

FREE FORUM with TERRENCE McNally - A WORLD THAT JUST MIGHT WORK

STUART KAUFMANN - REINVENTING THE SACRED - Conversation from 2008

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McNally:

Hello and welcome to Free Forum. I'm Terry McNally.

I wrote something in January 2005, reflecting on the 2004 election in which I felt the deciding factor may well have been the significant percentage of Bush voters who were misinformed about whether or not we'd found WMD in Iraq or Saddam had been involved with Al Qaeda or 9/11. I drew a bigger lesson from this triumph of ignorance.

I wrote: "For a system or an organism to thrive and evolve, intelligence should offer guidance and direction. With unprecedented technological power, humanity now more than ever needs intelligent direction. Yet intelligence is not in the driver's seat - at least not in America, still the world's most powerful entity -- it is underperforming and under siege. Losing out to ignorance, greed and ideology is not an option. The stakes are too high, whether in war, terror or environmental catastrophe."

It strikes me that intelligence has been defined by so many as just cognitive brainiac intelligence, and that we need to create a more robust definition that includes emotional, physical, spiritual, and intuitive -- so that intelligence can connect with and engage the greater society.

I started seeking out guests with something to say about these and related issues such as the roles of religion and science in society. I even came up with a book title for a collection of such interviews - *Wrestling with Religion and Reality*.

In preparing to interview today's guest, STUART KAUFFMAN, I got truly excited that in his thinking and in his new book, *REINVENTING THE SACRED: A New View of Science, Reason, and Religion*, he has pulled together some very big ideas that go a long way to making sense of the largest dilemmas we face and that he envisions a way forward that might restore our chances for success.

Here on Free Forum, we explore the lives, work and ideas of individuals I suspect hold pieces of the puzzle of a world that just might work. We look at new, innovative and provocative models in business, environment, health, science, politics and media -- all based on the fact that I believe we can do better and I want to find out how.

The show plays weekly on the Progressive Voices Network on TuneIn.com. Podcasts are available anytime anywhere on Apple Podcasts, YouTube, Spotify, most major podcast sites and at my site, terrencemcnally.net.

STUART KAUFFMAN is the director of the Institute for Biocomplexity and Informatics at the University of Calgary, a MacArthur Fellow and an external professor at the Santa Fe Institute. He is the author of *The Origins of Order*, *At Home in the Universe: The Search for the Laws of Self-Organization*, *Investigations* and his newest, *REINVENTING THE SACRED: A New View of Science, Reason, and Religion*.

Welcome Stuart Kauffman to KPFK and Free Forum.

Kauffman:

I'm so glad to be here. Thank you for having me.

McNally:

I like listeners to get a feel for the people behind the work and the ideas. So you were originally a medical doctor, your primary work has been as a theoretical biologist studying the origin of life, molecular organization. You've also applied the science of complexity to business management. And then in your newest book you take on the biggest questions of religion and science. Could you briefly talk about your path to the work that you're doing today?

Kauffman:

Well yes, I can. I came into science profoundly interested in how a fertilized egg grows into an adult. And the problem is called cell differentiation. And how 30,000 genes turn one another on and off to make the different cell types in the body. So I worked on that, I've worked on the origin of life, I hold founding patents on what is now called combinatorial chemistry. I've started four companies. I lived in one of them. And I've had fun being a scientist. So this has led me to investigations which in turn led to *REINVENTING THE SACRED*.

Maybe you have to get antique - or at least older - I'm now 68 and two thirds plus or minus - so there's the over 65 set. Part of what's driving me is the following set of things: a global civilization of some form is emerging. We don't know whether it will be homogenous or forever heterogeneous, but it's driven by global commerce, global communication. People, in response to that, are in part retreating into fundamentalisms that are often religious and often hostile.

Meanwhile we confront peak oil, that year when we get the most out of the ground which may be about now, with catastrophic possible consequences for our global economy, with global warming, water shortages, resource wars, death, hunger. And we lack, we profoundly lack a global ethic that we can share across the planet. We lack a shared sense of the sacred that we can share across the planet. And I think

we've got to find it, and my book REINVENTING THE SACRED is my best shot at it.

McNally:

And the first lines I'm going to read:

"The title of this book Reinventing the Sacred states its aim. I will present a new view of a fully natural God and of the sacred based on a new emerging scientific world view. This new world view reaches further than science itself and invites this new view of God, the sacred and ourselves ultimately including our science, art, ethics, politics and spirituality."

Ambitious. What is that new world view and what is the world view it's replacing?

