Life, the Universe, and Everything

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Forty Two; that is given as the simple answer to Life, the Universe, and Everything in Douglas Adams' radio play, books, TV show, movie, and more under the main title of The Hitchhiker's Guide to the Galaxy. To give you some idea of how serious this work is, in its book form it is "officially" a trilogy. It is made up of the following books. The Hitchhiker's Guide to the Galaxy, Life the Universe and Everything, The Restaurant at the End of the Universe, So Long, and Thanks For All the Fish, and Mostly Harmless. Yes, five books.

The books state that The Hitchhiker's Guide to the Galaxy is an actual publication in the worlds it depicts. One reason it is popular is it has a big red button on the cover that says, "Don't Panic". And I don't want you to panic. Even though some of the ideas I will be relaying to you I encountered while reading science fiction, I think they are profound.

This is life. More specifically it is a pattern of cells in John Conway's 1970 Game of Life. This is a representation of one generation. The black circles represent cells on the grid that are "alive". The world in the Game of Life is a grid of square cells that are either alive or dead.

There are a few simple rules for how to get from one generation to the next.

- If a dead cell has exactly three live neighbors it comes to life.
- If a live cell has two or three live neighbors it lives; otherwise it dies.

Let's see what happens when we apply these rules.

And now we can start to see why this can be interesting. The pattern we stared with in the first generation has reproduced itself and moved one cell diagonally! These simple rules allow for something like motion! This pattern is called a glider for good reason.

Interestingly it is impossible to predict what will happen to an arbitrary pattern without actually creating each generation explicitly.
Amazingly this simple pattern of 8 live cells evolves into 4 sets of 3 gliders heading off in each diagonal direction. A scattering of very simple stable stuff is left in the middle. At generation 185 the population has stabilized at 124 and the pattern has grown in size by a factor of 452. Even more impressive is it will never stop growing.

The key point here is that from very simple rules we can get complicated results. After the service I will demonstrate much more complex life examples downstairs. I will be using some readily available free software for this so you can play with it yourselves at home.

OK, this is fun and all, but what's it got to do with anything that matters? A lot. Our world has a lot in common with the Game of Life. In particular both are digital. In the real world the scientists most often refer to this as quantized.

It seems that in our world there is a smallest unit of distance, the Planck length. In the game there is nothing smaller than a cell.

In our world there is a smallest unit of time, the Planck time. In the game there is a generation.

In our world there is a set of particles everything is made of; each of which has a specific mass. In the game there is only one kind of "particle".

Real particles can only be in particular energy states. In the game you could say that one energy state is alive and to other is dead.

It seems that the real world is made of fairly simple things with rules that determine how each thing interacts. The game of life proves that even extremely simple things and rules can produce incredible complexity. Our world is the same way, but with its more complex fundamental parts and rules, it can produce much more interesting results; like us. There is something about how our universe is that allows conscious life to exist. The essence of life is a fundamental result of the rules of nature.

This doesn't necessarily mean we can find all the rules. In mathematics there was a big search for a complete and consistent set of axioms for all of mathematics. In 1931 Kurt Gödel brought all of that to an abrupt halt by mathematically proving it couldn't be done. You couldn't prove mathematics was correct with mathematics. This reminds me of agnosticism; where the nature of reality is unknowable.

There are some interesting alternative ways of looking at how the universe might work. Stephen Wolfram lays the groundwork for this in his book A New Kind of Science. In particular Chapter 9 shows how a number of properties of the "real" universe can be created in models made up of nodes and rules to get to the next state. These models differ substantially from the models made using differential equations that standard science uses.
This doesn't mean we can't be in awe of creation and even worship it if we like. Just because we have a good scientific understanding of something doesn't make it any less divine. The details can be beautiful.

At the Salvador Dali Museum in Florida I loved looking at the huge painting The Hallucinogenic Toreador. A tour leader talked for quite some time about all the layers and meanings in the painting. As a result I loved it even more. One of my goals in life is to get back there and take the whole tour.

