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CONSCIOUSNESS AND QUANTUM REALITY with NICK HERBERT, Ph.D.

JEFFREY MISHLOVE, Ph.D.: Good evening and welcome. Our topic tonight is consciousness and reality, and my guest, Dr. Nick Herbert, is the author of a book called *Quantum Reality*. Dr. Herbert is a physicist. Nick, welcome to the program.

NICK HERBERT, Ph.D.: Thank you, Jeffrey.

MISHLOVE: It's a pleasure to have you here. You know, as a parapsychologist I find it fascinating that of the various academic disciplines that are interested in psychic phenomena, there seems to be the most interest from quantum physicists such as yourself. I wonder if we can begin the program tonight by having you explain to our viewers just what is quantum physics, and why would you find the phenomenon of consciousness to be so interesting?

HERBERT: Well, quantum physics started out in the twenties to explain the interaction of light with atoms. It focused on that, but now it's extended to explain the interaction of anything with anything. It's basically the physicists' theory of the world these days, and it's been very successful. So there are two reasons, I think, why quantum physics and consciousness have some connection. One is that quantum theory, as most people know by now, is very strange. It has very weird properties.

MISHLOVE: You're dealing with the very smallest particles of matter that exist.

HERBERT: Yes, that's true.

MISHLOVE: Subatomic particles. Typically we hear that this sort of stuff [knocking on furniture] is no longer solid; it's mostly a vacuum in quantum physics.

HERBERT: Not only is it not solid, is it mostly empty space, but it's also probabilities -- just fuzzy, not even totally real.

MISHLOVE: In other words, particles aren't even particles anymore.

HERBERT: Particles aren't even particles anymore. That's one of the connections with consciousness -- that the solidity of matter is dissolving away in light of these theories, and becoming more and more like the fuzziness that's inside our heads.

MISHLOVE: And that's the basic, most fundamental theory in all of physics.

HERBERT: Yes, that's the basis of everything that we do in physics anyway, in quantum physics.

MISHLOVE: And physics is in fact the basic science of all the sciences. So the most fundamental theory of all of science is that the basis of reality is fuzzy.

HERBERT: Is fuzzy, is crumbling, and it is ambiguous -- that's a word I like to use. Somehow there's a basic ambiguity at the center of the world -- the center of the inanimate world, the unconscious world. So that's the first reason -- that there are some formal resemblances between quantum theory and what the mind looks like from the inside. And the second reason is that physicists are running out of problems. In some senses we're too successful. All the problems that are within our grasp we've not solved entirely, but solved in principle. So we're reaching for more and more things to capture within this net. People are now trying to explain the very creation event itself by using quantum physics, and we've just about run the particle trip down to the limit. Now it's only a matter of money -- bigger and bigger accelerators, that's the way to go. But that can only go on so long, so many physicists are looking for new questions to ask.

MISHLOVE: A term that I keep hearing is quantum interconnectedness, and the notion that separability doesn't exist -- that somehow all is one, the way the mystics used to say it.

HERBERT: Yes. There is a peculiar feature in quantum theory called quantum interconnectedness, and it was discovered right when quantum theory was discovered. It was found that in the quantum description of two objects, when two objects briefly interact and then you pull them apart, in the description at least they never come apart; there's a kind of stickiness that connects them together, so they're bound together forever in the theory. They never separate, even though they're not interacting anymore. It was thought that this was just a theoretical artifact; it was nothing that existed in the real world. Physicists noted it, said this is very strange, and then they promptly forgot about it for about fifty years. But recently, due to something called Bell's theorem, new interest has been rekindled in this interconnectedness. Bell's theorem proves that this connection is not a theoretical artifact, but actually exists in the real world.

MISHLOVE: I should mention for the benefit of our viewers, Nick, that you are probably one of the world's foremost authorities on Bell's theorem; that's what you specialized in. Bell's theorem seems like the crack in the cosmic egg, in a way; it's the one part of quantum physics that's almost turned everything upside down.

HERBERT: One of my claims to fame is that I have produced the shortest proof of Bell's theorem in existence. It's about three lines.

MISHLOVE: Now, Bell's theorem, as I understand it, goes back even prior to Bell -- to Einstein, and Einstein's disagreement with quantum physics, back in the early days. He made his classic statement, "God doesn't play dice with the universe," at a time when Einstein himself felt he disagreed with quantum physics, as I understand it. He felt that if quantum physics were true, it would have these horrendous implications which it now turns out are true.