Kauffman:

Can we start with the second? The view that it is replacing with the cautionary note of the scientist that I may be wrong - scientists are taught to say that. I may be wrong, I don't think I am. We'll see if we get there. So it really comes from Descartes, Galileo, Newton, Einstein, Schrödinger, and was best stated by a French mathematician, Simon Pierre La Place in Napoleon's time, who said, "If there were a superb intelligence - not meaning God - that knew the positions and the velocities and the masses of all the particles in the universe, then using Newton's laws that intelligence could compute the entire future and the entire past of the universe. The past because Newton's laws are time reversible.

Now there are three aspects of this reductionistic worldview: the first is that everything is deterministic, that is to say, if you start things the same way, the same things will happen, and that comes from Newton's laws which are deterministic.

Well, within a century quantum mechanics called that into question with the famous Copenhagen interpretation of what's called the Born Rule, where things are probabilistic, and Einstein was upset with God playing dice with the universe.

The second, which is the broadest in our Western world view, is what I'm about to tell you. It is the view that everything that happens in the universe is describable by natural law. I think that's wrong and that's the most startling thing I'm going to say.

I think I'm correct. I think it requires examination. If I'm right, it changes huge tracts of our view of the world, because I'm going to wind up saying that part of what happens in the evolution of the biosphere, the economy, human culture, and maybe even the abiotic universe is not describable by law, and so there's an endless creativity.

McNally:

A lot of people, - and I've interviewed many of them over the years because it's something I'm looking at, will point out the first problem in that worldview, which is that the reductionism, that everything went according to Newton's laws, and then

you say, “Well what about quantum physics, what about relativity?” And so that one’s out there. But the second one is new.

Kauffman:

...Is absolutely new. It is the most radical thing I’m saying in a chapter called *Breaking the Galilean Spell*. I do confess that the title came to me while I was taking a bath, and I thought it was too good to ignore so I used it.

McNally:

Galileo and everyone since has basically said we can explain things through natural laws, Stuart Kauffman says not so.

Kauffman:

Correct. I will ask the question I’ve asked of everybody. Suppose we went to Mr. Darwin and said, “What’s the function of the human heart?”

He would say, “It’s to pump blood.” And then we might say, “But you know it makes heart sounds.” And then he would say, “Yes, but that’s not the function of the heart. The heart was selected to pump blood.” And basically, he’s right. So there’s a whole discussion there to be had, because when he says the function of the heart is to pump blood, he discriminates between that which has been selected and that which hasn’t. And the physicist can’t do that. The physicist can talk about what is but not a subset of the puzzle or consequences of what is namely pumping blood as opposed to making heart sounds. And that’s part of the argument that biology is emergent with respect to physics. But that’s not the main point I want to make.

McNally:

When you select heart sounds, you just mean something else that the heart does or something else that happens if it’s a heart? But not the thing that we seem to focus on?

Kauffman:

Exactly so. Another example is that when your heart pumps blood water in your pericardial sac that holds the heart, wiggles. Well, that isn’t the function of the heart either. It’s not about wiggling, or jiggling.

So here was Darwin’s next wonderful idea. He said, “You know what... I bet there are properties of, say, organs like hearts of no use whatsoever in the current environment, like jiggling water in the pericardial sac or making heart sounds, that might turn out to be useful in some quite different selective environment. So that’s called now “a Darwinian pre-adaptation”, and Steven J. Gould, called them “expectations”, but it’s the same idea.

McNally:

Pre adaptations, something that existed and was an adaptation to an environment to that organism or organ wasn’t in at the time.

Kauffman:

That's correct, and there is no notion in the phrase pre adaptation of a designer, creator, God, intelligent design, or anything, it's just there. Now I'm going to give a couple of examples.

The first I want to talk about is something called a swim bladder. Some fish have an organ called a swim bladder. It's partially filled with air, partially filled with water. The amount of water in the swim bladder adjusts to neutral buoyancy from the water column and helps keep the fish turned upright.

Here's how paleontologists believe that the swim bladder arose. So there are fish that have lungs, they're called lung fish. The thought is that water got into the lungs of the lung fish. Now you have a sac with air and water in it. It's on its way to becoming a swim bladder. So that's a Darwinian pre-adaptation.

Now I'm going to ask some questions about it. First, did a new function come to exist in the biosphere? Adjusting neutral buoyancy in the water column?

Well, I think we'd both agree that the answer is obviously yes. Second, did it have an effect on the evolution of the biosphere? Sure, new species, new proteins, new molecules, so it had causal consequences. Now here's my big question: Do you think honestly that you could say ahead of time all possible Darwinian pre adaptations for all organisms, or say just for human beings?

McNally:

No. Could I sit here now and tell you everything that is a descriptor or a function within us that we aren't using yet. That might turn out. No of course not, because that stuff is difficult to see because of where we stand and where I look at this moment.

