The Open University

Philosophy and the Human Situation
The New Argument from Design

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It's some ten years since I wrote that passage about the way the universe seems mysteriously to have been geared up for producing life. Essentially nothing much has changed since I wrote it – you know, the mystery is certainly still there.

Mind you, there are people who don't see that there is any mystery. They argue "We are ourselves living creatures, therefore we must find ourselves in a Universe capable of supporting life. You know, what's the problem?"

Roger Trigg, the Professor of Philosophy at Warwick University, answers this with a story about a criminal who was about to be executed by a firing squad. The squad consisted of ten marksmen, none of whom had ever been known to miss their target. But for some strange reason, on this occasion, every single one of them missed – and the criminal walked away scot free. Afterwards he was interviewed by the media: How did he feel about this amazing coincidence that they all missed? "I don't know what you're talking about," he said. "Of course they missed. I wouldn't be here talking to you if they hadn't missed!".

Which is fair enough. Of course it still leaves the problem of why he was indeed there talking to them in the first place. Same with us. Given that we are here, the universe must be of a type to accommodate us – but that still leaves the question: why are we here?

The simple fact is that if you or I had the job of creating a universe and all we did was throw laws of nature together at random – you know, if we picked out of a hat the values for how strong gravity should be, how heavy an electron should be, and so on – then the chances of that universe being able to sustain life would be virtually zero – certainly far, far less than the chances of winning first prize in the lottery.

Take for example the initial thrust of the Big Bang. Make it any more violent than it actually was and the gases come out and disperse so quickly throughout space that they have no time to collect together and squash down to form stars like our Sun – and so you get no life. On the other hand, make the violence any less, and the universe expands for a while, but then the mutual gravity (operating between all its various parts) eventually brings the expansion to a halt, and then pulls everything back together into a Big Crunch – all this happening before life has had a chance to evolve on earth or anywhere else. Either way, quick dispersal of gases or Big Crunch, you get no life.

Now in the passage I wrote, I do mention a mechanism for ensuring that the thrust is just right. This is what we call the Inflation Scenario. According to this, immediately after the instant of the Big Bang – in fact within a tiny fraction of a second after the Big Bang – there was a quick burst of a very special kind of extra fast expansion – special in the sense that it created conditions such that after the inflation period, the universe would settle down to expand in just the right way to ensure that it would eventually come to a halt – but only in the infinite future. That way there is no Big Crunch. So that explains away half the problem over the violence of the Big Bang; making sure that it's not so weak as to have a Big Crunch snuff out all attempts to get life. Except of course one could then argue as to what a coincidence it was that the inflation mechanism should have been built in so conveniently. You know, who ordered that?!

Moreover, inflation does not ensure you against dispersing the gases too quickly for stars to condense out of it. That half of the problem remains.
Stephen Hawking calculates that if the density of the gases coming out of the Big Bang had been less by one part in a thousand billion the gases would have dispersed too quickly. Paul

Davies calculates that if the thrust had been greater by 1 part in 10 to the power 60, there would have been no life.

So there is still a problem over the thrust of the Big Bang. I also spoke briefly in that passage from my book about the synthesis of the heavy elements in the fiery interior of stars: the fusion of the hydrogen and helium issuing from the Big Bang elements well such as carbon. Carbon is a particularly sticky type of atom very good for cementing together the big molecules of biological interest. No carbon – and you get no life.

But making carbon is exceptionally difficult. In effect you have to get three helium nuclei to collide together essentially at the same time. Trying to do that with three snooker balls and you'll quickly see the difficulty. Yet these triple collisions of helium nuclei do happen in the interior of a star – and in great abundance. This was very difficult to understand. We now know that it's all due to what physicists call a resonance. Now, okay, this is not the place for me to go into details about nuclear physics, but essentially how big one nuclear particle looks to another depends on how rapidly they approach each other: at certain very special approach speeds, the particles can look enormous to each other – they can hardly miss each other. This is what we call a resonance. And, blow me, one of these rare resonances occurs for helium nuclei at just the speeds they are found to have in stars, and that's how the carbon is made.

