Free Will

(Adapted from Chapter 6 of my book on Consciousness)

The first question is, of course, does Free Will actually exist? Do we really have the ability to choose our own actions or are we so constrained by our genes, our upbringing, our current desires and prejudices etc., that we have no choice but to act as we do? Do the laws of physics actually allow free will anyway?

If you were to ask 100 scientists and philosophers who have made it their business to study the question, I suspect that the vast majority would say that free will was an illusion and that it does not actually exist. If you were to ask the same question of 100 lay persons though, I am sure that the majority response would be: "Of course free will exists – if it didn't people could not be held responsible for their actions. In any case, I just *know* it exists. I am as sure of the existence of free will as I am sure of the existence of my *self*, and for the same reasons."

So what then are the arguments against free will that cause so many highly intelligent people to turn against what seems to be such an obvious conclusion?

Determinism

The main argument stems from the fundamental assumption that every effect has a cause. Over the centuries this (somewhat questionable) philosophical position has been crystallised into a scientific axiom called determinism which states that the future state of a physical system is completely determined by the state of the system at the present. Typically the behaviour of a system like the motions of the planets in the Solar System is governed by a small number of what are called differential equations. Given the initial conditions, these equations define precisely what state the system will be in immediately after, and immediately after that, and immediately after that *ad infinitum*. Even the motions of individual atoms which are governed by the equations of Quantum Mechanics (known as Schrödinger's equations) have this characteristic – they are completely deterministic (up to a point, that is).

If we accept this kind of determinism, the complete course of the universe was set in stone at the first instant of the Big Bang and nothing can change its future course. In a famous quotation the eighteenth century philosopher Pierre Simon Laplace said:

> *We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past could be present before its eyes.*

There is, obviously, no place for free will in such a universe. What will be will be and there is nothing anybody can do about it. Period.

This idea has caused a lot of controversy and a whole string of what are called 'compatibilist' philosophers from David Hume onwards have since tried to explain how free will, or at least the most important aspects of free will, are consistent with strict determinism. I have little time for their efforts. I can see how an *illusion* of free will can be compatible with determinism but that is not the sort of free will which I want to believe in.

In any case, there is one small flaw in the argument. I said that the laws of Quantum Mechanics were completely deterministic *up to a point*. Under some interpretations of Quantum Theory, a system evolves according to Schrödinger's equations but then at some point, nobody knows why,

the system collapses at random and the equations have to be reset. A good example of this is that of a radioactive atom which may have existed for billions of years inside a lump of rock; then, completely out of the blue, it suddenly spits out an alpha particle. It is believed that this process is totally random. Quantum Theory can tell us precisely what the *probability* that the atom will decay in any given period of time is – but it cannot predict *exactly when* the atom will decay.

Now if the laws of physics permit genuinely random events (as I believe it does) then strict determinism is dead. But this does not really affect the argument against free will because random events at the atomic level are no better able to underpin the concept of free will than pre-determined ones. And even if there was some 'causal slack' in the behaviour of atoms, there is absolutely no evidence whatsoever that the behaviour of individual neurons is anything other than wholly deterministic. If there is any randomness at all in the behaviour of a neuron it will take the form of 'noise' which a healthy system will try to suppress. A brain which contains neurons which fire at random sounds more like a brain having some sort of fit, not a brain which is making rational choices.

In short, whether the laws of physics are deterministic or not, there is absolutely no place for free will. I think we must accept, therefore, that, under the laws of physics *as we currently understand them*, free will is impossible.

Now let's look as the arguments in favour of free will.

Our hypothetical lay person put forward two arguments in favour of free will, the second being the notion that each one of us just *knows* that we have it. Every second of our conscious existence we are somehow conscious of our *selves* and of the *decisions*, some great some small, which we we take in order to organise our lives. This subjective sense of being in control of our actions is just as strong as the subjective experience I have of sitting in front of a computer typing these words.

But if we accept that the laws of physics preclude free will then we must logically conclude that this subjective sense of being in control is just an illusion. Now it is well known that our subjective senses are easily fooled. Countless visual illusions exist which fool us into thinking that parallel lines are curved, that black is white and small things are bigger than large things etc. etc. And, of course, a brain under the influence of drugs can experience sights and sounds which do not actually exist. Notwithstanding these facts, it remains the case that for most of the time our senses can be relied on and the assumption that what we see and feel really does correspond to an objective reality out there is justified. So if we can (usually) rely on our five classic senses, why should we distrust our feeling that we have free will?

The objectors answer to this is simply: “I'm sorry. The laws of physics preclude free will so whatever you say, your sense of having free will is just an illusion. Live with it.”

What about our hypothetical lay person's first argument – that if free will did not exist then people could not be held responsible for their actions?

