It's Turtles All The Way Down

Rev. Edmund Robinson
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The story from which this sermon takes its title exists in numerous forms. As Stephen Hawking tells it in his 1988 best-seller, *A Brief History of Time*, a scientist is giving a lecture on cosmology, and afterwards a little old lady comes up and says, "that was very interesting, but it's wrong." The scientist says, "how so?" The lady said "the world is actually a flat plate which is resting on the back of a giant turtle." The scientist replied, "is that so? And What is the turtle standing on?" The lady said, "he's standing on another turtle." So the scientist says, "and what is that turtle standing on?" The lady sees where this is going and to cut him off says, "well, it's just turtles, all the way down."

I have been talking a lot lately about religious naturalism, the idea that religion should start from the picture of the world painted by science. A correlate of religious naturalism is a rejection of dualism. The religious naturalist tries to see the world as one, not two – there is not a supernatural realm and the natural world. The religion naturalist does not necessarily want to trash ideas like god and soul and salvation and sin and grace and purpose, but says let's try to find them within the world of nature instead of outside it.

I had a conversation several years ago with a UU colleague who was in seminary, where she had to deal daily with Christians of a conservative stripe. Some of them rejected evolution, believing that the Bible was the inerrant word of God. She got a bit blue because beside the vociferous certainties of these fundamentalists, her UU beliefs so full of doubt and nuance and paradox seemed weak and wishy-washy.

What I said to her was: cheer up. We have one thing on our side: reality. We are a reality-based religion. While religions in the 21st Century who deny the truths of science have temporarily seized the stage, they can't win. Science, or the world which science is describing, is the genie which can't be put back in the bottle. Look at how far we've come since the ancient Greeks in our understanding of the world, look at how far we've come since Newton and the Enlightenment. Look at the incredible powers science's understanding of the world has given us. Look at MRIs cell phones, global positioning systems, laser surgery. We're not going to go backward on this. The fundamentalisms of Christianity, Judaism, and Islam – indeed of any religion -- which set themselves against science's view of the world can't win; we have history on our side.

For some reason I got quite warm to this subject. I was beginning to wax eloquent when two thoughts hit me. First, it's pejorative to talk about fundamentalists as out of touch with reality. It's the kind of phrase that puts off a lot more heat than light, for in fact those who accept the Bible as the inerrant word of God would say that they are in touch with the supreme reality and that the apparent world, which is the everyday world of our senses and the world in which science operates, is only a shadow of reality.

But the second thought gave me greater pause: the everyday world of our common sense is not exactly the picture of the world painted by contemporary science; in fact, there is a greater divergence between the two every day. This was brought home to me forcefully by the article I read from, Brian Greene's reflections on the 100th anniversary of Einstein's four papers that changed our view of reality forever. If we are a reality-based religion, what reality are we based

in?

Now I am going to venture forth with a little explanation of a few concepts from science, and I do so knowing that there are people in this congregation who have worked with these concepts everyday, and others of you for whom they are exotic if not downright scary. From the first group, I ask your forgiveness if my explanations are less than clear or, worse, wrong, and from the second, I ask your patience, because after I explain a little science, I am going to try to tie it back to our religion and our lives. Relax, there's not going to be a test.

The year 1905 is referred to as the "miracle Year" in Albert Einstein's life. He was not at the time associated with any university; rather, he was a clerk in the Swiss patent office. On his own time, he developed four short but explosive papers. The first three papers – the general theory of relativity, the special theory of relativity, and the theory of atoms – together set the world of physics on its ear. But the fourth paper was arguably the most revolutionary in its effects, and it was this paper for which Einstein was awarded the Nobel Prize in 1921.

This paper argued that light was not a wave, as everyone had thought, but a string of packets of energy which are now called photons. It was this paper that led to what Brian Greene called "a mathematically precise and thoroughly startling picture of reality called quantum mechanics."

The most startling part of quantum mechanics as it emerged was indeterminacy. Sir Isaac Newton, in the Seventeenth Century, had given us a world where, if you knew the initial conditions, you would know the outcome. If this billiard ball is struck by the cue stick at this velocity in this direction, you could predict that it will hit the object ball at this angle and end up in this position. The original starting positions and the energy input determine the outcome.

Quantum mechanics said that the outcome is not determined, it's indeterminate. It's a matter of probabilities. Now with an object as relatively large as a billiard ball, the laws of Newton will usually predict pretty well where you're going to end up. But it will only be a very high probability, not a sure things. When you get down very small, to the level of electrons and protons, the probabilities get much more evenly distributed, and you can't say definitely where something will end up.

As Greene says,

"Quantum mechanics does not merely challenge the previous laws of physics.
Quantum mechanics challenges this centuries-old framework of physics itself.
According to quantum mechanics, physics cannot make definite predictions."

It is one of the great ironies of history that, to the end of his life, Einstein could not accept this conclusion, which his own work had started. He believed that a fundamental physical theory was more than just a bunch of pretty equations, but was a reflection of reality, and he could not accept an indeterminate universe, giving rise to his famous quote that God does not place dice with the universe.