HERBERT: Yes, Einstein was never comfortable with quantum theory, and he basically had three gripes with it. The one gripe was that quantum theory is a probabilistic theory. It just describes things like the world is essentially random and governed only by general laws that give the odds for things to happen, but within these odds anything can happen -- that God plays dice. Einstein didn't like that, but he could have lived with that. The second aspect that Einstein didn't like was the thinglessness, this fuzzy ambiguity -- that the world isn't made of things, it's not made of objects. It was put by Paul Davies -- the notion that somehow big things are made of little things. Quantum theory doesn't describe the world that way. Big things aren't made of little things; they're made of entities whose attributes aren't there when you don't look, but become there when you do look. Now, that sounds very, very strange.

MISHLOVE: Like an illusion.

HERBERT: Like an illusion, yes.

MISHLOVE: Or the Hindu concept of Maya, something like that.

HERBERT: That's right. The world exists when we don't look at it in some strange state that is indescribable. Then when we look at it, it becomes absolutely ordinary, as though someone were trying to pull something over our eyes
-- the world is an illusion. Einstein didn't like that. He felt that the big things were made of little things, as the classical physicists thought.

MISHLOVE: The Newtonian view of billiard-ball-like particles -- that if you could only understand the momentum and position of each one, you could predict everything in the universe.

HERBERT: Everything in the universe, yes, a comfortable sort of view.

MISHLOVE: You mentioned three things that Einstein objected to; then there must be one more.

HERBERT: Well, the third thing is this interconnectedness. Einstein said the world cannot be like this, because this interconnectedness goes faster than light. With this quantum interconnectedness, two objects could come together, meet, and then each go into the universe, and they would still be connected. Instantaneously one would know what the fate of the other one was. Einstein said, now that can never be; that's like voodoo -- in fact, he used the word -- it's like telepathy, he said; he said it's spooky, it's ghostlike. Almost his last words in his biography were, "On this I absolutely stand firm. The world is not like this." He died in '55, and ten years later Bell showed that the world must be like this. It's kind of ironic. Bell himself said, "My theorem answers some of Einstein's questions in a way that Einstein would have liked the least."

MISHLOVE: And Einstein created a very strange picture of the universe as it is, almost time travel, in his theory of relativity.

HERBERT: Yes, but even Einstein's mind wouldn't go this far, to accept these instant connections, which now we believe really must exist in the universe.

MISHLOVE: The notion of instant connections almost implies that space itself is an illusion.

HERBERT: Yes, that distance is an illusion.

MISHLOVE: That distance is an illusion -- that you and I and our viewers and the chair are all somehow intimately connected with the most distant part of the galaxy.

HERBERT: Yes, that we're all in one place, that there aren't any places.

MISHLOVE: And the notion the mystics sometimes say, that you and I, we're not really separate individuals, but at a deeper level we're like fingers; we're all connected. Or we're like islands connected. There's that sense of connectedness as well.

HERBERT: Yes. This now has a certain kind of verification in Bell's theorem. But like most of these things in physics, there's a good side and a bad side. Bell's theorem shows this connection must exist, but it also says that in some senses it's an invisible connection, it's an inner connection. There are two aspects to quantum physics; in a sense it's a little bit like dice. There are two aspects to dice. There are the individual dice events that occur, and then there are the statistical patterns -- like a lot of sevens will occur and not many twelves. So there's the overall pattern, and the individual events. Now, what quantum theory talks about are the patterns; quantum theory predicts patterns. And what Bell's theorem shows is that none of these patterns are ever connected faster than light; you will never see a faster-than-light pattern. But the individual events, the dice falls themselves, must be tied together faster than light. One could say, "Well, everything is connected faster than light, instantaneously," but that's not so, because the patterns don't connect, but the individual dots do. So that's the constraint on this connectedness. If all the patterns were instantaneously connected, it would really be a strange world, because our ordinary experience is made of patterns of dots, of these little quantum events, and so there wouldn't be any space for us.

MISHLOVE: Now we're dealing with a paradox, it would seem. It reminds me in your book you conclude with a little blues song. As I recall, it goes something like, "If we're all so connected, why do I feel so all alone?"

