

# TECH[NOCULTURE

## Spirituality and quantum physics: The scientific study of consciousness

### Episode 37

### Full transcript

Guest: Federico Faggin [Federico]

Host: Federica Bressan [Federica]

[Federica]: Welcome to a new episode of Technoculture. I am Federica Bressan and today my guest is Federico Faggin, an Italian physicist, multi award-winning inventor, innovator and successful entrepreneur. Welcome to Technoculture Federico.

[Federico]: Thank you.

[Federica]: Thank you for letting me call you Federico and for having me here at your house today, in the Palo Alto area, where you have been living and working for the past decades, achieving all the important results that we all know in your career. But you're still working on something new! You're not done with being an innovator and in this case by trying to bring into the sciences the fundamental concept; that consciousness is an intrinsic property of nature and that physics is incomplete if we don't consider this with all the implications and artificial intelligence and all the rest. So would you like to summarise, if you will, what's important in this message that you're trying to express - specifically to the scientific community - and that is hard to get through?

[Federico]: Yes. The essence of the message is that reality has two fundamental aspects. An inner aspect, which is similar to the inner reality that we have within ourselves, which is private and not shareable directly, you cannot see my inner reality, I cannot see yours. But I can communicate to you using symbols and you may be able to understand the inner reality is semantic, the outer reality is symbolic, syntactical. So, to me this is a foundational aspect of all reality. So the quantum fields of quantum physics, for example, in my model, are conscious.

They have an inner reality and they have an outer reality. Physics only studies the ‘outer reality’ as if it was all that existed and so, in my model that is not enough. There is also the ‘inner reality’ and inner reality is made of consciousness of identity and agency, in other words, the quantum fields that view from the physics side are only symbolic, they’re only information, quantum information. In my model, a quantum field, is ‘a self’ that has consciousness, in other words, it has an inner experience where it perceives itself and the world, and can comprehend itself and the world, get the meaning of itself in the world. It has free will and the capacity to act in the world, while the actions in the world are actually ‘communications’ and the symbols of the communications are what we imagine the particles to be, which are actually states of the fields. So, in this model, reality is made of selves that communicate with each other and through that communication create ‘hierarchies of selves’, in hierarchies of symbols; like the particles, the atoms the molecules, the macro-molecules, the cells, human beings and so on. So, in this model then, inner and outer are two aspects, irreducible aspects of an entity, conscious entity, that cannot be broken down and that changes completely the reality, the way we understand reality. So consciousness is a foundational aspect of reality, but the essence of reality is not matter anymore, it is these ‘selves’ that communicate and through communication, create physical universes which are the outer aspect of a constructed reality by a collection of selves and each self has an inner world, which is private, made of me.

[Federica]: There is something important to observe precisely; you quote quantum physics, you’re not falsifying any previous theory, you say quantum physics expanded, contains Newtonian physics, so your model may contain quantum physics...

[Federico]: That’s correct.

[Federica]: Would you imagine that this is the final layer - or of course we can’t know - but if consciousness is the fundamental and intrinsic property of the universe, so what the universe is made of, an energy that wants to know itself, right? Then, that’s the limit, if we could understand that?

[Federico] : Yes, that in some ways, that would be the limit. But, it is an ever evolving limit, in other words, the ‘self-knowing of the selves is never-ending’, because you know, you have to assume that these selves are potentially infinite entities, they will never finish knowing themselves. So whatever they know, it becomes finite. But there is more to know about themselves and so, you know, there is a continuing evolution of these selves into organisations of selves, organisations of organisations of selves and so on. And we are an example of an organisation of an organisation of an organisation of selves because we’re made of atoms and molecules and cells and, you know, and entities which are much higher than the organs of our body.

[Federica]: Now I know why you chose this quote, which I have here, which I took from the

website of your Foundation: "Everything is an enigma and the key to an enigma, is another enigma", by Ralph Waldo Emerson. So, I just mentioned your Foundation, I took this quote from the website of 'The Federico and Elvia Faggin Foundation', which you started in 2011, correct...

[Federico]: Yes.

[Federica]: To support the scientific study, theoretical and experimental study of consciousness in US universities and nonprofit organisations.

[Federico]: Yes.

[Federica]: So, this has been going on since 2011, it's 2020 now. Can you give us some example of some concrete results obtained with the foundation?

