

for tuberculosis, which remained the leading cause of death in the United States as late as 1937 (p. 243).

The last chapter of the book urges a sensibly balanced approach to history of science in which social context is given its rightful but not excessive due. Then for each chapter there are some suggestions for substantial further reading.

Difficult as it may be to remain dispassionate when treated unfairly, we serve ourselves best by sticking to the high ground of substantive discussion and leave the mudslinging and the denigration of opponents to the other side and their fellow-traveling "skeptics"—vide the sad cases of Semmelweis and Albert Schatz. That is just one of the insights offered by this interesting, instructive, thought-provoking book.

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Quantum Enigma: Physics Encounters Consciousness by Bruce Rosenblum and Fred Kuttner. Oxford, England, Oxford University Press, 2006. 211 pp. \$29.95 (hardcover). ISBN 0-19-517559-X.

One of the most instructive books that I have ever read (and also simply one of the best reads, as well) is Arthur Koestler's *The Sleepwalkers*, a marvelous history of the Copernican Revolution. Koestler argues (and convincingly) that Copernicus, Brahe, Kepler, and Galileo did what they did without any real understanding of what it was that they were doing. Scientists today could easily be (and, I think, largely are) in precisely the same boat.

In that most excellent book, Koestler also makes the point that Copernicus and Galileo were extremely reluctant to have it publicly known that they held unorthodox scientific beliefs, and he emphasizes that it was fear of ridicule, not fear of the Church, that constricted them both. Copernicus only published his great book on his deathbed for that precise reason, and Galileo lied to his students for decades before "coming out" with his Copernican beliefs.

It is more than 80 years since the discovery of quantum mechanics gave us the most fundamental insight *ever* into our nature: the overturning of the Copernican Revolution, and the restoration of us human beings to centrality in the Universe.

And yet, have you ever before read a sentence having meaning similar to that of my preceding sentence? Likely you have not, and the reason you have not is, in my opinion, that physicists are in a state of denial, and have fears and agonies that are very similar to the fears and agonies that Copernicus and Galileo went through with *their* perturbations of society.

A case in point is the book *Quantum Enigma*. This book is a result of a course for non-science majors (at the University of California, Santa Cruz) on the meaning of quantum mechanics, and in particular the authors seek the role, if any, of consciousness. The authors bring out, in pretty good fashion, the experimental facts that show the Universe to be drastically different in its nature than almost anyone thinks (usually, even *after* they have studied quantum mechanics in detail). And they do note, and quite correctly, that quantum mechanics *easily* accounts for every single one of these bizarre facts, and that it does so *completely*. And yet, are our two authors able to come to an actual conclusion?—No, they are NOT—here is their concluding thought: "Does quantum theory suggest that, in some mysterious sense, we *are* a cosmic center?" The question is left hanging.

In his Gifford lectures, very shortly after the 1925 discovery of quantum mechanics, Arthur Stanley Eddington (who immediately, once quantum mechanics was discovered, realized that this meant that the universe was purely mental, and that indeed there was no such thing as "physical") said "it is difficult for the matter-of-fact physicist to accept the view that the substratum of everything is of mental character." What an understatement! On this fundamental topic, physicists are mostly terrified wimps.

And what *are* these "terrors" that prevent the acceptance of the obvious? I think it is a combination of the fear of being ridiculed plus the fear of the religious implications. Does that sound familiar?

And yet, it is perfectly respectable for scientists to be religious. A notable example is Charlie Townes, who is unapologetically Christian. So, what's there to be afraid of?

The authors are correctly emphatic that there is no controversy at all about either the experimental facts, or quantum mechanics itself (that is, the mathematical theory that completely accounts for the facts). Whether, like me, you are convinced that the universe does not exist at all (except as mind), or you are some kind of "realist," or you are that common creature the decoherence evasionist, or *whatever*, you irregardless do your calculations *identically*. It is only when you attempt to articulate in *English* what quantum mechanics, and the facts that it so easily explains, *mean* that you enter on dangerous grounds: the authors give several quotes of nasty remarks by their departmental colleagues in response to their teaching material of the kind that appears in their book.