HERBERT: Oh yes, "Bell's Theorem Blues." Yes, we're all connected in a sense, but in another sense we're not connected. There's a certain balance in nature. In fact, that's one of the things that drew me to physics. We're learning that the world is put together in such a strange way that it's almost like reading science fiction. You don't know what's going to happen next. And this is certainly a strange way to make a universe. All the patterns are perfectly ordinary; they preserve space and time, and they're separated at light speed. Yet the bricks that make up these patterns are not that way at all. They don't know anything about space and time, and they're connected instantaneously. Now, why make a universe that way? I would never make a universe that way. To make a local universe, I would use local parts. But whoever made this universe, or if it made itself, s/he did it with parts that were better than the whole, in some sense.

MISHLOVE: We'd better define what local means in this context.

HERBERT: Well, local is a technical term used by people involved with Bell's theorem. A local connection is an ordinary connection that obeys the speed of light, and a non-local connection is like voodoo -- that when you do something here, instantly it affects someone over here. What Bell proved was that no model of the world that used only local connections would work.

MISHLOVE: So there have to be occasional non-local connections.

HERBERT: Not occasional -- everything is non-local.

MISHLOVE: Everything is non-local, but as you say, it doesn't normally show up in the patterns of events. Well, let me ask you this. Let's talk for a moment, to shift gears, about psychic phenomena -- telepathy, voodoo, or psychokinesis. Quantum physicists are very interested in this. How do the predictions of quantum physics relate to this aspect of mental functioning -- information transfer at a distance?

HERBERT: Well, since information is a pattern, Bell's theorem would say, well, no patterns are transferred faster than light, so you won't see any telepathy on that level. So at a first cut, Bell's theorem would say no telepathy. But then there are these individual events that are churning along. Now, one of my speculations is that there are two kinds of knowledge that people have about themselves. One is the kind of computer-like knowledge where you have facts, and the other is this very experience ourselves, that we have right now. It isn't computer-like, it isn't facts.

MISHLOVE: Direct, raw experience.

HERBERT: Raw awareness, whatever that is. My feeling is that these correspond to the two types of observation, two types of phenomena, going on in quantum theory -- that there are these patterns, these are like computer data; and then there are the events themselves, the irreducible events, and that's like awareness. So my feeling is that people might be able to share awarenesses, whatever that is, but not data. So there might be mood links.

MISHLOVE: Empathy.

HERBERT: Empathy -- soft connections, but no hard connections. So if I were to do experiments of this sort, I would work on that level -- try and find a way of making clearer these non-data type of experiences that people have, and see if they're connected with one another. I'm afraid Bell's theorem doesn't offer much hope for mind reading and things of that sort. At least it doesn't to me; I can't see how to use it.

MISHLOVE: Interesting. That answer surprised me a little bit, but I know you yourself have conducted some ESP research. You designed a very unique instrument called the metaphase typewriter to test psychokinesis. Perhaps we could talk about that a little bit, and what you did find.

HERBERT: OK, well, since physicists don't know much about consciousness, we start with very crude models. So one model was that things have insides and outsides. Your outside is the physicalness of you, and the inside is your consciousness. So we assume everything has an inside and an outside, all the way from atoms to people.

MISHLOVE: You mean atoms might be conscious?

HERBERT: Oh yes. We'd never know it, because I can't find out your insides either.

MISHLOVE: There are some psychologists who think that human beings aren't conscious either.

HERBERT: That's true. What they show is that psychological methods can't show a psychologist someone else's insides. That's what they've proved.

MISHLOVE: You can only know your own.

HERBERT: Yes. So if we can't do it with people, we certainly can't do it with atoms. Atoms, for all we know, could be conscious; there's no way to show one way or another. My notion had to do with the idea of discarnate entities coming through channels, through spirit mediums. I felt there might be something unethical about that -- of a spirit's inhabiting a body already inhabited by a spirit. So the idea came to me, why not build a little machine that an entity, a discarnate, could inhabit?

MISHLOVE: A computer, in effect.