This argument is easily demolished too. If the world is deterministic then things just happen. When a judge orders a man convicted of rape to be put behind bars, he is not punishing the man for the deed, he is simply doing what the neurons in his brain, governed by the laws of physics, are telling him to do. When the King gives an OBE to a carer who has spent her life looking after orphaned children, he is not rewarding her – he is simply obeying the laws of physics. If, as I have said, in a deterministic universe every event which happens in the universe is set in stone from the beginning, then that includes not only the creation of our galaxy and planet Earth, the extinction of the dinosaurs and the Christmas tsunami of 2004, it also includes the conviction of the rapist and the award of the medal to the virtuous woman.

Even if the laws of physics contain some randomness, that only means that the course of events is not predictable, even in principle. It does not mean that the judge is making a moral judgment or that the good lady deserves reward. It just means that the random firing of neurons in the judge's

and the king's brain happen to cause that particular result. If you think that this sounds extremely unlikely, I would agree with you; but if you truly believe in the laws of physics then you *must* conclude that *everything* that actually happens comes about either because it was inevitable from the start or because it was the result of some random event at an atomic level..

Another form of the argument from moral responsibility is this: "If we didn't have free will, then we would have no moral responsibility to curb our actions and we would all run amok and kill each other." This won't wash either. If the laws of physics preclude free will, then either we would all have run amok and killed each other long ago or the world would be exactly as it is. Since the former has not happened, we must conclude that the world is as it is because the laws of physics permit such a world. All this argument proves is that we *want* free will to exist, not that it actually exists.

But here's the rub. Yes, obviously the laws of physics *do* permit such a world – but how could such a world actually come about? Is it likely, or even conceivable, that a world in which criminals get punished and good people get rewarded is somehow an inevitable consequence of Schrödinger's equations? Let us look at this more closely.

The argument from evolution

I am perfectly prepared to accept that, given the laws of physics and the initial conditions at the Big Bang, the development of galaxies, stars and planets was inevitable. I am also prepared to believe that the origin of life on Earth was, if not inevitable, at least consistent with the laws of physics. I also am perfectly happy with the idea that life evolved through a process of Darwinian evolution to the point where there existed nervous systems which became conscious in some degree. As I have argued earlier, the main evolutionary benefit of a conscious brain was the ability to recognise other members of the same species as individuals and it was this ability (which I call *empathy*) which enabled some creatures to form strong pair-bonds and others to cooperate in hierarchical societies. I have also argued that the acquisition of consciousness brought with it two other abilities – the ability to create and invent new ways of doing things (*imagination*) and the ability to use long-term memories of past events to plan for the future (*intention*). Few species actually made much use of these last two abilities. Very few animals show much imagination and the extent to which sparrows and mice, even if they are conscious, plan for the future is seriously limited. Even *Homo sapiens* lived and hunted in small family or tribal groups for tens of thousands of years, inventing the occasional new tool or participating in ritual ceremonies etc. without seriously upsetting the course of Darwinian evolution.

But shortly after the retreat of the glaciers from northern Europe 12,000 years ago, something really dramatic happened. The invention of agriculture tied individuals to a particular piece of land; this led to the concept of ownership of property; people started to trade what they owned and record the transactions on clay tablets or papyrus leaves; trade enabled some individuals to forgo hunting for food and start specialising in making things such as clothes and tools for others to use; other individuals used their physical strength or intellectual advantages to dominate weaker individuals and put themselves forward as chiefs and kings or priests and religious authorities; still others, with time on their hands, turned to creating works of art and thinking about science and philosophy leading to the creation of things like the works of Shakespeare and the theories of Newton and Einstein; at the same time, religious leaders capitalised on primitive beliefs about the spirit world, developing different ideas about God and imposing different systems of morality on their followers. And so it came about that our current state of human society with all its faults and contradictions evolved.

In my opinion, none of this creative activity could have come about without individuals making choices of their own free will. According to Darwin's theory, species automatically adapt themselves to changes in their environments and occasionally change so radically they turn into new species. But the corollary of this is that if there are no changes in the environment, a species

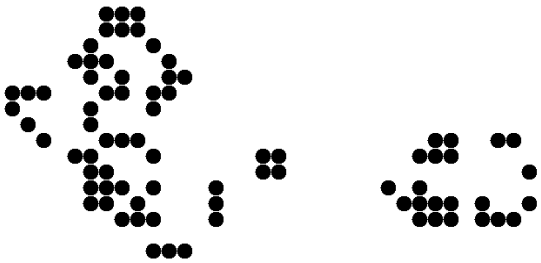
which is in ecological balance with its environment will not change either. Early humans 50,000 years ago (and isolated groups like the Australian aborigines up to a few hundred years ago) were in ecological equilibrium with their environments and did not need to change. Obviously the retreat of the glaciers was in some way the trigger for the immense changes that came about in human society in the succeeding centuries, but Darwinian evolution cannot account for either the speed or the direction of those changes. In fact, the glaciers had retreated many times before but the only changes these episodes brought about was a northerly shift of the human population.