[Federico]: Yes, well the Foundation has supported the research of Dean Radin, for example, at IONS (Institute of Noetic Sciences) who has studied the influence of intentions on photons going through a double-slit, finding that there is in fact the capacity to affect the physical behaviour of these electrons, even at distances of many thousands of miles. And it's a small effect, about four or five Sigma which is not insignificant, but there is no model to explain how this can, might happen. More recently, I am working on a model of consciousness and I'm founding the group of UC Irvine, [with] Don Hoffman, and there have been several papers published so far. I've also created a Chair in the Physics of Information at UC Santa Cruz to study informations in living systems, in 'systems out of equilibrium', because I believe that type of information is not Shannon information that we use in computers and so it's important to really study that. I also am [supporting] groups in Chapman University and in the Quantum Group that exist at Chapman and also a Brain Institute that Chapman has just started and several individuals as well. So, you know, the work is progressing and of course, I am myself developing a model and that starts with these ideas that I expressed earlier and trying to create a conceptual structure that can guide us to find out what, how far we need to go in physics. In other words, can quantum physics the way we know it, 'quantum field theory', explain consciousness if we add a few things, or do we need a physics which is even beyond quantum physics, that we don't know yet. But ideally the physics that we know, re-interpreted and by adding consciousness to the field, so the quantum field may be sufficient to explain, so we'll find out.

[Federica]: Science is something very specific, it needs to, wants to, prove and verify and observe. So how can you be sure that, science can investigate these types of things where you have mentioned 'inner experiences', or almost receiving some knowledge, instead of you know, an active wanting to understand and manipulate which science does, it's the right tool to do

that. So how can you be sure that science can investigate this field?

[Federico]: Well, obviously, I can only appeal to people that have a similar thinking like I do and I hope to appeal to a sufficient number of young people that are still open to the reality of ‘inner reality’ and not just ‘outer reality’ that physics today doesn’t doesn’t consider ‘existing’. For physics today, only the ‘outer reality’ exists, consciousness is simply produced by the brain and is ‘an emergent property of a complex informational system’, which doesn’t explain anything. But, it provides a pacifier to anybody that asks questions and you can keep on doing whatever you did before. And of course, I had accepted that 30 years ago, 33 years ago, when I started studying consciousness, I had accepted that. And I asked myself, ”Can I build a computer that is conscious?”, and as I started thinking about the problem it was very clear, pretty soon that it was impossible. Nobody can explain how we, as a mechanical system, can have consciousness. It is impossible to explain, no physicist can explain, no scientist can explain the fact that we have an ‘inner reality’, because ‘matter’ is only ‘outer reality’. So ‘interiority’, how can ‘interiority’ emerge from matter that is only ‘exteriority’? It’s impossible. They are two different qualities and so in the past, the word consciousness was cleverly and carefully avoided in scientific circles, because nobody could explain it, so might as well pretend that it doesn’t exist. But it exists and in fact it is what gives meaning to our life, how can we neglect what gives meaning to our life and then today people talk about creating computers that will be conscious perhaps in 20 or 30 years and people don’t even know what consciousness is. How can they say that?! And then people get confused and today we’re told that we are machines and so, all of that creates enormous confusion and enormous damage to people because we are actually not machines. We’re not even close to computers, we are compared, the brain is compared to a computer, we are not even close. We are quantum systems, we are quantum systems. We have a nucleus, a ‘core of quantum-ness’ that connects us to a reality, which is the quantum reality in which things can be in super-position, things can be connected non-locally. Our thought, a thought that we can make before it is translated into words, into mental words, that thought has super-position of potentially contradictory things. But we can perceive that, in our mind, when we translate it into symbols, we can only tell one thing at a time and therefore, things are no longer in super-position. But our mind already has this property, we perceive a reality which has ‘quantum-ness’ in it, already, and we know that. It cannot be explained, a computer is pure Boolean logic and not the quantum logic that exists in the quantum reality. So here we have a fundamental difference and science needs to attack this problem before it’s too late, because today everybody thinks, every scientist typically thinks, that consciousness is a ‘property of matter’ and that is not the case, in my opinion, after studying it for thirty years. And many of the student of consciousness that have studied consciousness for tens of years are arriving at the same conclusion; that it is impossible to explain consciousness with the paradigm, scientific paradigm that we have today.

[Federica]: It’s a little bit like wanting to find a soul in the body by taking the parts apart

or weighing the body after death and saying, oh the soul left. There's something that you said, that when I heard it, scared me, very much. And that is about one of the first spiritual experiences you said, a certain truth revealed itself to me and I just knew, like I knew, I understood in that moment. That scared me when you said it, because for how much I relate to that experience as an academic myself, that type of, 'I'm sure of this, but I don't have immediate proof here', it scares me.

