Can we do without realism?

[*Transcript of a paper presented by* Desmond Sander *at the Australasian Association of Philosophy Conference, Monash University, July 2016.*]

> "While Newton seemed to draw off the veil from some of the mysteries of nature, he shewed at the same time the imperfections of the mechanical philosophy; and thereby restored her ultimate secrets to that obscurity, in which they ever did and ever will remain."
> David Hume, History of England,1757.

> "As far as the laws of mathematics refer to reality, they are not certain, and as far as they are certain, they do not refer to reality."
> Albert Einstein (1879-1955).

> "Fear of certain concepts is characteristic of philosophy; we need to conquer this fear."
> Colin McGinn, Principia Metaphysica. 2007.

I am interested in understanding what happens. It goes without saying, at least for me, that physics — I mean 20th. Century physics — is our best account so far of what happens, very compelling and astonishingly successful. But physics, as is well-known has some deep problems. I have slowly come to realise that the source of those problems is a philosophical mistake, a mistake that is not restricted to physicists but shared by nearly everyone. To put it briefly, it is the belief of nearly everyone that there is just one reality and just one truth, the truth about that reality. I think that physics can be made right, or at least made better, by dropping that faith and accepting that there are many realities, and consequently many times, and that truths about those realities are not given but are reached by agreement.

I will be talking about both physics and philosophy. So I should begin by saying that I am not a physicist and not a philosopher, just a man in the street who has been thinking about both for quite a while and now has far too much to say. Both disciplines address the problem of understanding what happens, but in this talk I will address mainly philosophy aspects of this, and ask you to suspend disbelief of some big physics claims that I will make — to grant for the sake of argument that they just might be right, even though probably not.

1 Realism

A distinguished Australian philosopher recently told me that he no longer calls himself "a realist", though he once did. So I guess that some philosophers are a step ahead of physicists

in waking up to the inadequacies of what I call classical thinking, a name I have been using pretty much interchangeably with realism for some years now. It is classical thinking, the realism of physicists, that this talk will be about. I think, and hope you will see, that this is nonetheless of importance for philosophy as well as for physics.

I am quite incapable of addressing the long history and subtleties of philosophical realism, and will confine myself to commenting on a regrettable but subliminal feature of it that persists to this day. I mean its pre-emptive language, language that pigeon-holes each particular alternative to realism as if one of the two must be right and the other wrong. Whoever accepts being called an "idealist" or "solipsist" or "relativist" or "pragmatist" or "instrumentalist" or even "anti-realist" accepts that dichotomy which is the essence of realism. If you accept one of these names for your way of thinking you should refuse that dichotomy and propose instead to the realist: you have one story and I have another, and let us talk about our stories and, maybe, reach agreement as to which is the better story. Or, try to agree about the good points of both stories.

The classical thinking of physicists was captured pretty well, I think, by the philosopher A C Grayling (In his *Truth, Meaning and Realism*, 2007) when he described a certain kind of realism that "we all, at least in our non-philosophical moments, believe", namely that "the world of physical objects and events exists, and has the character it has, independently of any thought, talk, knowledge or experience of it".

A good reason for rejecting the realism of physicists is that many physicists would accept the slick idea that, while physicists talk about the "real world" (or, nowadays, "the universe"), philosophers talk about talk. Even if there is something in this, as I think there is, it is, as I will argue later, a positive for philosophy, not a negative. Indeed this presentation of mine is itself talk about talk.

By way of introduction, let me say two things about the classical thinking of physicists:

- it works, wonderfully well;
- it is responsible for the well-known deep technical difficulties of modern physics.

2 Mindless Physics

I will begin with my own personal and superficial take on the history of 20th. Century physics. Superficial is appropriate because it matches the thinking of most physicists about their own discipline. I call it mindless physics because it does not take account of minds or account for them.

The revolution in physics that occurred in the first decades of the twentieth century was recognized by everyone in physics and in philosophy. The fact that this seemed to overthrow the powerful physics of Newton which had held sway for a couple of centuries only served to enhance the prestige of physics as the theory of what objectively happens. The physics of

Einstein and Bohr and the rest, a conflation of geniuses, was a brilliant story, not only because it was compelling to those who understood it, but also because, as the theory on which modern technology and engineering are based, it paid off in a big way.

While some physicists already began to see physics as a potential theory of everything, philosophers saw the weak point of such a grandiose ambition. Physics ignored minds. To this plain fact, there were, and still are, two possible responses.