When, not so long ago, I grew baffled that there was no concise and clear

public statement concerning the most important philosophical discovery, ever, in the history of science, and I decided, therefore, that I must make such a public statement myself—and I did so, in an essay in *Nature*, "The Mental Universe,"—I knew that no such negative response could possibly occur in my case, because of the fine character of my great university; and ... indeed, there was none.

I did get one implicitly chiding email, from my Masters thesis adviser, who mildly asked me what Einstein would have thought of my essay! Oh, poor, poor, Einstein! If our individuality does survive death, well, my my; how poor Einstein is blushing!

I really do not understand how it can be that so little attention is directed to what is acknowledged to be the deepest discovery ever in human intellectual history: one that has changed our understanding of our own nature far more than did the Copernican Revolution. Our two authors do address this important point, saying that Copernicus (and Darwin) are "easier to comprehend—and much easier to believe." (I don't agree with that. If you read Galileo's *Dialogue* you will see that he himself found it almost impossible to believe that the Earth rotated in 24 hours and went around the Sun annually. You don't find that impossible to believe, and I don't; but he did. So, we owe him.)

No, I think that the explanation lies in particular history. In the Copernican case, the man of character and strong opinion, Galileo, came to the right conclusion, and carried society with him. In the case of the quantum, the man of character and strong opinion, Einstein, came to the wrong conclusion, yet nevertheless, he carried society with him. Leaving me in the pickle that I find myself in. As a person of iron integrity, I cannot participate in the dereliction of social duty that is going on among scientists today. I must speak up, and, by gum, I am!

Despite the fact that I am heavily criticizing this book, above all for its timidity, I do highly recommend it, if only because, except for Nick Herbert's excellent *Quantum Reality*, it is about the only available book that clearly brings out the amazing, the astounding, the utterly unbelievable simple facts. Although quantum cryptography and quantum computing are gradually forcing people to stop averting their eyes, there is still an amazing amount of ignorance about these unbelievable experimentally established facts.

"That's crazy" a physicist said to me just the other day, when I described the quantum Zeno effect. Yet this physicist has worked lifelong in quantum-intensive research!

All I had mentioned was that, if you observe a quantum system with a short half-life, it will not make the transition to the lower state. Your simply observing it (not interacting with it in any way) causes it to remain in its higher-energy state. (Just Google on "quantum Zeno effect," should it happen that you don't believe me!)

Quantum Enigma only mentions the quantum Zeno effect in passing, which surprises me. Despite their timidity, it is quite clear that our shivering authors

know darned well that mind is central—and nothing shows the truth of that more clearly than does the quantum Zeno effect.

The book does have one major defect, in my opinion, and that is that it does not bring out *why* the world is quantum mechanical. There is no mystery about this—it is because the observations have the character of numbers, and because there are (for unknown reasons) symmetries in the observations—symmetries that Emily Noether taught us result in conserved quantities. Because these are *conserved*, they give the impression of something "really being there," so when we study them, we get the incorrect impression of a real Universe being "out there." These simple facts result in quantum mechanics, as I showed in 1990 in my paper "Quantum Mechanics Made Transparent," in the *American Journal of Physics*.

No, the mystery is not quantum mechanics. The mystery is our own existence. Let me ask you: which would be easier to believe in (if you did not have irrefutable evidence for one of them): life after death, or your own existence? I do think that the latter is incomparably more improbable.

