

The mental Universe

The only reality is mind and observations, but observations are not of things. To see the Universe as it really is, we must abandon our tendency to conceptualize observations as things.

Richard Conn Henry

Historically, we have looked to our religious leaders to understand the meaning of our lives; the nature of our world. With Galileo Galilei, this changed. In establishing that the Earth goes around the Sun, Galileo not only succeeded in believing the unbelievable himself, but also convinced almost everyone else to do the same. This was a stunning accomplishment in 'physics outreach' and, with the subsequent work of Isaac Newton, physics joined religion in seeking to explain our place in the Universe.

The more recent physics revolution of the past 80 years has yet to transform general public understanding in a similar way. And yet a correct understanding of physics was accessible even to Pythagoras. According to Pythagoras, "number is all things", and numbers are mental, not mechanical. Likewise, Newton called light "particles", knowing the concept to be an 'effective theory' — useful, not true. As noted by Newton's biographer Richard Westfall: "The ultimate cause of atheism, Newton asserted, is 'this notion of bodies having, as it were, a complete, absolute and independent reality in themselves.'" Newton knew of Newton's rings and was untroubled by what is shallowly called 'wave/particle duality'.

The 1925 discovery of quantum mechanics solved the problem of the Universe's nature. Bright physicists were again led to believe the unbelievable — this time, that the Universe is mental. According to Sir James Jeans: "the stream of knowledge is heading towards a non-mechanical reality; the Universe begins to look more like a great thought than like a great machine. Mind no longer appears to be an accidental intruder into the realm of matter... we ought rather hail it as the creator and governor of the realm of matter." But physicists have not yet followed Galileo's example, and convinced everyone of the wonders of quantum mechanics. As Sir Arthur Eddington explained: "It is difficult for the matter-of-fact physicist to accept the view that the substratum of everything is of mental character."

In his play *Copenhagen*, which brings quantum mechanics to a wider audience,

Michael Frayn gives these words to Niels Bohr: "we discover that... the Universe exists... only through the understanding lodged inside the human head." Bohr's wife replies, "this man you've put at the centre of the Universe — is it you, or is it Heisenberg?" This is what sticks in the craw of Eddington's "matter-of-fact" physicists.

Discussing the play, John H. Marburger III, President George W. Bush's science adviser, observes that "in the Copenhagen interpretation of microscopic nature, there are neither waves nor particles", but then frames his remarks in terms of a non-existent "underlying stuff". He points out that it is not true that matter "sometimes

Physicists shy from the truth because the truth is so alien to everyday physics. A common way to evade the mental Universe is to invoke 'decoherence' — the notion that 'the physical environment' is sufficient to create reality, independent of the human mind. Yet the idea that any irreversible act of amplification is necessary to collapse the wave function is known to be wrong: in 'Renninger-type' experiments, the wave function is collapsed simply by your human mind seeing nothing. The Universe is entirely mental.

In the tenth century, Ibn al-Haytham initiated the view that light proceeds from a source, enters the eye, and is perceived. This picture is incorrect but is still what most people think occurs, including, unless pressed, most physicists. To come to terms with the Universe, we must abandon such views. The world is quantum mechanical: we must learn to perceive it as such.

One benefit of switching humanity to a correct perception of the world is the resulting joy of discovering the mental nature of the Universe. We have no idea what this mental nature implies, but — the great thing is — it is true. Beyond the acquisition of this perception, physics can no longer help. You may descend into solipsism, expand to deism, or something else if you can justify it — just don't ask physics for help.

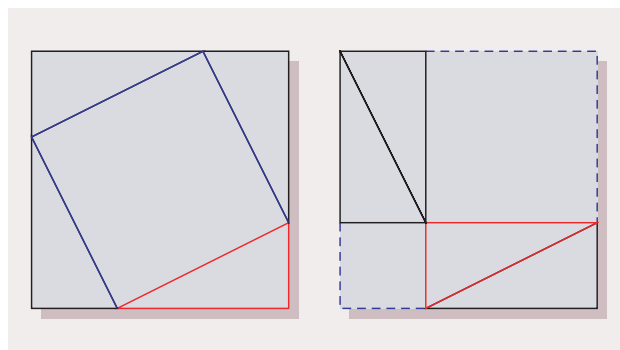
There is another benefit of seeing the world as quantum mechanical: someone who has learned to accept that nothing exists but observations is far ahead of peers who stumble through physics hoping to find out 'what things are'. If we can 'pull a Galileo', and get people believing the truth, they will find physics a breeze.

The Universe is immaterial — mental and spiritual. Live, and enjoy. ■

Richard Conn Henry is a Professor in the Henry A. Rowland Department of Physics and Astronomy, The Johns Hopkins University, Baltimore, Maryland 21218, USA.

FURTHER READING

Marburger, J. *On the Copenhagen Interpretation of Quantum Mechanics*
www.ostp.gov/html/Copenhagentak.pdf (2002).
Henry, R. C. *Am. J. Phys.* **58**, 1087-1100 (1990).
Steiner, M. *The Applicability of Mathematics as a Philosophical Problem* (Harvard Univ. Press, Cambridge, MA, 1998).



Proof without words: Pythagoras explained things using numbers.

behaves like a wave and sometimes like a particle... The wave is not in the underlying stuff; it is in the spatial pattern of detector clicks... We cannot help but think of the clicks as caused by little localized pieces of stuff that we might as well call particles. This is where the particle language comes from. It does not come from the underlying stuff, but from our psychological predisposition to associate localized phenomena with particles."

In place of "underlying stuff" there have been serious attempts to preserve a material world — but they produce no new physics, and serve only to preserve an illusion. Scientists have sadly left it to non-physicist Frayn to note the Emperor's lack of clothes: "it seems to me that the view which [Murray] Gell-Mann favours, and which involves what he calls alternative 'histories' or 'narratives', is precisely as anthropocentric as Bohr's, since histories and narratives are not freestanding elements of the Universe, but human constructs, as subjective and as restricted in their viewpoint as the act of observation."