Kauffman:

Exactly right.

McNally:

So the fact we can't predict all of those is important?

Kauffman:

Watch what happens. Now it turns out that I've talked by now to thousands of people. We all say the same thing. We all say, "No, we cannot say ahead of time what Darwinian pre-adaptations are going to be in the biosphere." And it will turn out in the economy, in the human culture too.

First of all, could we do what Newton told us to do? Here's what he told us to do about a billiard table. He said, "Look, here's a billiard table. It's got billiard balls on it. Name the variables."

Well, there are the billiard balls and their positions and velocities and masses. Now name the laws among these variables, I just happened to write them down, here's my three laws of motion. Now look at the boundary conditions, the edges of the billiard table.

Now compute. Just go ahead. I invented the calculus. Compute what's going to happen, and lo and behold you can compute what's going to happen. So that's Newton.

Now let's ask, "Can we do that for the biosphere? Can we write down the variables such that we can talk about the evolution of the biosphere from before until after swim bladders come into existence?"

McNally:

In other words, what both Newton and La Place said, which was that if you know those mathematical pieces of information about the particles of the universe you should be able to predict whatever's going to ever happen in the biosphere. And, as you say, not just the biosphere, in human culture. And you actually focus on human economy, which I think to some people will be one of the more interesting things.

You pick up a book that seems to be a scientist talking about science and religion, that's a lot already. But you actually do put the human economy as a world worth studying that to you is another one of those exceptions to those predictive rules of these natural laws.

Kauffman:

It is absolutely. Can we write down the Newtonian trick and do it for the biosphere? And the answer is no, because we do not know ahead of time the variables that are going to come into existence. We don't know the billiard balls, we don't know swim bladders, lungs, livers, noses, your middle ear bones which evolved from three adjacent bones in an early fish. We don't know so we can't do it.

So we can't do what Newton said. And by the way, let me go back to part of why you said no, and we all do. How would we say ahead of time what all selective environments are? It seems possible.

Let's come back to the jawbones. Three adjacent jawbones in an early fish became three adjacent bones in your middle ear: the incus, malleus and canstapes - and they help you hear. Had one of those bones been in the skull, one on the spine and one in the jaw, would we have gotten the same thing in the middle ear?

Almost certainly not. That means the spatial relations among those jawbones mattered. So let's use the physicist's phrase, "relational degrees of freedom." Do we have any way whatsoever to specify ahead of time the relationships among things

within or between organisms that might turn out to be pre adaptations in environments that we can't state? And the answer seems to be obviously no.

Most people think a natural law is a compact description of the regularities of the process like Newton's laws or like Einstein's laws or like Schrödinger's equations from quantum mechanics. Do you think we could have a natural law for the emergence of swim bladders? Well, the answer seems to be obviously no, we can't even prestate the possibility. How could we have a law?

That means something stunning. It means, if this is right, that - contrary to what La Place thought, Descartes thought, Galileo thought, Newton thought, and Einstein thought - what happens in the unfolding of the universe - at least the biosphere, maybe the whole universe - is partially beyond natural law. And it's from that, that the wellsprings flow, because it means a lot.

McNally:

Once life emerges, once there's something you call agency - and agency has something to do with will and choice - and once that emerges, then all that stuff that applied to pool balls doesn't apply any more. And one of the key things you say is ...You cannot predict all of that, and the fact that there is agency, there is choice - and I don't mean to say conscious choice. in other words, life has an agency that still defies prediction.

Kauffman:

That's right, we cannot predict how the biosphere is going to evolve, we just can't.

McNally:

Why is that so critical and what are the implications of that?

Kauffman:

Well the same thing is true in the economy. I don't have time to tell you story of the invention of the tractor.

McNally:

Basically the tractor had an engine case that was too heavy for the ways they thought of putting it together.

Kauffman:

They were trying to put it on a chassis that would hold it and it kept breaking chassis. And finally one of the engineers said, "You know what, the engine block is so big and rigid, we can use the engine block itself as the chassis and hang everything off the engine block." And that's how tractors are made. That's a Darwinian pre adaptation. It's causal.

McNally:

The rigidity and weight of the chassis, which looked like a problem, actually was an opportunity.

Kauffman:

Of the engine block, right.

And, in fact, most inventions are used for purposes besides that for which they were invented. For example, when the computer was invented, nobody foresaw Facebook, right? I chose Facebook because it's the height of Western civilization. What this means is, that the same thing is true for the evolution of our economy and culture, it's not describable entirely by natural law.

McNally:

One of the key things I get from that is, how do you know something cannot be explained by natural law is if you cannot predict it from what you know right now.

