gavin Menzies about 15th-Century Chinese explorations around the world have been extensively critiqued; the linguistic aspects of his case were reviewed by me in *Skeptical Adversaria* (Spring 2010). Menzies has now published this book, in which he argues (against all mainstream scholarly opinion) that the fabled island of Atlantis – initially described by the ancient Greek philosopher Plato as part of a moral tale – really existed as an advanced, far-flung civilisation, centred on Minoan Crete.

In support of his case, Menzies draws on the work of both scholars and non-mainstream writers, not always adequately distinguishing between these two groups of sources. For example, his list of sources on pp. ix-xiii includes figures such as the hyper-diffusionist Gunnar Thompson. He also fails to make explicit the relative even-handedness of authors such as John Sorensen, who does not endorse **all** of the many claims which he surveys.

Again, I criticise here the linguistic aspects of Menzies' theory; it is possible that the other aspects of his proposal (see below) are more persuasive. Menzies' main source on Cretan languages and scripts is Minas Tsikritsis.[1]

The three most important early Cretan scripts (found on clay tablets) are:

1. 'Linear A' (the number of distinct symbols suggests that this script is 'syllabic' – one symbol per syllable – but most mainstream authors regard it as so far

undeciphered; the 'maverick' professional linguist Cyrus Gordon analysed the texts as being in a West Semitic language – fairly similar to Phoenician and Hebrew – but although this is not historically implausible his 'decipherment' has not been generally accepted);

2. The later, superficially similar 'Linear B' (deciphered as a syllabic representation of early Greek by Michael Ventris and John Chadwick in 1952; some historians were initially surprised by this identification, but almost all scholars now accept the decipherment); and

3. The script used in the mysterious text on the Phaistos Disk (discussed by me in *Skeptical Adversaria* (Autumn 2008), which displays around 45 distinct symbols and is thus probably in a syllabic script but is almost certainly too short (around 240 symbol-tokens) to be persuasively deciphered.

Menzies' main discussion of Tsikritsis' ideas is on pp. 314-321. Tsikritsis (himself from Crete) believes that he has deciphered Linear A as an early form of Greek. Others, notably Steven Fischer, have advanced similar claims regarding the Phaistos Disk, and indeed Tsikritsis himself regards fifteen of the symbols on the Disk as shared with Linear B and 'deciphers' part of the Disk text too as Greek. But these 'decipherments' of both bodies of material require otherwise unknown (and in places unlikely) varieties of Greek (unlike the Ventris-Chadwick decipherment of Linear B, which actually confirmed earlier philological predictions as to the pronunciation of Greek in times before the alphabet was adopted). Furthermore, Linear A in particular would probably have already been reliably deciphered on the basis of Linear B if it did indeed represent Greek; this has in fact been attempted a number of times, but without demonstrable success. In fact, many writers with varying degrees of expertise have offered speculative decipherments of Linear A (as of the Disk) as representing a plethora of languages (for instance, Leonard Palmer, discussed by Menzies on p. 64, believed that he had discerned links with the Anatolian language Luvian); and anyone proposing a new interpretation needs to argue that his own decipherment should be preferred to these earlier efforts – and to the mainstream 'null hypothesis' that no decipherment currently recommends itself. Tsikritsis has not been able to persuade mainstream scholars that he has achieved this.

Supported by sources such as Hans Peter Duerr (see p. 97), Tsikritsis also proclaims that various bodies of symbols found in various locations spread across Europe, the Near East, India, etc. represent Linear A, and thus indicate (along with his readings of the Cretan texts) that the users of the script operated far beyond Crete and the Aegean. However, the evidence for these identifications appears inadequate. The parallelisms are not patently systematic, and indeed the bodies of non-Cretan data are typically too small for systematicity to be manifested; for instance, Duerr cites a single isolated symbol (from northern Germany).

Tsikritsis also holds (citing Gordon in support; see p. 260) that the Linear A texts contain much mathematical symbolisation; and he extrapolates from his 'findings' to argue that the Minoans started the Olympian Games, invented mechanical 'computers', and in general constituted a 'lost' ancestral civilisation of vast sophistication, which can be identified with Atlantis.

The likelihood of arriving at an authoritative decipherment of a particular text or body of texts crucially involves (as noted above) the volume of material available….

Menzies himself makes some dubious theoretical/ methodological claims. For example, he states (p. 316) that 56 distinct symbols are required if a language is to be translated 'with absolute statistical certainty' (and that the Phaistos Disk script thus displays marginally too few symbols for this). I do not know where he obtained this figure of 56. Any such calculation would depend on the total predicted number of the symbols in the entire writing system, and this in turn depends on the script-type involved: logographic (thousands of symbols, as in Chinese script), syllabic (typically between 40 and a few hundred), or alphabetic (between 10 and 150). More importantly, the likelihood of arriving at an authoritative decipherment of a particular text or body of texts crucially involves (as noted above) the **volume** of material available (that is, the combined length of the relevant texts). And there are other factors too, notably the amount of supporting cultural information available, the presence or absence of potentially recognisable proper names or of other words likely to be shared with known languages, the historical plausibility of each proposed identification, etc., etc. Menzies has grossly oversimplified this issue.

If Menzies' theories are to be accepted, it must be on the basis of his **non**-linguistic evidence; he especially emphasises genetic data. I will not attempt to evaluate this evidence here.

Note

1.http://www.anistor.gr/english/enback/v014.htm

THE ASSOCIATION FOR SKEPTICAL ENQUIRY (ASKE)

Founded in 1997, ASKE is an association of people who support the following aims and principles:

- ASKE is committed to the application of rational, objective and scientific methods to the investigation and understanding of ideas, claims, and practices, especially those of an extraordinary and paranormal nature.

- ASKE is committed to challenging the uncritical promotion of beliefs and claims which are unsupported or contradicted by existing objective and scientific knowledge.

- ASKE opposes the misinterpretation and misrepresentation of science for purposes which deceive the public.

- ASKE supports the objective evaluation of all medical or psychological techniques offered to the public and opposes the uncritical promotion of techniques which are unsupported or contradicted by existing scientific knowledge.

- ASKE supports all efforts to promote the public awareness of the rational and scientific understanding of extraordinary and paranormal claims.

- ASKE is committed to a rational understanding of the reasons and motives which underlie the promotion and acceptance of irrational and paranormal claims and beliefs.

- ASKE accepts the rights of individuals to choose for themselves their beliefs about the world.

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