[Federico]: Are you sure that you exist?

[Federica] : I think...

[Federico]: Are you sure of existing?

[Federica]: As far as, you know, I can tell... yes!

[Federico]: Okay, well, that is the certainty of that experience. That experience brought together - actually revealed for the first time, but also brought them together - the four fundamental levels of 'inner reality' that we have; the physical sensations, the emotional feelings, the mental aspect of reality, the mental feelings - because before the thoughts become words they're feelings, they're images - and the spiritual dimension, which I didn't even know existed. Now all four layers of being, we are resonating, my body was vibrating, you know, almost like these cells were participating to this epiphany. Reality had the feeling of being love, of a power so potent that the biggest love I ever felt before in my life, pales in comparison. The mind clearly understood, that this substance of which everything is made, that feels like love, unbelievable love, is all that exists and I was the observer of the world and the world was me. So I was the world observing itself, which is the sense of unity that I never felt in my life before. And the joy of that sense of unity was immense. So, how can you not know that you caught the essence, I caught the essence of what reality is. Now, you know, can I prove it? No. Do I need to prove it? No. I know within myself that that's the way it is. Too bad if you don't believe it, I'm not trying to make a religion out of it. I'm telling you what I felt and that sense of truth was exactly the same as the sense of truth that I had with within myself that I know that I exist. So if a scientist says, "Prove it, that you exist", ask him back, "Prove that you exist!" This idea of 'proof', when we have absolutely the inability to feel deeply reality, it's not the same as a mathematical theorem. What kind of axioms are you going to start with to prove anything, when you have something like this. You cannot! So, you know, obviously if I make a statement which is based on mathematical axioms, I have to prove them. And I know how to do that, I used to know more than now how to do that. But in any event, that is what science is about. But the intellectual knowledge is not, absolutely not the same as the 'lived experience' through conscious experience, of all the levels of our being. And that is what physicists, that is what scientists need to begin to be open to experience themselves. That is the point, the point is

that if you live only inside your head and which is exactly what happens when you shove away your emotions because those are bad, those are bad for you, you can go out of control, you know and so on and so forth. And only certain thoughts are permitted and on it goes and if you get into that mode, you end up in your head and you live in your head and your life will be typically miserable.

[Federica]: Now, I would like to challenge you again though, because I agree with you 100

[Federico]: Well, what those experiences have done to me - because it wasn't just one, it was several - is to give me the beginning of a framework that will allow me to hopefully have a model of reality that then can be 'mathematised', but you cannot mathematise my experience. Experience is not 'mathematisable', its only the symbolic aspect of reality that can be put into maths. The symbolic, yes. And you can make predictions based on a model that has the capacity to model that part that is 'model-able' with mathematics and then, those can be proven or disproven. But the 'inner reality of self', that is beyond mathematics. But if we start with the hypothesis that only math can explain reality, what are we going to do? The point is that, the moment that we face our 'inner reality', we have to change completely the way we think. And we have to understand that the origin of the universe and the evolution of the universe and the purpose of the Universe have to start from the beginning, because if conscious is primary, it has to have an impact from the beginning. Otherwise, if it happens only later, well then you know, consciousness is really either epiphenomenal or an evolutionary accident of certain brains that develop that particular capacity. But I don't believe that, based on all that I have experienced and all that I have thought about. So I'm developing a model that hopefully will provide testable hypotheses and then we'll find out: that's my... schtick!

[Federica]: Did I understand correctly, also, that you are not trying to investigate what consciousness is, per se - or is there life after death - you're interested in how consciousness interacts with 'matter', so the influence that it has on matter. By the way, I liked how you said: It's easier to explain how the 'outer world emerges from the inner world' and vice versa

[Federico]: Yes.

[Federica]: So, there is a permeation, precisely because all these fields are not separate, are always there...

[Federico]: They're all in super-position, yes.

[Federica]: So, is it this that you want to model mathematically, then? The interaction? The back-and-forth of...

[Federico]: Yes, but you can only model the symbolic aspect of reality which is the inter-

action, is the communication between these fields, that's all that you can model. You cannot model the 'inner experience' that's private and that's, you know, that cannot be modelled.

[Federica]: And since you've been studying this, thinking about this, for many, many years now - although only more recently have you devoted more resources and have been going public with it - you've been studying this for many, many years and you followed courses, you travel, you read, you talked to people. How much of the material that you found existing in Oriental religions, in mysticism, do you find sort of ready to be taken and translated into the language of mathematics, for example?

[Federico]: No, I don't find it at all ready to be plucked.

