

A Conversation with Henry Stapp
Ryan Cochrane

Ryan Cochrane (RC): How did you become interested in physics and how did you end up working with [Wolfgang Pauli](#) and [Werner Heisenberg](#)?

Henry Stapp (HS): Already in high school I was solving every mathematical puzzle I could find, and was proposing theories about how the world works for example how light is propagated. As a junior, I read a book *Inside the Atom* that described, in effect, the [double-slit experiment](#), and I decided that this was a puzzle that I needed to solve. As a junior in college, at the University of Michigan, I carried out, during Easter vacation a double-slit experiment where the photons were, on average, 1 km apart, and verified that effect was not due different photons interfering with one another. As a young post-doc at UCB [University of California, Berkeley] in 1956, I was chosen to write up the lecture notes describing lectures that Pauli was giving. I talked often to Pauli, and expressed my objections to a theory that he was then working on with Heisenberg. Pauli invited me to come to Zurich. I arrived in September, we talked every weekday, and he treated me with great kindness and respect. In December he went to the hospital for a check-up, and sent a message that he wanted me to come to the hospital. But because I knew he was not at work, I worked at my apartment. When I returned to my office I found out that he had died. After his death I completed what we had been working on together, and then read von Neumann's book. I wrote for myself as essay "Mind, Matter, and Quantum Mechanics". I pursued the topic as a sideline to my main more practical work at the lab, and in 1993 [published a book](#) with the same title.

It was years later, in 1970 or 1971, that Heisenberg invited me to come to the Max Planck Institute in Munich, of which he was then the director. I had been working in Berkeley on [Axiomatic S-Matrix Theory](#), but had become deeply involved with the question of locality (faster-than-light transfer of information about which experiment an experimenter chooses to perform) stimulated by a 1935 paper by Einstein, Podolsky, and Rosen, and Bohr's response, and some more recent works by John Bell. We talked about these deep problems, and stimulated by those, and by my readings of William James, and many others, I wrote an article, "[The Copenhagen Interpretation](#)," which was published in 1972 in AJP [American Journal of Physics]. Heisenberg commented favorably upon it in letters recorded in the appendix.

RC: What do you think [quantum mechanics](#) [QM] has to say about the nature of the universe?

HS: I think the fantastic success and accuracy of QM, and its capacity to rationally encompass our conscious thoughts and their evident empirical capacity to influence our bodily behavior, together with the mind-like behavior of the physical aspects of the quantum mechanical description of nature — its sudden global jumps to new forms

compatible with newly received information — suggest that the world is in closer accord with our conception of mind than with our conception of classically conceived matter.

RC: Information is neither matter nor energy; several physicists are proposing that the basic substance of the universe is information. What does this say to you about the nature of the universe?

HS: But what is the nature of information? Is it an objective property of material bits, or is it a mathematical property of a message embedded in a stream of bits? Or does it have something to do with meaning? Does it have something to do with a consciousness being able to be informed about something? I think that shifting from the basic issues about mind and conscious experience is obscuring, not clarifying. The essential issues have to do with the place in the greater whole of the only things we know to be real, our conscious thoughts and the capacity of our present thoughts, ideas, and feelings to influence our future thoughts, ideas, and feelings, and if so, how to both comprehend that capacity and enhance it. Focusing on information tends to obscure rather than clarify, at least if information is not clarified.

RC: This basically supports Albert Einstein's view that the cosmos is fundamentally intelligible but why is that humans can deduce this?

HS: What is the 'this' that begins and ends this question?

RC: Wolfgang Pauli and [David Bohm](#) had somewhat mystical ideas about the nature of the universe and believed that the universe that you and I experience is an emanation of a deeper reality. What do you think about this?

HS: Our thoughts, ideas, and feelings are obviously part of a greater whole. But I am not sure they are mere emanations of a deeper reality. Our thoughts and feelings may generate causal inputs, something that classical mechanics denies.

RC: [John Archibald Wheeler](#) and [John Barrow](#) and [Frank Tipler](#) felt that human beings were vital components within the cosmic order. Would you agree with the [Anthropic Principle](#), that humans were brought into existence by the universe to observe it?

HS: Not merely to passively observe it, but to contribute to the actual unfolding of the actual.

RC: Many scientists today try to get around these issues by postulating the existence of a [Multiverse](#). [Hans Peter Durr](#) is an example of one quantum physicist who rejects the idea of a Multiverse in favor of a single universe that is creating itself anew moment by moment. What are your thoughts on the Big Bang and the multiverse concept?

HS: I agree with my friend Hans Peter, and also with my friend David Bohm — whom I explicitly asked, and he explicitly replied — that we live in one of the many worlds of the quantum multiverse. Of course, that does not mean that in some other sense there are not other independent creative processes going on.

RC: So are you saying you favor an approach to quantum physicists that postulates a single universe or do you lean towards the idea that our universe is one of an infinite number of island universes in a vast multiverse?

HS: I am talking about our own individual quantum universe, not about independent possible others.

RC: The [Bell Experiment](#) showed that quantum mechanics is correct, shows that there is an instantaneous transfer of information non-locally and that the universe may be the result of a self-existing mind or consciousness. Would you agree with this interpretation?

HS: I basically agree, with perhaps a slight weakening of the wording.

RC: The fact that the cosmos is fundamentally intelligible and science, mathematics and logic all seem to tie into together to create a coherent picture of reality, does that imply that there is some kind of organizing force of mind behind it all? The famous astrophysicist [Arthur Eddington](#) was actually quoted as saying that the idea of a universal mind or *logos* would be, I think, a fairly plausible inference from the present state of scientific theory.

HS: I do not believe the reality of which we are parts is an accident!

RC: If we try and tie together classical physics, quantum mechanics, evolutionary science and other fields of inquiry, what kind of overall picture is emerging and where do you think this is all going?

HS: I think von Neumann's orthodox QM gives a good way to understand the nature of the universe: it is tightly tied to the practical test and uses of our basic physical theory, while also accounting for the details of the mind-brain connection in a way that is rationally concordant with both our conscious experiences, and experience of control, and the neuroscience data.

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