So, what are your options? If you are not simply to be like a squirrel or a rabbit, you *must* choose *some* quantum mechanics interpretation (as it is called—it is not really "an interpretation," of course; it is your theory of yourself and of your experience of observations). The authors offer nine choices. Let me go through all nine, giving you my "take" on them. Our authors make the important point that "while scientific theories must be testable, interpretations need not be." I found the authors' discussion of these choices extremely enlightening; in particular, I discovered that my own understanding of what these various interpretations contend was in some cases quite *defective*. I hope I can avoid major errors here, but I will be extremely brief:

1. **Copenhagen.** The "majority" interpretation, for decades. Not really an interpretation at all, but rather a (clearly non-physical) segregation of the world into the microscopic (in which there *is* reality, but it is *observer-created* reality) and the macroscopic (which was taken to be real). A *human* observer is not needed; a geiger counter will do just fine. Our authors correctly point out that the advance of technology now *forces* retreat from this increasingly untenable "interpretation."
2. **Extreme Copenhagen.** "In this view, there are no atoms" (attributed to physics Noble Prize winner Aage Bohr). The existence of the microworld is denied. And yet our authors say "This interpretation shows how far some physicists will go to evade the encounter with consciousness." I gather that the creators of this view identify reality with the world of experience.
3. **Decoherence and Consistent Histories.** Our authors correctly paint these as ineffective evasions of the real question. Decoherence is quite popular.
4. **Many Worlds.** Every observation with two possible outcomes results

in the creation of an additional entire universe. Many observations have an infinite number of possible outcomes, so infinitely many universes (complete with a you in it) are made very often indeed. Our authors say "there is no single reality, which is essentially equivalent to no reality." At the Science and Ultimate Reality meeting in 2002 in Princeton, Bryce DeWitt (the most influential advocate of this interpretation) sat down next to me at lunch and told me that those other versions of the universe are as real as ours . . . and that in his opinion we will eventually communicate with them (I am not making this up). Many highly-regarded physicists accept "many worlds."

5. **Transactional.** A convoluted approach that "very much involves an encounter with a conscious observer."
6. **Bohm.** I had not appreciated that for Bohm "there is no physical world 'out there' separate from the observer." The authors bring out that Bohm did consider a role for consciousness. There is a "quantum potential" that has no role other than to allow this interpretation in which there is "a physically real, completely deterministic world."
7. **GRW.** Not an interpretation, as it proposes a *change* in quantum mechanics. Such a change could be tested, and it should be! But, don't invest your own money in such tests. Our authors quote Steven Weinberg, "the one part of today's physics that seems to me likely to survive unchanged in a final theory is quantum mechanics" and state that they share his intuition. Well, his was *no* "intuition!" Weinberg once attempted to change quantum mechanics, but Polchinsky showed him that it couldn't be done.
8. **Ithaca.** "Correlations have physical reality; that which they correlate do not." This is the interpretation that is advanced by David Mermin.
9. **Quantum Logic.** Change the rules of logic. Our authors are not happy with this approach.

Finally, the authors note two additional "interpretations" that actually include physical speculations involving consciousness.

Do you find *any* of these interpretations satisfactory? I certainly do *not*. And our authors clearly do not. So, let me offer the Henry interpretation: There is no actually existing universe at all. The universe is purely mental.

If you prefer to do so, you may call this the Eddington-Jeans interpretation.

The only reason that it is difficult to accept the Henry interpretation is that few except Henry believe it. We are social creatures, with a herd mentality. But, Malcolm Gladwell has educated me that there can come a "tipping point," and I take it on myself to push toward broad acceptance of my simple thesis. (Calendar reform is more difficult. There, I *don't* expect to succeed.)

Let me ask my readers, does your *own mind* actually exist? Note that I am not talking about your brain, I am talking about your *mind*. Well, of course it does! *Cogito ergo sum*. After all our convoluted and ultimately entirely unsuccessful attempts to tease something, *anything*, REAL out of quantum mechanics and out

of the observations (the so-called "universe"), here, first crack out of the box, we have, with the Henry interpretation, a solid and irrefutable success! Something that is *real*. And it is a success that you *cannot* arrive at from physics, because physics does not include treatment of consciousness at all!

But does the Henry interpretation actually *say anything*? Does it have any *meaning*? It most certainly does! First, it means you can forget all the other interpretations that are offered (and what a relief that is!). Second, once you understand that there is no universe out there, you are forced to face up to your personal responsibility. You now have a fundamental decision to make. You *know* that other people do not exist. But, you must now decide whether their *minds* exist, as yours unquestionably does. Physics cannot assist you in this critical decision. Your stark choices are solipsism, or a leap of faith.