[Federica]: But it relates to what you are talking about...

[Federico]: It surely relates, yes, but basically what is needed is a 'comprehension' that is connecting the dots. There are many dots out there, many people said this, that, that, that, but nobody has put together the package that connects certain realities that are talked about in spirituality - since the Vedas four or five thousand years ago, the spiritual traditions - to science, to physics, to quantum field theory. Typically the physicist doesn't know and doesn't care about spirituality and the spiritual people don't care about physics. And so, typically, there are few that tried to connect it, but few and far between. So, there is an incredible amount of work necessary to create a conceptual structure that is coherent, that makes sense, that has a capacity, an explanatory capacity that today doesn't exist and that's what I'm doing.

[Federica]: I would like to touch on artificial intelligence - before I let you go - it's a little bit of a different issue than investigated human consciousness and all of that. But it's also very interesting because you bring a lot of concepts from there and are critical of how currently, artificial intelligence is done and you can tell us why, but I would like to start by asking you; don't you think that, maybe the word 'intelligence' in artificial intelligence was a misnomer to begin with?

[Federico]: Yes, I mean the intelligence of a computer is simply the mechanical aspect of intelligence but, our intelligence is not that mechanical...

[Federica]: We don't even have a univocal definition of intelligence, so when we argue about artificial intelligence, I'm always like, what do we mean by...?

[Federico]: Of course, but people understand what 'mechanical' is, right, I mean if you do mathematical operations, [these] are mechanical in application, are mechanical intelligence. And computers are much better than we are at doing mechanical things. But we are incred-

ibly, in fact, its incommensurable the capacity that we have - intuitions, insights, inventions, imagination - those are the qualities that are human and are the qualities of consciousness, that a computer doesn't have and will never have, because the computer is simply, a symbol manipulator, no matter how you look at it. So what I am critical about AI, is the fact that people tell you that computers in 20 or 30 years will be conscious, that's why I'm critical. AI is excellent to do the things that AI can do, but let's not make AI give the idea that AI can do things that AI cannot do. AI cannot be empathic. People are building empathic robots today telling you they can take care of all people, I mean that's silly! I mean, consciousness is the seat of our emotions and emotions are not measurable, they are not things that you can measure. In fact, love and hate and pleasure and joy and whatever, they are all coexisting, they are facets of some ever-changing ensemble of situations. We are not talking about 'reductive reality', the reality of consciousness is 'holistic' and the world of computers is 'reductionist', that's fundamentally different. We are quantum, essentially the core is quantum and a computer is classical. So, it's a machine that uses pieces, that can be taken apart and put back together. A living system, you cannot do that, you cannot take atoms and molecules and put them back together and you have a living system again. We are completely different organisations, completely different systems and that's where the problem is. I mean, there are two fundamental misconceptions today, the dissimulation of reality is reality, which is not even close. And that, a living system is like a computer, its a classical machine... no! A living system, a living organism is a quantum system essentially, in its essence and a simulation of reality, is not reality. A picture that I see, is not the same as living an experience with that person.

[Federica]: Have you talked to VR people recently, with the advancement of the resolution of the world and all of that, it's so much like reality that it's going to be indistinguishable for practical purposes when you're in it - it may not be the same - but when you're in it, it feels exactly the same. I'm not advocating for that, I'm just saying have you talked to these VR people that counter-argue and say, well if you can't tell the difference, it's the same thing to you?

[Federico]: But I think that this physical reality, is actually a virtual reality. But it's not a virtual reality, the way we are told that it is. In other words, we are the ones that live that virtual reality. Our experience is not the same as the pixels in the screen, that's the problem, people think that the experience of something is the pixel in the screens. No! And people don't understand what consciousness is, that is the problem today, most people don't even understand - particularly people in AI - don't even understand what consciousness is. Because they live in their head, typically, they have no idea; emotions, everything else, out of the window, you don't care, okay. Or, there are bad things that make you suffer, whatever, but it's not a human being in that way, that is basically just a brain, a brain that only thinks about something that is a problem to solve, as opposed to 'intuiting', thinking about the nature of reality, the nature of things and so on. No, it's all about solving problems, so they become themselves 'mechanical people', as opposed to being fully human beings. Human beings love

all kinds of other things, art, movement, whatever, but not just being limited to a world which is mechanical. And so we got a problem there!

[Federica]: Well, it's been a great pleasure to meet your symbol, I also just heard you say our bodies are symbols...

[Federico]: Absolutely!

[Federica]: So, it's been a pleasure to meet your symbol, to exchange symbols with you, thank you very much.

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