We cannot guess exactly why humans responded so differently this time round. I have suggested that it was the invention of agriculture but it may have been the invention of language or the development of writing. Experts will disagree. Whatever it was, it happened, and it did not happen through a process of Darwinian evolution. It was far too quick and far too dramatic a change. In my opinion, it came about because humans started using their conscious ability to imagine how things could be done differently and then to use their free will to do things differently.

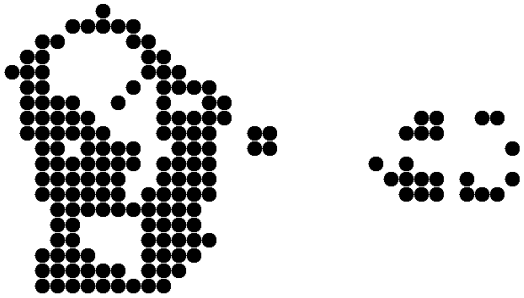
To see just how impossible it is to imagine how the current state of human society could have come about in the absence of free will, let me use a simple analogy.

The development of a deterministic universe can be simulated by Conway's game of LIFE. Without going into details the game is played on an infinite square grid each of whose cells can be either black or white. Fixed rules determine how any given configuration evolves into a new configuration. It turns out that there is no way the future evolution of a given configuration can be predicted in advance – the only way to find out what is going to happen is to run the game and see. Some initial configurations live for a while and then die, but a few appear to grow without limit. Here, for example is a five spot configuration that grows for a while at least:

After 60 generations this develops into:



Obviously as time proceeds the number of possible configurations into which it could develop increases rapidly. Conversely, as time proceeds the probability that an initial configuration hits a specific recognizable target decreases in proportion. What then are the chances that an initial configuration, similar to but different from the pentomino illustrated could generate the following picture?



(In case you do not recognise the image, here it is much reduced:  . It is a digitised copy of a famous image of Marilyn Monroe by Stefano Padoan.)

As it happens, the chances of this configuration arising are zero because *there is no antecedent* which could produce this exact configuration. This is a consequence of the rules of LIFE being entirely deterministic. If the rules contained some randomness, then this precise configuration could result by chance but even with this simple example, if we ran the game on the fastest computer in the world it would take longer than the current age of the universe to generate even this simple image[1].

If we translate these results into the context of the history of the universe, it is either astronomically unlikely or even impossible for there to exist a configuration of the early universe which could develop into a world which contains the works of Shakespeare or the Newtonian theory of gravity. The only way in which sophisticated societies could develop in which the sciences and the arts could flourish and in which systems of legal and moral responsibility could develop is a universe in which conscious creatures have free will.

The argument from creativity

The crux of this argument is the idea that the process of creativity, whether it is the invention of agriculture. construction of a moral code or the writing of a symphony, absolutely requires a conscious brain capable of free will.

I mentioned on page Error: Reference source not found a pod of orcas which has invented a new way of catching seals. I cannot believe that four autonomous robot submarines, possibly equipped with a random number generator, pre-programmed with the goal of killing seals could come up with the idea of coordinating their actions in such a way as to wash the seal of his ice floe. It is just not going to happen – not in a billion trillion years anyway. They are just going to go on killing seals in the way they have been programmed to do.

The whales, however, equipped as they are with conscious brains capable of imagining things which have never been imagined before, have seen a possibility and made a conscious decision to do something different.

When Shakespeare was writing a play or Mozart was composing a symphony, they were both continually making conscious decisions about writing this word or composing that note using their powers of free will – and without free will they could never have created these fabulous works of art.

When talking about free will we often try to simplify things to make our ideas as clear as possible. In discussing free will we tend to concentrate on binary decisions like whether or not to accept a job or whether to choose chocolate or vanilla ice cream. Mark Balaguer calls these 'torn decisions'[2] and suggests that we may only make such decisions a few times a day. I think he underestimates the importance of free will. I think that we are making 'torn decisions' every moment of our waking day; whether is is to say 'hello' rather than 'good morning' or to type 'which' instead of 'that'; whether to scratch an itch or to rub it, whether to think about a problem at work or forget it and go to sleep.

So now we have two slam-dunk arguments. The laws of physics as we currently understand them preclude free will but if we didn't have free will we would still be living in the Stone Age and the works of Mozart and Shakespeare, Einstein and Newton would not exist.

For the moment I will leave you to guess where this is going.

Carr Bank: October 2024

1 The image contains about 400 pixels each of which can be either black or white. The total number of different possible images is therefore 2^{400} which is equal to about 10^{120}. If a computer could generate a million images per second, it would only have checked about 10^{23} images in 5 billion years so my claim is a gross understatement to say the least!

2 Mark Balaguer *Free Will*