Eddington was a Quaker, so the leap of faith was easy for him: "the stuff of the world is mind-stuff. The mind-stuff is not spread in space and time; these are part of the cyclic scheme ultimately derived out of it. But we must presume that in some other way or aspect it can be differentiated into parts. Only here and there does it rise to the level of consciousness . . ."

For a person (such as me) who has never before been religious, this leap of faith is not so easy. Indeed, I worry that my decision, which (let me relieve your mind) is that the reader's mind *does* exist, is too much influenced by my previous (but now seen to be utterly silly) belief that the reader's (as well as my own) mind was created by real electrons.

Physics does not *require* you to make the leap of faith. But, should you choose *not* to leap, physics *does* then force you to believe that your mind alone is all that exists.

What is it like, after taking the leap? Well, first, understand, what I say now has nothing whatsoever to do with physics. Surely for, say, an Eddington, the result was simply reinforcement of his Quaker beliefs (which needed no reinforcement). For an atheist such as myself, the result is simultaneously enormous, and minor. I have made the leap of faith that MY mind is not the universe: well, you will not be surprised to learn that I sure don't accept that YOURS is! So, I am forced to meet the Great omniscient Spirit, GoS. How do you do! Pleased to meet you! I am here not at all joking; as I go for my hour of walking each day, I not infrequently hold hands with GoS.

You can see what I mean by "enormous." Of fundamental importance to me. But minor at the same time, because that is the end of it. The first ten Presidents of the United States were all Deists, not Christians. As was Lincoln. I join them in that belief.

The authors make the critical point that religious belief flowing out of quantum mechanics does not in any way validate "intelligent design" (ID). (Indeed, in my view ID is insulting to GoS, who is surely not, as the authors emphasize, a tinkerer.)

Let me return now to physics, and to the book *Quantum Enigma*. "Einstein believed quantum theory denied the existence of the real world." "This seems to deny the existence of a physically real world." "If unobserved atoms are

somehow not physically real things, what does it say of chairs, for example?" "You're denying the existence of a physically real world." "... told his cat story to show that quantum theory denied the existence of a physically real world." All quotes from this book! Why, then, does the list of interpretations in this book not include the Henry interpretation?

Or perhaps I should call it the Rees interpretation—I have not read Martin's book but the authors quote him: "The universe could only come into existence if someone observed it. It does not matter that the observers turned up several billion years later. The universe exists because we are aware of it."

Does any of this matter? It most certainly does. The authors point out that "*Principia* ignited the intellectual movement known as the Enlightenment." It was the Enlightenment that inspired the American founding fathers to create the Constitution, a landmark in human history. Note that Newtonian physics is deterministic, and yet, nonetheless, the founding fathers were all Deists. They, noble souls, had a much larger leap of faith to make than we do today (thanks to quantum mechanics), yet they all managed it. Our authors ask "Can it be that out there in our future there is a quantum impact on our worldview?"

Bruce? ... Fred? ... Hello-o? Have you read your own fine book?

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The Cult of Personality: How Personality Tests Are Leading us to Miseducate our Children, Mismanage our Companies, and Misunderstand Ourselves by Annie Murphy Paul. New York: Free Press, 2004. 320 pp. \$26.00 (hardcover). ISBN 0-7432-4356-0. Republished as **The Cult of Personality Testing: How Personality Tests Are Leading us to Miseducate our Children, Mismanage our Companies, and Misunderstand Ourselves**. 2005. \$14.00 (paper). ISBN 0-7432-8072-5.

To understand others is a desire that has persisted throughout the ages. From Hippocrates' four temperaments and Galen's corresponding body fluids, to physiognomist Johann Kaspar Lavater's use of facial structures, expressions and colorations and German physician Franz Joseph Gall's determination of character on the basis of the shape (and bumps) of the head (phrenology), cultures have sought to capture the essence of individuals—to describe and classify people and predict their behaviour.

During the 20th Century, a belief in the ability of psychology to subject