One response is to imagine that physics will account for mind phenomena, in the fullness of time. That faith/hope is usually unspoken, but Brian Greene, one of the many distinguished physicists who have ventured into philosophy territory enunciated it very explicitly:

> "I believe that a physical system is fully determined by the arrangement of its particles. Tell me how the particles making up the earth, the sun, the galaxy and everything else are arranged and you have fully articulated reality. This reductionist view is common among physicists, … ."
> Brian Greene, *The Hidden Reality*, 2011.

This is the response that showed itself also, among philosophers of a certain bent, as a succession of new stories that seemed to move their ideas about the human mind closer to the objective physics story. I mean a succession of new disciplines: behaviorism, AI, consciousness studies, cognitive science, transhumanism, computationalism, informationism, and no doubt others. None of these is without value, but none of them succeeds in unifying a scientific view of minds with an objective physics. [This is what I simplistically think of as Anglo-Australian-American Philosophy, but the name is not important.]

The alternative response is to accept the clear matter of fact that twentieth century physics says nothing about mind, and to make the most of it by entertaining an independent story or stories of individual minds and the human Mind from the ground up, so to speak, with variations on a theme that called itself *phenomenology*. Reason and close observation can indeed tell us a lot about mind phenomena, and this was a kind of new science, needing its own special language because the standard language of science was inadequate. [This is what I simplistically think of as Continental Philosophy, but the name is not important.]

In parallel with these developments in philosophy, physics was moving forward, both in its subject matter — objective phenomena — and in its theory, and big issues became apparent. In particular, the kind of deterministic model that had been initiated by Newton (exploiting wonderful new thinking of Descartes to bring time into mathematics), and that worked so well at everyday scale plainly failed in experiments at atomic scale. When faced with the weirdness of observations in experiments at atomic scale, two very different responses were possible.

The so-called Copenhagen response of Bohr was simple to state but hard to accept: suck up the weirdness. If that is how it is, so be it. [Einstein did not like this view and tried to show that it could not be correct, because it eliminated a key feature of physics: its locality. As it turned out, with John Bell and Alain Aspect, his clever objection became just one more very

strange but accepted item in the quantum story: entanglement.]

The so-called many-worlds response of Hugh Everett was to give up determinism entirely, in favor of the view that physics predicts (if one may call it that!) not what happens but only probabilities for the many things that might happen. For a couple of decades, this idea was sensibly ignored, but in the eighties it was endorsed by some brilliant thinkers, most prominently David Deutsch. It is a view that lends itself to empty speculation and, arguably for that reason, was subsequently taken up by many leading physicists and quite a few leading philosophers.

It has been most surprising to me to realise that, putting it far too briefly, both the 20th. century's new physics stories, quantum mechanics (briefly QM) and relativity, were, and still are, profoundly incorrect [by which I mean only that there are much better stories, stories that have to do with chance/free_will and with time/experience.]

Since QM and relativity are correct mathematical theories, it is not possible to refute them. Even as physics, they work pretty well. But there are very different empirical interpretations of both that work much better. And these new empirical interpretations are presented, haphazardly but in detail, in my book *Mindful Physics*. Here I will state very briefly what lies behind those great errors, and ask you only to concede that, unlikely as it may seem, my claims just might be correct. Of this there can be no proof, only, eventually, recognition that a mindful story works much better than the mindless story of 20th. Century physics.

The QM of the great founders was incorrect, because it failed to realise that the mathematics (of von Neumann's Hilbert space model) pertains not to an objective "real world" out there but rather to the individual private realities in the heads of individual physicist experimenters (and likewise in your head and in mine) that I call their actualities, to draw out their distinction from the shared reality that people agree about. Here I am not referring to the quantum speculations of Penrose and Hameroff, but rather to the oscillating electromagnetic (or other) fields in neural circuits. Also, to view those individual private actualities as ongoing physical processes is not to deny that there is something out there that can reasonably be called a real world.

The space-time physics of Einstein is also incorrect, but even more subtly than quantum mechanics. Stated too briefly, he tried to eliminate time as such but did not succeed. The reason is that there are many independent times of which the time in your head, whose passing is experienced by just you, is only one example.

