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Reality is Eye Candy

*(When Human Science Lifts Human Spirit - The Challenge for Science and Spirituality)*

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Our conscious experiences are quite complicated and have all sorts of unexpected properties. For example, our experiences of color are highly correlated with an area of the brain called V4. If you have a stroke in V4 in the left hemisphere you lose all color experience in the right visual world. It just goes to shades of grey. If you take a magnet and inhibit V4 in the left hemisphere you lose color temporarily in the right visual field. Take the magnet away and color comes back.

This is just one of hundreds of correlations we've found. Every conscious experience that we've been able to test has a neural correlate, and this has raised the scientific question, how does matter, perhaps neural matter, create conscious experiences? We have tons of data, tons of correlations between conscious experiences and states of the brain, so how does the magic happen? How does neural activity create conscious experiences?

This turns out to be one of the biggest unsolved mysteries in science today and it's not a new mystery. Leibniz raised this question 300 years ago and Huxley raised it in 1869. He said that how neural activity causes conscious experiences is as mysterious as a genie appearing out of a lamp when you rub it. We still don't have any scientific theories that explain how conscious experiences could emerge from brain activity.

This raises the question, can there actually be a science of consciousness? Can science actually address this question or not? We don't expect that monkeys have the concepts needed to understand quantum mechanics. Maybe Homo sapiens doesn't have the concepts we need to understand how matter could give rise to consciousness. If we don't have the concepts, then maybe we can't do this. Wittgenstein said, "Whereof one cannot speak, thereof one must be silent."

Then there's the argument from a spiritual direction as well. Rumi said, "Silence is the language of God. All else is poor translation." Science has been very successful, but is it the case that when it gets to consciousness it's gone beyond what it can do? Is the spiritual realm where progress stops?

Now, I respect someone who says silence is the language of God, all else is poor translation, and then is consistent and says nothing further. I would respect that, but that's not what happens. Tens of thousands of words in every spiritual tradition try to deal with issues of consciousness and we have conferences where we talk about it. There are lots and lots of words. Wittgenstein had something else to say: "What can be said at all can be said clearly." Again, I respect complete silence, but if we're not going to be silent, then we should at least try to be as precise as we possibly can.

Science is characterized by careful observations, precise testable theories, and by the willingness to be shown that you're wrong. Precise theories are precise not because you think you're right, but so that

others can tell you precisely why you're wrong. Can we be precise about consciousness so that we can be shown to be wrong?

We can learn by doing careful experiments on conscious experiences. There are things about them that surprise us. We are not infallible about our conscious experiences, and we are not the true authorities about the nature of our conscious experiences. Introspection about conscious experiences is fallible. That's why we need to do science.

Part of my background is in psychophysics. This is the science of studying conscious experiences and building mathematical models. Your conscious experiences are not random things. We do careful experiments and can write down mathematical equations that actually describe the conscious experiences you will have. They're mathematical, so conscious experiences can be described by mathematics.

How can we move forward with a scientific theory of consciousness? I think both science and religion, science and spirituality, science and nonduality, have contributions to make to a new science of consciousness, but there are going to be challenges for science and for spirituality to do this successfully. Deeply-held preconceptions are going to have to be let go to make progress, because the current conceptions aren't working. It's still a mystery.

Here are the challenges for science. Scientists believe that space, time, and objects exist even if they're not perceived. That's a fundamental assumption of most. They also believe that space, time, and matter are the right concepts to describe objective reality. I want to propose that that's false. Those are the wrong concepts. One reason why most scientists think that those are the right concepts is because we perceive the world that way. We perceive the world in terms of space and time and physical objects.

And there's an evolutionary argument. We don't see all of reality, but those of our ancestors who saw reality accurately had a selective advantage over those who saw less accurately, so we are the offspring of those who saw reality more accurately. We might get things wrong here and there - not quite the right shape and so forth - but, in general, our perceptions are accurate. That's the standard view, and it turns out that it's false.