HERBERT: A computer, or some receptacle similar enough to human minds, that a discarnate could inhabit. And since I believe that quantum mechanics is at the basis of our consciousness, that somehow the reason we are conscious is not because we are really good computers -- because actually we're not very good computers at all; our consciousness pretty much impedes in some senses our computational facilities. Consciousness is really a luxury, so for whatever reason, I believe that somehow quantum theory has to do with consciousness. So any quantum system would do, but then it needs to be coupled to a level we can understand. So the metaphase typewriter used a quantum system coupled through a computer to a language-generating device, and it typed out English, and the English came from nowhere. It came from absolute quantum randomness, generated by a radioactive source. We put the metaphase typewriter in very high-energy psychic realms and tried to invoke spirits to come into it and take over its keyboard.

MISHLOVE: Now, let me step back for a moment, because I think we made a logical leap. The typewriter was in effect being controlled by the output of subatomic particles from a radioactive source.

HERBERT: Yes.

MISHLOVE: And you referred to that as nowhere because, as I understand it, the output of subatomic particles is considered in quantum physics to be a purely random, unpredictable phenomenon.

HERBERT: Totally uncontrollable. As far as physicists, that's where physics stops. Physicists can't explain when the next subatomic particle will come out. Even if they have complete control over the experiment, they can't make the next one come out. It comes out of its own accord. And all of quantum physics is like this. When the next light photon comes out of a laser can't be controlled, or any other quantum phenomenon.

MISHLOVE: I should mention, for the benefit of our viewers, that this is the basis of a great deal of computerized research today in parapsychology -- using a quantum mechanical radioactive source, and having people -- some with psychic experience or psychic claims, and other people -- try to predict or attempt to control that radioactive output.

HERBERT: It's certainly more random than the wheels at Reno. It would be very impressive if someone could change a radioactive source's output at will.

MISHLOVE: You connected this output to a language generator, so that if any patterns were to form in the output, it might be intelligible as language. So if some kind of discarnate entity could control the radioactive output, it would be like a computerized Ouija board; it might be able to create sentences, words, and so on.

HERBERT: Yes, but it would be better than a Ouija board, because no human would be operating it. It would be a direct proof of the existence of discarnates, in addition to being your channel to discarnates. So we did the metaphase typewriter, and also an advanced version that involved a voice generator, called the quantum metaphone, where this voice came out -- out of nowhere again, out of the quantum void. And we invited Matthew Manning one afternoon, at Xerox, actually, to come in.

MISHLOVE: The famous psychic from Britain.

HERBERT: He didn't like the sound of the voice, so we turned that off, and we just sat him in front of the typewriter, which came out on a typewriter as well as a TV screen. He liked to watch the TV screen as this gibberish scrolled across the screen.

MISHLOVE: Normally, this is what it would be, is gibberish -- random phonetic sounds.

HERBERT: Yes. And he just watched that, and tried to will something to come across. That one was unsuccessful. In fact, most of the events were unsuccessful as far as getting a clear channel, a clear psychic channel. We had a lot of strange events happen, whether by random or by some spirit hitting it for an instant.

MISHLOVE: What would be an example of such a strange event?

HERBERT: Well, the best one was we had an all-day Houdini fest, on the hundredth anniversary of Harry Houdini's birth. We set up challenge posters to Houdini, who claimed that if he could make it back from the dead, he would try to make it back. And here was an anniversary of Houdini's death. We held it in San Francisco, a place Houdini liked. We held seances while the metaphase typewriter was going on. We turned out the lights and held hands and tried to contact the spirit of Houdini. We tried everything we could think of to bring Houdini's spirit into this typewriter. But what happened, the very first line of data was what was most interesting, because the typewriter wouldn't work. The feed malfunctioned.

MISHLOVE: Jammed or something.

HERBERT: And the print went all over the page, making a little frame. In that frame there was a single word, and that word was "inininfinitime."

MISHLOVE: That's quite a word.

HERBERT: That's a nice word.

MISHLOVE: "In an infinite time."

HERBERT: It wasn't spelled quite right; it was "inininfinitime."

MISHLOVE: Phonetically. In other words, In an infinite time, if I had a million zillion monkeys all typing, eventually I could type out Macbeth.

HERBERT: Or I could type out a message from Houdini. So it was a very ironic message. We burst out laughing, of course, at this message, and that seemed to be the only conscious thing to come across on the metaphase typewriter that day. By the way, the metaphase typewriter generates literature not in lines or pages, but in pounds, if you can imagine. As fast as the typewriter can print, we can generate that.