3 Strict empiricism

The take-away from my informal and no-doubt biased history of modern physics is its realisation of and dependence upon the sharp division between mathematics and physics. For both quantum mechanics and relativity, the mathematics is right but the physics is wrong.

Strict empiricism is my name for the way of thinking/talking I propose as an alternative to the classical thinking of physicists. It is the nature of strict empiricism that it cannot claim that classical thinking is wrong, only that there is a better way of talking/thinking. A judgment about that cannot be made without taking in the evidence, and the evidence is an elaborate new physics that I can only sketch in this talk. Strict empiricism is the realisation that our talk about what happens is talk and not theTruth. This does not mean abandoning any notion of truth, it only means recognising that truths are not mysteriously given but are reached by agreement.

It is for this reason that the talk about talk of philosophers that one hears at a conference like this is important; it is a game with agreed rules, like chess, but of great value because it explores ways for reaching agreement. Talk is all we have and so it is good for our best talkers/thinkers to show us how to do it well. In my opinion it would be good for philosophers to turn their sharp eyes upon the questionable talk of some physicists.

Strict empiricism puts Newton on the same pedestal as Shakespeare. One speaks mathematics, the other speaks poetry. Both are genius talker/thinkers, but the empirical worlds they talk about are different. One deals, one might say, with the world out there, the other with the world in here; or, more correctly, with the many possible worlds in here. The world out there is what physicists hope to pin down; of the worlds in here, each of us directly experiences just one, and must judge others on the basis of the talk of others.

To emphasise the talk character of the many theories of mathematics and of physics, I prefer to call them stories. The difference between the stories of mathematics and the stories of physics is easy to explain.

Mathematics embraces many stories. [Incidentally, elaborate attempts made in the twentieth century to express mathematics as a single story came to nothing.] A mathematical story (usually anointed as a theory) begins with primitives and axioms and inference rules. Its theorems are proved using those rules. [Here, a primitive is an undefined term whose meaning emerges in the developing story. Example: vectors in a vector space.] Those proofs are checkable by people or even by computers. So, very simply, when we say that T is a theorem we mean only that T can be derived from A, the axioms, in such a way. Proofs are checked and we agree about them.

Of course, most mathematicians are Platonists. They (like Newton) see their theorems as being true in some God-given or otherwise-given sense. A world is imagined by the creative mathematician that may serve to convince him/her of a theorem prior to its being proved. But proof is always required.

So far as I can see, nothing can distinguish between my view that theorems are made and proved and agreed about by human brain/minds, and the Platonist view that they are objectively true. So it is a distinction without a difference. It doesn't matter.

It does matter, however, when a mathematical story is supposed to be about empirical

phenomena — stuff out there that can be observed/measured. There is no reason for the observations of physicists to conform with mathematics, but history has repeatedly shown that particular phenomena can be matched with particular mathematics to produce theories that are both very compelling and very useful. Finding those fruitful matches and working out their consequences is the challenging activity that we call physics (viewed very generally as including all applied mathematics).

The reality of everyday life and of 20th. century physics, with its billiard balls and the moon and time, is great for those purposes, but is not what realist physicists would like it to be: an objective foundation for their story. It is, very plainly, a product of human instinct. Newton showed us that already when he showed that (white) light is composed of colours that we do not see. Not to dismiss this immensely useful agreed story of what is out there, I call it the foreground reality.

Einstein's realism is on display in the well known story of his friend Abraham Pais:

> "We often discussed his notions on objective reality. I recall that during one walk Einstein suddenly stopped, turned to me and asked whether I really believed that the moon exists only when I look at it."
> Abraham Pais in Reviews of Modern Physics, 51, 863 (1979).

The idea that objects only exist because they are observed, is a (very common) misreading of quantum mechanics. The problem here lies in the realist notion of "objects that exist". The moon which is such a certain part of our lives is not an "object that exists" independent of the brain/minds that see it. You believe that the moon exists because, from time to time, you see it, because others say that they sometimes see it, and, importantly, because of its essential role in our stories of what happens (including, notably, our story of tides). And that is all there is to the "objective existence" of the moon. It is no more than an agreement that everyone subscribes to, one of the many agreements that constitute our foreground reality.

[Do I need to say, here, that Einstein's bad reason for doubting quantum mechanics was not a good reason for him to accept it?]

Our grand illusion is that the foreground reality is the background reality that physicists are hoping for, and that Einstein anticipated with his space-time (strangely populated by points that are called events), a story that did not quite do the job and still does not.

