The Universe Has a Mind of Its Own

A conversation with Templeton Prize-winner Freeman Dyson.

Interview by Karl W. Giberson

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Freeman Dyson is a distinguished physicist, British-born and educated but based for nearly 50 years now at the Institute for Advanced Studies in Princeton, New Jersey. He is also the author of many influential and widely read books for a general audience, including Disturbing the Universe, Infinite in All Directions, Imagined Worlds, and, most recently, The Sun, the Genome, and the Internet (Oxford Univ. Press). In March of this year, Dyson received the 2000 Templeton Prize for Progress in Religion, awarded annually "to a living individual for outstanding originality in advancing the world's understanding of God or spirituality." Earlier winners of the Templeton Prize, which this year carried a monetary award of just under one million dollars, include Mother Teresa, Aleksandr Solzhenitsyn, Billy Graham, Charles Colson, physicist Paul Davies, and the 1999 recipient, religion-and-science scholar Ian Barbour. Karl Giberson met with Dyson this summer.

Professor Dyson, you have recently won the prestigious Templeton Prize for Progress in Religion. It seems appropriate to start by asking you about the role that religion played in your life while you were growing up.

I was brought up in English schools where religion was taught with Scripture as part of the normal curriculum—as part of the culture, which I think is a good idea. You did not have to believe what you heard, but at least you got to hear it.

Was there any religion in your home?

Yes, my mother used to go to church quite regularly. My father was an organist so he played in the chapel. We were an average churchgoing family, Anglicans, not dogmatic at all; neither of my parents was in the least dogmatic. They had the same kind of freethinking attitude as I do—namely, that religion is a way of life and not a system of beliefs.

Did you ever have any intense religious experiences?

Well, in a certain sense. I started a new religion when I was 14. It was not a very successful adventure, but it was quite intense. At the time I was worrying about the injustice of the world—particularly that I was so privileged and most people were not. It occurred to me then that we are really all the same person, that injustice is only apparent but not real, since the person who is suffering is me anyway. I called that "cosmic unity," and I started preaching it, much to the dismay of my friends. I found that nobody took me very seriously. After about a year I decided that evangelism was not really my gift and that I should stick to science. I think I maybe made one convert, but that's about all.

Did you ever have a time of religious despair—that life had no meaning?

No, I wouldn't say so. Of course I've been through periods of depression, but it's not the same thing. I have never been a particularly religious person, so with most of my depression I don't think of it in religious terms; I just think of it as perhaps due to some bad chemistry in the brain!

You sound like a materialist! You talk a little bit in your autobiography about your early interest in mathematics. What first attracted you to math?

I was interested in numbers as a small child, and I was also interested in astronomy and stars and planets, but I don't think there was any connection there. I didn't do calculations about planets; I did calculations about numbers. I certainly had an attraction to numbers right from the beginning. I only learned about physics much later. Physics wasn't taught in the school where I was, and so that was a subject I came to through my own reading. But then I wanted to do all sorts of things! I wanted to be a medical doctor, for instance, but I found that the only talent I had was in mathematics. So, when it actually came to it I won a scholarship in mathematics to go to Cambridge. It was clear that this was what nature designed me to do. It wasn't so much that I had thought of mathematics as a career, it just

happened that way.

How did you come to move from pure mathematics into physics?

That came about because physics was in a golden age during the late thirties and forties so that it was obviously very exciting stuff. I re member reading physics books in the evenings during the later years of World War II, when I was working as a statistician for the Air Force, and that's probably when I settled on physics. I already had a degree in mathematics. I was probably 22 or 23 at the time.

The main contribution you have made to physics, or at least what you are best known for, is quantum electrodynamics. Tell us a bit about how you first got interested in that.