Kauffman:

Let's look at consequence number one.

The highest human virtue of the enlightenment that we all love, is reason. But what I just told you is we really don't know. In fact I just talked to Jan Rifkin, who's in charge of teaching strategy at Harvard Business School, and he said, "You know what, we have no methodology whatsoever, we just give them a lot of hard problems and hope they get good at it.

And business people - who are precisely people who are trying to figure out what to do in the world when they don't know. That means that reason, our beloved reason, is an insufficient guide for living our lives. We need emotion. We need intuition. We need metaphor. We need story. We need whatever we can bring to bear that we've evolved over the last three billion years to manage to live our lives.

I think this means something enormous. It means that we have to re-understand our integrated humanity. We don't understand it. And that's why I said at the beginning of the book, this goes way beyond science: it involves art, politics, plumbing, the law, interviews.

McNally:

That's why when I started reading your stuff, I got so excited. If as I've seen happen in American society, if intelligence is just rationality, then it's easy to attack, and what ends up happening is, we then throw out the baby with the bathwater - with people who turn their back on rationality. What you're saying is, that's because it isn't all that's going on, it isn't all that we have as our resource with or without the words of a holy book.

Kauffman:

That's right. So we have to re-understand and re-integrate our entire humanity. I truthfully believe we need a new enlightenment. And then I want to get to God. But let me say this about a new enlightenment. We have to understand, if what we've said is correct about partial lawlessness, then the view that we've had in the west about reductionism and explaining everything is wrong. We have to understand what it is to be human in a world where in part we have laws, but in part we don't have it and we don't know. What does it mean to be fully human and make our way?

So that's a huge topic and it's going to take a long time to understand it. Now let me turn to God. How many Gods have we worshipped in the last 100,000 years? Lots. At least seven. Are our ideas about our Abrahamic God changed in the last 4500 years? Well, Yahwe was a tough God, he was a warrior law-giving God.

McNally:

In the New Testament, God of love, God of compassion and mercy.

Kauffman:

I think God is a symbol that humanity has invented, and I think it is our choice whether or not we wish to use that symbol in a new way and reinvent God. Here's what I think we should think about. In place of law in the becoming of the biosphere and human civilization and maybe the whole universe, there is an incredible and ceaseless creativity.

Let's distinguish between the creator God and the creativity of that God. Do we need the creator God anymore? I say we don't. We need the creativity and we've got the creativity. It's here in this boundless creativity. We are children of this creativity.

I'm going to tell one personal story that I think brings it home. I was sitting in my house up in Canada and there is a hillside and a river right next to us. The hillside is covered with spruce and fir. And I looked at the spruce and fir, and I said, "You know I could cut that down if I wanted to, but in my sense of God, that spruce and fir forest is God's work. How dare I? I better have a very good reason." Then I looked at the river and I said, "I could dam that river if I wanted to, but that's God's work, I'd better have a very good reason."

You see, I think this view of God invites a sense of the sacred. The sacred becomes all of life on the planet.

McNally:

Including us, including you that sits there and considers cutting down that forest or damming that river.

Kauffman:

Become part of the sacred.

McNally:

You, in your creative response to the question you yourself raised, then your perception, and then your feeling, and then your resonance, and then your emotion, and then all of those things that went into that moment - that is part of the creativity, and that is God.

Kauffman:

That's right. In this view we're not made in God's image, we too are God. But so is the worm, the butterfly, the tree and the planet.

McNally:

And God is the endless, boundless, continuous creativity of existence or of life.

Kauffman:

Of existence and of the natural world. So then the hope is we can get from the sense of the sacred to a global ethic that can guide us in the face of peak oil, water resources being limited, global warming, global civilization.

We have to do it, Terry. We're killing one another.

McNally

Our creativity is what has created the problems that we face. In other words it was our creativity that discovered the value of oil, that created the internet, that found the value of hygiene and thus led to enormous populations. And it is our creativity that must get us out of this and that's the role of God.

I've got to wrap it up. The book is REINVENTING THE SACRED: A NEW VIEW OF SCIENCE, REASON, AND RELIGION. You can learn more by going to edge.org and then looking for Stuart Kauffman or his particular essay, *Breaking the Galilean Spell*.

Thank you to Gee, my engineer, Stan Misraje in production, Matt Perez in traffic, and to you, my listeners. I look forward to being with you again next week. Email me at temcnally@mac.com if you want to receive my weekly announcement of who's going to be on and what we're going to talk about.

You've been listening to Free Forum with Terry McNally on KPFK 90.7fm, Pacifica radio for Southern California streaming globally on kpfk.org.

Thank you, STUART KAUFFMAN, keep up the good work.

Kauffman:

Thank you so much.