The theoretical and practical work since Einstein's death in 1955 has tended to confirm the indeterminacy aspect of quantum mechanics, and some other aspects that are even more surprising. Science has not just deprived us of a predictable future, it has deprived us of a solid place to stand. This floor, this pulpit in which I stand seems solid enough, but a physicist will say that if you look at it closely enough, it is basically empty space occupied by a few bits of matter/energy whizzing around in such a manner you can't even say definitely where they are. In sum, if we break matter down into its ultimate components, there are no ultimate components. It's turtles all the way down.

Quantum mechanics is not the only way modern science serves us up unpredictability, of course. Students of evolution know that the course of evolution is not directed at any goal. How a species evolves is a product of random genetic mutations interacting with environmental constraints. It is what is called a stochastic process; there is no designer, no goal, no end-point.

And neurologists will tell us that the most unpredictable piece of matter in the universe is the one that lies between our ears. You can study all the inputs to your brain, but you can't predict what your next thought will be. You can review all the experiences you've had during the day, but that doesn't predict what dreams your brain will generate during the night. You can't even predict what sentence will come out of my mouth next.

Unpredictability is very disturbing. We as humans want predictability. We want control. In the play The Fantasticks, there is a song that goes,

"Plant a Radish, Get a Radish,
Never any doubt
That's why I like vegetables,
You know what you're about."

If we applied the principle of indeterminacy in gardening, you'd plant a radish and get a squash.

In fact the song in the play is sung by the parents of the teenage lovers, and anyone who has ever raised children knows that you can't predict how they will turn out from how you tried to raise them.

Now let's bring this back to religion: if reality is, in fundamental ways, unpredictable, what does this do to the notion that God has a plan for the world? How can there be a plan in the face of indeterminacy?

The idea of God's plan is buried deep in religious tradition. Jesus painted for his disciples a picture of a God who was in control of every detail of reality; he said

> "Are not five sparrows sold for two cents? And yet not one of them will fall to earth without your father's consent. But even the hairs on your head all are numbered." (Luke 12:6-7)

Shakespeare picked up on this when he said "There's a special providence in the fall of a sparrow." (Hamlet, Act 5, Sc, 2) Providence is not just a city in Rhode Island, but a very basic part of Christian theology. It is God's plan for us, individually and collectively. It is basic to orthodox belief, and the more conservative, the more role providence plays. Some of you have heard of the Left Behind series of novels which sold in the millions a few years ago; these novels tap a strain of thought that claims God has a precise timetable for the end of the world, and the countdown either has already started or is about to start.

And more in the Christian mainstream, Calvinism, which spawned both Unitarianism and Universalism as reactions against it, holds that God decided at the beginning of time whether you are going to heaven or hell – the doctrine of double predestination. In classic Calvinism, God calls all the shots and nothing you do in your lifetime can affect your fate. I should add as a footnote that classic Universalism also has God calling all the shots, only with a happy ending: we all end up in heaven instead of hell. God knows everything, God can predict anything.

The notion of indeterminacy which quantum physics gives us seems directly contrary to the notion of providence. If the outcome of physical events is not determined in physical reality itself, how could any such outcome be known to God in advance?

Many of became UUs because we were impatient with the fuzziness of theistic religion.

Was God in the sky or in the mountains, where is the soul, how can we know anything about a being who is all-knowing, all powerful and present everywhere? If God is all powerful and all-good, why is there so much evil in the world? If we are made in the image of God, why do we do such awful things to each other?

Many of us take refuge from these hard questions by saying, that's all religion and I'm really about science. Science at least is knowable. But suppose it's not? Suppose science is just as slippery as religion? Suppose it's turtles all the way down whether you're looking at it religiously or scientifically? Is there any solid place to stand?

UUs are already associated in the popular mind with fuzziness and confusion. You all know the joke, what do you get when you cross a UU with a Jehovah's Witness? You get someone who rings your doorbell but doesn't know why. Or a UU terrorist group burns a question mark in your front lawn. If we are already perceived as hopelessly muddled, how can we sell indeterminacy?

But indeterminacy is not confusion; it is not a fuzzy concept. It is a fundamental statement about the way reality works. And it is fundamental to our religion that we look to reality for clues about the way God works. It was Thomas Aquinas who said we basically have two ways of getting knowledge about God, reason and revelation. In our liberal approach, we use our reason actively, and we consider that revelation, how God reveals God's self to us, is not sealed in the pages of holy scripture, but is open to us in the world of nature as well. If nature is indeterminate, maybe God is too.

This would make William Paley roll over in his grave. The Rev. Mr. Paley was a British clergyman who proposed what is called the watchmaker argument for the existence of God, which in recent times has been used by the Intelligent Design advocates. Paley says, suppose you are walking along the beach and you pick up a watch. You can observe that the gears fit together in just such a way and that the hands are designed in just such a way and that if you take it apart and clean it up and put it back together correctly, you will have a working watch that will tell time. You can infer from the fact that all the parts fit together and function together that there was a designer of that watch. By analogy, if you look at any of the parts of the natural world, such as the human eye or the wings of a bird, you will find such parts marvelously wrought to accomplish the purposes to which they are put by the animals using them, and can also infer a designer.