I wish I could remember who said, "Be in awe of the whole of nature and be grateful that it allows you to exist. Not that a specific conscious entity is allowing you personally to exist, but rather that the way nature works makes it possible for you to exist."

One of the interesting things about our universe is that probability plays an important role and can produce some strange results. Consider the situation in the game show Let's Make a Deal. Monty would offer you a choice of the prize behind 1 of 3 doors. One door had a good prize while the other two had duds. The odds you picked being the good one is 1/3.

At this point Monty opens one of the two remaining doors which has a dud behind it. Monty then offers you the opportunity to switch from your original choice to the other closed door. The question is should you switch.

Many would say this it doesn't matter, it's 50/50 now, but the answer verified by experiment is that you should switch. The probability that your initial choice was correct is still 1/3. The probability of the other two doors having the prize is still 2/3 even thought you can see one of the doors is a dud.

All this leads to the likelihood that we are not the only conscious beings in the universe. The rules that allow life here must surely allow life elsewhere. Some claim that we are special and must have been created and say the odds against life starting spontaneously are astronomical. They are forgetting that the numbers of chances for it all to come together ARE astronomical.

I end all of this with an abridged excerpt from the book Rollback by Robert J. Sawyer. This story is set on Earth in the not too distant future. One of the key points of how the world of the story differs from our own is that a message has been received from extraterrestrial beings near the star we call Sigma Draconis. Sarah Halifax is the researcher who figures out that the message is really a questionnaire about moral issues. This is a conversation about the message she has with her husband Don.

Sarah said." I still think most races will face very similar moral issues as they develop technology that expands their powers. I know the aliens didn't mention God—"

"That's right," Don said smugly.

'—but every race that survives long enough will eventually struggle with the ramifications of getting to play God."

"'God' is a very loaded term," he said.
"Maybe so, but we don't have a lot of synonyms for the concept. If you define God as the creator of the universe, all races that live long enough eventually become Gods."

"Huh?"

"Think about it. We'll eventually be able to simulate reality so well that it will be indistinguishable from reality, right? And a sufficiently complex virtual reality could simulate living beings so well that they themselves will think they are alive. Again, where do you draw the line between life and non-life? What right do those simulated life forms have? Those are moral issues all races will have to face."

"In fact," she continued, "you could argue there's evidence that we ourselves are precisely that; digital creations."

"I'm listening."

There is a smallest possible length in our universe, the Plank length, and a shortest time, the Plank time; All due to quantum effects. Think about what that means. We live in a universe made up of discrete little bits of space that's aging in discrete little chunks of time – a universe that has pixels of distance and duration. We are digital at the most fundamental level."

"That means our world might be nothing more than some far-advanced civilization's version of The Sims – and that would mean there's a programmer somewhere."

"What's her email address?" Don said. "I've got some tech-support questions."

"You know I love following the debates in the US about the teaching of evolution and intelligent design. Well I'm an evolutionist – you know that – but I don't agree with the testimony that the scientists give. They say that science can not admit supernatural causes meaning the explanations must be limited to causes intrinsic to the universe."

"What's wrong with that?"

"Everything is wrong with it," she said. "That definition of science prevents us from ever concluding that we are the product of the work of other scientists working in a reality above this one. It leaves us with the cockeyed mess of having a scientific worldview that on the one hand freely acknowledges that we will eventually be able to simulate reality perfectly, or maybe even create daughter universes, but on the other had is constrained against ever allowing that we ourselves might exist in one of these things."

"Whether we live in a created universe is an inherently interesting question, and it's worthy of scientific investigation. And if a creator does exist, or if a race becomes a creator itself, that immediately raises the moral question of what, if any, accountability or obligation the creations have to that creator – and the flipside which is what if any accountability or obligation our possible creator has to us."

"And so the aliens from Sigma Dracoris wrote to us asking for our advice?" asked Don. He shook his head. "Heaven help them."