That was the central problem in what we now call particle physics, which in those days was called atomic physics. Quantum theory had been formulated around 1930 by Heisenberg and Dirac and had been widely accepted. The theory looked good and agreed with the experiments more or less. But in the forties, it was possible to do more accurate experiments, which showed that the theory didn't precisely agree with the energy levels of the hydrogen atom. So, it was a problem that everybody saw as a central problem to "clean up this theory" and find out what was wrong with it. That's essentially what I did.

The solution was a combination of many factors coming together. There were new theories produced by Julian Schwinger, Richard Feynman, and Sinitiro Tomanaga, all of them pointing the way to getting the right answers. In fact they all managed to get the right answers, but the mathematics was still a mess. So, as a mathematician I came to it then with the right tools. But I didn't contribute anything to the ideas, I just contributed mathematical technique to clean up the mess and make the theories usable.

You have worked with a number of extraordinary physicists. Among those figures and their immediate predecessors, is there one you think of as the greatest physicist of the twentieth century?

No, I don't think that sort of ranking makes much sense. You can't really compare people with different kinds of personalities. It's just a question of taste. I suppose if I had to choose some body I found congenial to my taste, it would be Rutherford. There's a famous story of Rutherford complaining to Eddington, "Why is Einstein so famous? After all, I found the facts of nature, which he is only trying to explain." Anyway, it's clear that Rutherford and Einstein were the two big people. Rutherford was the more sympathetic to me. It's true he worked in the laboratory and built tools while Einstein was playing around with ideas. Those are the two major themes of science, tools and ideas. But I find that in a way the more fundamental contributions very often come from tools.

You're well known for your belief that science should serve the greater good, and, unlike some scientists, you're motivated by more than the fact that science is simply very interesting. Can you comment on the source of your passion in this area?

I would say that you shouldn't overstate that. When I'm doing science, what I'm actually working on professionally has nothing to do with the welfare of mankind at all. I never think of it in those terms. I have two quite separate modes of living. As a scientist I'm interested in the puzzles. Whether they have anything to do with practical matters or not, I work on puzzles because they're fun to solve. As a citizen I'm concerned about the human aspects, but there's not much connection between religion and my own work, there's nothing at all. I can't claim as a scientist that I did anything that was much value to humanity.

Let me put it this way then. A lot of scientists would claim that the simple fact that science gives us knowledge is its own justification. But I sense in some of your writings that you think that science should do more than simply find things out. Is that fair to say?

Oh yes! Clearly science is also a huge influence on human life in general. Francis Bacon is my hero. He was a "founding father" of the scientific revolution in the sixteenth and seventeenth centuries. He clearly had practical applications very much in

mind. He thought science was a both a source of wisdom and a source of well-being for humanity. I think that's right—it has to be both.

***In Disturbing the Universe* you call yourself "a Socinian heretic," a phrase I believe you got from Charles Hartshorne. Elsewhere you've referred to yourself as an agnostic, and yet you also use the word *God* quite freely in your writings, sometimes in what appears to be a fairly conventional way. Can you comment on your understanding of God and belief in God?**

I don't think *belief* is really the right word. I like to use the word *mind* or *world soul* rather than *God*. *God* is a convenient abbreviation; it's part of the language. I think that the universe very likely has a mind of its own, but I would say *very likely*, rather than using the language of belief. We don't know anything about world souls; what we think about such matters is purely conjectural. It's foolish to say you believe in that, because it may be true or it may not. It's a useful working hypothesis.

Is there much overlap between your "world soul" and the traditional monotheistic idea of a transcendent creator?

There may be or there may not be. We know so little about it. I would say maybe yes, maybe no. A Socinian says that God is neither omniscient or omnipotent. This God doesn't know what's going to happen; he can't necessarily determine the future. That seems a reasonable hypothesis to me. If there is a God, I would say it's very likely that he is learning as the universe evolves. But clearly that conflicts with the traditional conception of God.

Let me ask you about one of your most frequently quoted phrases, which also appears in *Disturbing the Universe*, in a passage I have returned to many times. You write that "in some sense the universe knew we were coming."