Of course, the flaw in the argument is that, as we now know, the processes of evolution are what makes these things in the natural world, and they work through a kind of blind trial-and-error that looks like design only in the result.

If you throw into the mix that nature itself is indeterminate, that there could not be a watchmaker because the world doesn't run like a watch, it puts Rev. Paley's argument at one more remove from what we know.

For if the future is in principle unknowable, doesn't it follow that God doesn't know it either? To some this possibility is uninteresting; to others, it will be profoundly unsettling. People who don't relate to the concept of God will say, "so what?"

However, for those of us who relate to God, who cultivate a personal relationship with the guy or the gal, we kind of expect God to know a bit more than we do. Some of us pray to God for strength and guidance in quiet times or in times of great need.

Yet even here, in our most extreme need, I don't think we need a God who can see the future with crystal clarity. I think we need a God who can help us understand and accept our

present.

We all want to control outcomes. We all also know that a lot of outcomes are beyond our ability to control. Reinhold Neibuhr's famous prayer asks God for the serenity to accept the things that can't be changed, the courage to change the things that can, and the wisdom to know the difference. What God grants in that prayer are not outcomes, but mental and emotional attitudes. The prayer works perfectly well with out any requirement that God know the outcome in advance.

In process theology, that 20th century movement which includes most UU theologians, God is neither all-powerful nor all-knowing. God is the spark of creativity, the force of novelty, the factor of unpredictability in things. God is the generator of surprises. The universe does not run like a clock or a billiard table and neither does God.

So to get back to my dialogue with my colleague, I think one of the great strengths of liberal religion is that it is open to the truths of science, though the fit is not always easy or comfortable. Our fourth principle commits us to the free and responsible search for truth and meaning. It does not dictate what that truth shall be, which means that it is completely compatible with the methods of scientific inquiry. In the long run, I think this will be its greatest strength.

In a few minutes we will sing a great hymn written by Don Marquis:

"A fierce unrest seethes at the core of all existing things...Sing we no governed firmament, cold, ordered, regular, we sing the stinging discontent that leaps from star to star." The fierce unrest at the core of all things is constantly creating novelty. It is that force which some might choose to call God.

My friends, the physicists are telling us its turtles all the way down, but we need not panic. We need to celebrate this uncertainty. It liberates us from the ability to control everything. It's a staple of contemporary psychology that happiness consists in letting go of outcomes. Maybe we should start a new movement on the religious landscape called evangelical indeterminacy. We can't know the outcome, and isn't that great? It gives us more room for our own imaginations and for God to work with us to create the future. Hallelujah, it's turtles all the way down!
Amen.

Reading
"100 years of Uncertainty" by Brian Greene, New York Times April 8, 2005

... Yet, it is the remaining 1905 paper, written in March, whose legacy is arguably the most profound. In this work, Einstein went against the grain of conventional wisdom and argued that light, at its most elementary level, is not a wave, as everyone had thought, but actually a stream of tiny packets or bundles of energy that have since come to be known as photons.

This might sound like a largely technical advance, updating one description of light to another. But through subsequent research that amplified and extended Einstein's argument (see Figures 1 through 3), scientists revealed a mathematically precise and thoroughly startling picture of reality called quantum mechanics.

Before the discovery of quantum mechanics, the framework of physics was this: If you tell me how things are now, I can then use the laws of physics to calculate, and hence predict, how

things will be later. You tell me the velocity of a baseball as it leaves Derek Jeter's bat, and I can use the laws of physics to calculate where it will land a handful of seconds later. You tell me the height of a building from which a flowerpot has fallen, and I can use the laws of physics to calculate the speed of impact when it hits the ground. You tell me the positions of the Earth and the Moon, and I can use the laws of physics to calculate the date of the first solar eclipse in the 25th century. What's important is that in these and all other examples, the accuracy of my predictions depends solely on the accuracy of the information you give me. Even laws that differ substantially in detail -- from the classical laws of Newton to the relativistic laws of Einstein -- fit squarely within this framework.

Quantum mechanics does not merely challenge the previous laws of physics. Quantum mechanics challenges this centuries-old framework of physics itself. According to quantum mechanics, physics cannot make definite predictions. Instead, even if you give me the most precise description possible of how things are now, we learn from quantum mechanics that the most physics can do is predict the probability that things will turn out one way, or another, or another way still.

Faced with a mountain of supporting data, Einstein couldn't argue with the success of quantum mechanics. But to him, even though his own Nobel Prize-winning work was a catalyst for the quantum revolution, the theory was anathema. Commentators over the decades have focused on Einstein's refusal to accept the probabilistic framework of quantum mechanics, a position summarized in his frequent comment that "God does not play dice with the universe." Einstein, radical thinker that he was, still believed in the sanctity of a universe that evolved in a fully definite, fully predictable manner. If, as quantum mechanics asserted, the best you can ever do is predict probabilities, Einstein countered that he'd "rather be a cobbler, or even an employee in a gaming house, than a physicist."