The person who first discovered this was Fred Hoyle. Hoyle was not only one of our leading astronomers, but also used to be well known as a militant atheist. I still recall him giving a series of Reith lectures back in the 1950s. He used one of those broadcasts to pour scorn on religious belief. Nowadays, in respect of that resonance phenomenon for producing carbon – so essential for the creation of life – Hoyle speaks of "He who fixed it."

I once heard him use that phrase in a lecture he gave. "He who fixed it." Afterwards I tackled him. I reminded him of those notorious Reith Lectures. He looked embarrassed that I still remembered them after all this time. I asked him "Tell me Fred, have you really changed your mind that much?" He quickly responded "I don't want anything to do with organised religion." "All right, all right" I said "But have you really changed your mind that much?" Grudgingly he conceded "Yes". In fact, Hoyle has written "Would you not say to yourself, some super-calculating intellect must have designed the properties of the carbon atom, otherwise the chance of my finding such an atom through the blind forces of nature would be utterly minuscule? Of course you would… a commonsense interpretation of the facts suggests that a super-intellect has monkeyed around with physics… The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question." So speaks a one-time atheist.

Okay, we have our carbon. But where is it? It's in the middle of a star – at a temperature of about 10 million degrees. Hardly an environment conducive for life. No, the materials have to be got out. But how are we going to do that? After all, we know how difficult it is to lift something off the surface of the Earth and out into space – one needs a rocket and stars have no rockets and, in any case, the gravity forces are much stronger.

What happens is that a proportion of the newly synthesised material is ejected by supernova explosions. These explosions occur when a massive old star runs out of fuel and collapses in on itself. But that raises a problem. How can an implosion produce an explosion? This was a conundrum that exercised the minds of astrophysicists for many years. In the end the mechanism turned out to be the strangest imaginable. The material is blasted out by neutrinos. Neutrinos are one of the fundamental particles of nature. Perhaps the best known feature of neutrinos is that, unlike the other fundamental particles, they hardly interact with anything. As you sit there, billions upon billions of neutrinos coming from the Sun are passing through you every second and yet you are quite unaware of them. Indeed, one could pass a neutrino through the centre of the Earth to Australia a hundred thousand million times before it had a 50:50 chance of hitting anything between here and Australia. They are incredibly slippery. And yet it is the neutrinos coming from the centre of the collapsing star that blasts out the precious stardust – the stardust from which the rocky planets like the Earth, and the bodies of living creatures like ourselves, were later to be made. (And that means we can regard ourselves as made of stardust – either that or of nuclear waste – it comes to the same thing). Without this extraordinary mechanism for ejecting the stuff from stars, life would have been impossible.

Incidentally not all the nuclear materials for forming living bodies is produced in the steady nuclear burning taking place in stars for millions of years prior to the catastrophic collapse. Those heavier than iron don't exist up to that point. So, where do they come from? Well, believe it or not, they are manufactured in the extraordinarily short-lived conditions of the supernova explosion itself. It is as though someone has had an afterthought and said "Whoops. No bromine, cobalt, copper, iodine, zinc; they'll be needing those as vital trace elements. Better make some quick." Then they were made in literally the few seconds of the explosion itself (making use of the exceptionally high density of neutrons flying about at that time).

Another point to be considered is the strength of the force of gravity. Make it a little weaker than it actually is and one does not collect enough gas together to produce a temperature rise sufficient to light the nuclear fires. No nuclear fires, no stars, and that means no life.

On the other hand, gravity must not be too strong. That way we would get only very massive stars. Such stars have more fuel than smaller stars, but they burn at such a fierce temperature that they use up their fuel very rapidly – in fact, such stars burn for only 1 million years. For evolution to take place on a nearby planet you must have a steady source of energy for five thousand million years – you need a medium sized star like the Sun.