Because, plainly, people have made and keep making bad agreements as well as good agreements, strict empiricism has an ethical aspect, evident even in the choices we have to make of the stories that we call physics. Far from being objectively true, the stories of physics can be chosen and should be chosen on two clear grounds: they should (in my opinion!) be compelling and they should be empowering for humanity (that is to say, potentially useful). The latter is the requirement that a physics story should support reliable predictions of what will happen; the standing up of bridges, the reliability of GPS satellites, and the world wide web are nice examples of the value of the reliable predictions that are enabled by our current

physics stories. [The World War 2 contributions to nuclear physics of von Neumann, on one side, and Heisenberg, on the other, display very clearly an ethical aspect of physics talk.]

4 Mindful Physics

An obvious alternative to classical thinking is to accept the plain fact that human beings, the inventors/discoverers and beneficiaries of language are story tellers, and so to begin a new story of what happens in which the very many brain/minds of individual human beings, the writers of stories and makers of meanings, are the primitives. They are the starting point for understanding what happens, not something to be explained, but something that explains.

For this idea there is a great precedent in physics: Newton's wonderful theory of motion, based upon gravity as a primitive; as he was well aware, Newton did not tell us what gravity is, only how it works.

Mindful physics is my name for the enhanced physics I propose, with individual brain/minds as its primitives, and I cannot go into the detail of it today. Suffice it to say for now, that mindful physics is much more compatible with experimental facts than the mindless physics of the 20th. Century. Mindful physics embraces 20th. century physics, discarding only the fantasies with which the many competing cosmologists have recently begun to indulge themselves.

What has been most surprising to me is that mindful physics

- opens the way to an extraordinary new mathematical account of what happens based upon encounters between entities that (passively) listen and (actively) speak, entities that range from individual human beings to individual electrons (and, here, it is not intended that "speaking" and "listening" be restricted to sound);

- accounts for phenomena observed in quantum-scale experiments in a way that completely explains the weirdness that confounded the founders and which is still accepted as deeply mysterious by the experts — it is a consequence of the fact that individual entities have individual times;

- a background reality is conceived in a plausible way, matching the expectations of Einstein, as a fixed geometry, as yet unknown, over which entities move somewhat independently in their individual private times; and interact by individually listening and speaking;

- plainly requires abandoning the principle of locality, which was declared by Newton to be an obvious and necessary truth and was viewed by Einstein as an essential property of the real world;

- offers a simple account of the entanglements of entities (including human brain/minds) which embraces as a special case the entanglements of particles that physicists

have long viewed as deeply mysterious.

• suggests, very speculatively, that the very many string theories which have been invented/discovered by mathematicians and physicists apply not to the many universes of prominent cosmologists, for which there is no evidence whatever, but to the very many brain/minds (and other entities) which are plain to see.

The big thing and the difficult thing about mindful physics is that it will only work for those who are prepared to give up whatever residual classical thinking they may have, and accept that human beings are the makers of stories, and hence the makers of meanings. This is not to say that there is no reality out there, only that we are stuck with the task of telling good stories about it. Stories, without the imprimatur of an objective reality, are the best we can do. But with stories we have done and can do wonderfully well. Or terribly. It is up to us.

5 Conclusion

To leave it at that, with the suggestion that mindful physics is right and mindless physics is wrong would be to fall into a realist trap. You can avoid that very simply by accepting that mindful physics and mindless physics stories are incompatible stories of what happens though each is both compelling and internally consistent. This is Niels Bohr's complementarity writ large.

As to which story you might prefer I can only draw your attention to four things. First is the plain fact that mindless physics generates fantasies that (so far!) have no empirical support. Second is the plain fact that mindful physics embraces almost all of mindless physics, omitting only those fantasies. Third is the plain fact that mindful physics opens the way to a new understanding of individual brain/minds as on-going private physical/mental processes that are both independent and entangled. Fourth is the plain fact that mindful physics demolishes the Berlin wall that has so long separated the two great territories of understanding that we call the sciences and the humanities.

REFERENCE

This paper, complete with Glossary links for all underlined terms, is *Appendix 6* of

Sander, Desmond. *Mindful Physics — A NEW ACCOUNT OF WHAT HAPPENS*, ongoing Apple iBook, 2013-17, about 600 pages. Available from the web page https://itunes.apple.com/au/book/id831211879.