The problem is just what we signifies. It does not mean "human beings." It means life and intelligence in general. It doesn't mean the universe was de signed for humans. That's not what I intended to say. What it means is that the universe seems to be constructed in a way that it is hospitable to life and intelligence. I

still think that's true, but I wish I had defined the meaning of we a little more clearly.

Do you connect that to your idea of a world soul or universal mind?

Yes. If the world has a mind of its own then of course we are a part of it. Some local manifestations of mind are part of the whole. So, it's not surprising that the design of the universe is such as to make mind possible.

Is your sense that the universe knew we were coming largely derived from the anthropic argument?

Yes—though I hate the word *anthropic*, because that refers exclusively to humans (the Greek *anthropos* means a man or a human). So it shouldn't say that. What it says is that the universe has to be built in such a way that intelligent creatures can ask questions about it. That's what I understand the principle to mean. It certainly is a true statement, but I think it is unfortunate that it was given that name.

Not only in your work but also in books by Stephen Hawking and Leon Lederman and many other physicists, there seems to be a lot of use of the word *God*. Is that something being used now to sell books, or are we moving past the sort of nineteenth-century warfare between science and religion when religion was off the table?

I'm not sure about that. One fact which is not widely known, but I think is important, is that Thomas Huxley, who was a great fighter for Darwinism in the nineteenth century, was also on the Royal Commission for the establishment of public education in England, and he always insisted that the Bible should be taught in schools. He was the strongest Darwinian of them all, and he didn't see any discrepancy there. I think the idea that the nineteenth-century scientists talked less about God than their counterparts do today is wrong. It's always been there one way or another.

It's clear from your writings that you take great interest in speculating about the future. Does that go back to your

early reading?

I suppose it came from Jules Verne originally. I admit when I was about eight years old I discovered Verne. I read as many of his books as I could find. So that certainly gave me a taste for the future. And I found, of course, that there were lots of books by H.G. Wells that I also enjoyed. That sort of thinking was in the air in the 1930s; it was fashionable. There was a delightful little book called *The World, the Flesh, and the Devil*, by J.D. Bernal, who was also a great physicist. It was probably the most speculative of all. It seemed to me quite natural to think about the future, and I was a bit surprised to find that so many people paid so little attention to it.

Are you optimistic about the future?

Oh yes, more so as time goes on.

Do you think that the human race will be successful in setting out from Planet Earth and colonizing increasingly larger regions of space?

I hope so. That's up to us to decide. I mean I'm not tossing it onto anybody. I don't say that we *should* send anybody, but I think there will al ways be people who want to go as soon as the tools exist. We don't yet have the tools, but give us a hundred years and I think we probably will.

What do you think of the concept of progress in religion?

My version of that I think is quite clear. Religion should be a force for progress in human society, and it should be the leader in improving conditions of people all over the world. That's what I mean by progress in religion. Religion should be practically beneficial to everybody. I think this is, to some ex tent, happening. Religion has been a leading force, for example, in abolishing slavery, abolishing dueling, improving the situation of women in society. In lots of different ways, religion has been a practical benefit. Many people, because of their religious convictions, have worked hard to improve the status of the poor in all sorts of ways. Religion should no longer be on the side of the oppressors but should be on the side of the victims. And the

more that happens, I would say, the more progress we have made.

That's not exactly what Sir John Templeton had in mind when he established the Templeton Prize, I suspect. What he means by progress in religion is above all intellectual progress. Progress in understanding the nature of the universe, and what he calls progress in theology—turning theology into a progressive discipline more like science. That's something I can respect, but it's not really my cup of tea. I'm not myself so much into religion intellectually.

For me the main thing is hope, and religion is just one of the factors leading me to be an optimist. I'm hopeful be cause in so many ways the world is better now than it was when I grew up. I don't see the present-day problems as being anything like the severe problems we faced in the 1930s, when we were dealing with Hitler. So we have absolutely no reason not to be hopeful.