Indeed when you come to think of it, the Sun is a remarkable phenomenon. After all, what is the Sun, what is a star? It's a nuclear bomb going off SLOWLY. Have you any idea how difficult it is to make a nuclear bomb go off slowly? I recall soon after the war hearing a talk extolling the virtues of unlimited cheap supplies of nuclear power to be obtained from the fusion of the heavy hydrogen to be found in abundance in the oceans. How long would it take for this to be a commercial proposition? 50 years we were told. Since then, at regular intervals, I have heard talks updating us on progress in harnessing the power of hydrogen fusion. Always someone in the audience asks the question: 'How long will it take us for this to be a commercial proposition?' And the answer is always the same: "50 years". Only last year I was giving a lecture at the Culham Laboratory – which is the European centre for this type of research. I was given a conducted tour of the research facilities. I asked the usual question – and I got the usual answer! The past decades of research, costing countless millions of pounds, must surely have brought us somewhat closer to the goal – but sometimes it doesn't seem so.

Not surprising really. It is incredibly difficult to contain fuel at temperatures reckoned in millions of degrees, and to persuade this bomb to go off in a controlled manner. Yet the amazing thing is that the Sun does all this for nothing!

The secret is the way the force of gravity in the Sun conspires to feed the new fuel into the nuclear furnace situated at the centre of the star. It does this at just the right rate for the nuclear fires (governed by the nuclear force – which is an entirely different force to that from gravity) – for those fires to consume the fuel at a steady rate extending over a period of ten thousand million years.

So, in order for there to be life, the force of gravity must lie within a very narrow range of possible values: not too strong, or you'll get only short-lived massive stars; not too weak, or you'll get no stars at all, and the gravity of the actual Universe does just that – it lies within that narrow range.

It's impossible to put a hard figure on the overall likelihood of getting life from simply throwing together a bunch of physical laws at random – laws incorporating arbitrary values for the various physical constants. In talking for example about the strength of gravity having to lie within a narrow range, it's impossible to be more quantitative about the chances of this happening unless there is some way of specifying a permissible range of values that the strength of gravity could conceivably have taken on. If it could have been any value whatsoever, then the finite range would be divided by infinity – and that way the chances would be virtually zero.

All of this calls for an explanation. As you've learned, one possibility is that there might be an infinite number of universes, all with different laws of physics. In just a few of these universes the laws happen, purely by chance, to be conducive to the development of life. We being a form of life must find ourselves in one of these freak universes.

Now to some extent this idea has had something of a boost since I wrote my book. A theory closely associated with that of the inflation mechanism is that the very early universe could have split up into different domains. In each of these, the conditions, the physical constants, and so on – these could have been different. Our observable universe – the one we are familiar with – is, so it is claimed, is but a minutely small part of just one of these domains. The chances of us ever having contact with a boundary between our domain and a neighbouring domain are virtually zero – it would be so far away. So although in principle there is no reason why we couldn't contact another domain (because it's technically part of the same universe – it's not in a different universe) to all practical purposes it's not a hypothesis that can be tested any more than the earlier version involving different universes.

The alternative to many universes, or many different domains of the one universe, is to accept that there is just the one universe – the laws of physics are the same everywhere in it, and that it's a put-up job; it was deliberately designed for life, and the designer is God. I and others have argued that this is the simplest hypothesis; just one designer God rather than an infinite number of different kinds of universe – or different domains of this universe.

One of the criticisms levelled at this is that although this suggestion is simplest in the sense that it calls for only one unknown rather than an infinite number of unknowns, it is not the simplest suggestion in the sense that a God is an entirely different kind of concept to the physical ones. We know that there are physical concepts, so it's a relatively simple extension of that idea to postulate a wider variety of the sorts of things that are known to exist. God on the other hand is an entirely new and unverified concept – so it's claimed.
I can see the strength of that argument – at least how I would imagine it appearing to an atheist – someone for whom God is an unknown. But that objection completely fails for someone like myself who already believes in God – on other grounds. You see, I don't see how anyone is ever likely to be argued into a belief in God. Even if contemplation of the awesome cosmos inclines one to think that there must be some great creative power behind it all, it still remains a big jump to go from that idea of God to the one who is worshipped by all the major world religions (with the possible exception of Buddhism) – namely a God who takes a personal interest in us. One comes to believe in God through religious experience – coming into contact with God through one's prayer life. Given that one knows God in this way, to then go on and say that this same God is the creator and designer of the world introduces no new concepts at all – over and above what one already accepts to explain other features of one's experience; one's religious experiences. The believer has to introduce no new concepts. For such a person, that must be the very best explanation of why the universe seems so fine-tuned for life.