MISHLOVE: With the high-speed printers these days. So that was one of the rare occasions when something interesting did come across.

HERBERT: Yes.

MISHLOVE: Well, you mentioned earlier that you believe quantum physics is at the basis of consciousness. I wonder if you would come back to that point and elaborate on it.

HERBERT: Yes. Right now there are two main approaches to consciousness, I believe. They are studying the brain, looking at how the brain does it -- the one machine in the world that we know is conscious for sure -- and then trying to simulate cognitive things on computers. I think this is where the smart money is placed these days. I think these are a good place to do research.

MISHLOVE: Trying to simulate brain functioning on the computer.

HERBERT: On computers, and looking at brains. And I think we learn a lot about brains and computers there, but not very much about consciousness.

MISHLOVE: The field of bionics.

HERBERT: Bionics, robotics, something of that sort. It seems to me that consciousness is wholly other than a computer program or electric impulses. The brain is an exotic electric medium. It doesn't have wires.

MISHLOVE: It's been defined as a kind of computer with electrical impulses and chemical impulses, so it might be both an analog and a digital computer. But you're saying if there's a quantum mechanical basis it goes down to a subatomic level, then, not just neurons.

HERBERT: Not just neurons. And I believe that any entity that's conscious must tap into this quantum level somewhere -- that somewhere in the brain there is a system that is sensitive to quantum fluctuations, and that that system is where we are conscious. If you look at consciousness from an information theoretical point of view, there are certain data rates associated with things. The data rate associated with television, for instance, is six million bits a second. That's how much it takes to take these images and send them.

MISHLOVE: That's a lot.

HERBERT: It's a lot. The telephone takes about three thousand bits a second -- three thousand bits to send a voice along a line. To send Morse code it takes about ten bits a second. Now, I've looked at the data rate of human consciousness. It's maybe two or three bits a second.

MISHLOVE: Two or three bits a second?

HERBERT: Two or three bits a second.

MISHLOVE: Slower than Morse code?

HERBERT: Slower than Morse code.

MISHLOVE: And what do you base that on?

HERBERT: How many things we can pay attention to at any one time. I mean, sure, there's a lot going on in the brain, and sure, there's a lot going on in your visual field. But how much of that do you see, right this instant? We're very distractible, very small-data-rate entities.

MISHLOVE: OK, but what you're saying, if I understand you right, then, is that the brain is receiving a lot of information, but consciousness is filtering it out somehow.

HERBERT: The brain is about 1012 bits per second. It's immensely more powerful than TV.

MISHLOVE: And than consciousness itself.

HERBERT: Well, consciousness itself is a minuscule flea on the back of this enormous machine.

MISHLOVE: And yet it's responsible for all of our culture.

HERBERT: Yes. So consciousness as a data rate would be obviously almost undetectable in the masses of everything else that's going on there, unless it were located in some central point, which may be so. We had a little group in San Francisco called the Consciousness Theory Group. We were going to solve the problems of consciousness. There were people from physics and from psychology and computer sciences, and one of our hobbies was looking at slides of the brain and trying to locate where the consciousness would be. One popular place is the reticular activating system.

MISHLOVE: Oh yes, in the brain stem.

HERBERT: In the brain stem, a very primitive part of the brain.

MISHLOVE: It has to do with awareness, alerting you to pay attention to things, waking and sleeping.

HERBERT: Yes, to various sorts of things. But it's not a very complicated system.

MISHLOVE: But what you're saying, then, is consciousness is very, very small. And yet my sense is -- you surprised me -- I would think consciousness would be potentially very large.

HERBERT: No, not as far as data rate goes. Basically, it's like the President and the three hundred million people, or however many there are, and one man in some sense controls the actions of the whole thing -- not the detailed actions, but the collective actions.

MISHLOVE: I see. In other words, the control system is a very small part of the whole system. I've got it.

HERBERT: Exactly. If you think the purpose of consciousness is to control this.

MISHLOVE: Well, Nick, you've certainly raised many more questions than we've had time to answer this evening, but it's been a real pleasure having you with us exploring the mysteries of consciousness and quantum reality.

HERBERT: It's mutual, Jeffrey.

MISHLOVE: Thank you very much.

HERBERT: Thank you.

END