When you analyze the equations of evolutionary game theory it turns out that, whenever an organism that sees reality as it is competes with an organism that sees none of reality and is tuned to fitness, the organism that sees reality as it is goes extinct. It's very clear. If our senses evolved and were shaped by natural selection, the probability that we see reality as it is is zero. The probability that space and time and matter are the right concepts to describe objective reality is precisely zero.

Back in 1633 Galileo said, "I think tastes, odors, colors, and so on reside in consciousness. Hence, if the living creature were removed, all these qualities would be annihilated." He thought that colors and tastes are not objective properties of the world, but subjective properties of consciousness. He still believed that physical objects and space-time were objective. Galileo took the first step. There's another step. You have to let go of space, time, and physical objects as well.

Space, time, and objects exist only in consciousness. That's a bitter pill for most scientists, but some are coming around. Nima Arkani-Hamed is a professor working on fundamental physics at the Institute for Advanced Study in Princeton and he's come to the conclusion that space-time is doomed. He goes on to say that in the underlying description of the laws of physics there's no such thing as space-time. That's

startling because what physics is supposed to be about is describing things as they happen in space and time. If there is no space and time, it's not clear what physics is about.

Our theories of quantum mechanics and general relativity, which assume space-time, are deeply wrong. We're going to have to give up space-time.

So what is space-time and what are our perceptions of objects? I think a good way to think about them is that they are just a user interface. We evolved a user interface.

If you're crafting an e-mail on your computer and the icon for the e-mail is blue and rectangular and on the right corner of your screen, that doesn't mean that the e-mail in your computer is blue and rectangular and in the right corner of your computer. The interface is not there to resemble reality. It's there to hide reality and to give you eye candy that lets you do what you need to do. That's what evolution did. 3D space is our desktop. Physical objects are the eye candy. They are there not to show us the truth but to hide the truth and let us act in ways that keep us alive. Space-time is not a fundamental reality. It's a data structure that we evolved. We're living in the matrix of our data structure.

When I open my eyes and I have a conscious experience that I describe as a red tomato one meter away, I'm interacting with something, but that something is not a red tomato and it is not in space and time. It's something utterly different.

And here's the kicker for the problem of consciousness. When I look inside the skull and I have a conscious experience that I describe as a brain and neurons, I'm interacting with an objective reality, but that reality is not brains and neurons. It's something utterly different. The best I can do as a humble member of Homo sapiens is to describe it as brains and neurons. But brains and neurons do not exist unperceived. They have no causal power, and that's why we've never been able to boot up consciousness from neural activity. It can't be done, because neurons have no causal powers. They're just useful fictions of our desktop interface.

Scientists have to give up the idea that there is a third-person science. The key idea of third-person science is that you can look at this physical object and I can look at the same physical object and we can both make measurements on it and then compare. But there are no public physical objects and space-time itself is doomed. Scientists will also have to give up the idea of third-person science. All of science is first-person science. There can be comparison between different experimenters, but it's all first-person science.

Finally, I am proposing the idea that conscious agents are fundamental. I think we have to reboot science with a notion of consciousness. The story that there was first the Big Bang and then, billions of years of later, life, and then, hundreds of millions of years later, consciousness, is fundamentally wrong. It's the other way around. Consciousness is fundamental. We need a mathematical model of it and from that model we need to boot up space-time and matter. We can do that, but it's going to take some hard mathematical work.

Now, challenges for spirituality. Everybody's going to have to give up on something here. It's not easy. First is to admit that maybe consciousness can be described with mathematics. The only way to show that this is wrong is to try and go down trying. Can we come up with a mathematically precise theory of consciousness and, from that, boot up space, time, and matter?

I think a precise mathematical science of consciousness is possible, a science that doesn't have to be a contradiction to human emotions and aspirations. The two can work together. Science is about careful observations and testable theories, and there are no infallible authorities. Scriptures and teachers can be a source of inspiration but we cannot take them as infallible authorities. For some that might be difficult.

Science and spirituality can work together and bring our insights to make a very human and a very rigorous approach to understanding the question of consciousness, so we can finally understand who we are. That's my hope. Science and spirituality, working together, can explore, and I think understand, consciousness.