TIDEFARE: A PHYSICIST'S VIEW OF TIME AND DETERMINISM, FALL AND REDEPMTION

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("TIDEFARE" is an acronym of "Time, Determinism, Fall and Redemption")

Preface

I was brought up in the Anglican Church, and remain a committed member of it at the age of 75. It is chiefly in the last third of my life that I have faced up to the intellectual problems of harmonizing my scientific faith with my Christian faith. This article is about my state of progress towards their solution. The first problem is that of time: this, taken on its own was well reviewed by Prof. Stannard's article, which is copied in the Appendix. I think that most people, especially non-scientists, equate "eternal" with "everlasting", and confuse "timeless" with both. However, Stannard points out that "God's time" does not flow like our time: writers on religion mostly seem unable to present God, or heaven, or eternity, as outside "our" time altogether.

The physicists' 4-dimensional universe, which we observe in part, and presume that God perceives in whole, presents us with the second problem, that of Determinism vs free-will. How can we have free-will in a physicists' universe? Then, third, if consciousness and free-will are tied together, their arrival makes a fall inevitable. It is not really our business, but why did God allow them all to arrive? Fourthly, why should He choose His means of Redemption? Why is it, and how can it be seen as both "necessary and sufficient" (to choose a phrase familiar in science and logic)?

My excuse for writing the following pages is that, thinking along the way described, I have found for myself sufficient rational grounds on which to form a "working hypothesis", and from which to proceed in following the Christian religion, "the Way", as early Christians called it.

TIDEFARE:- A response to “Making sense of God’s time” in “The Times”, August 22 1987 by Russell Stannard, Professor of Physics, The Open University. (Copy below.)

1 Time and Determinism

In the beginning, God made all the Laws of God, in particular those which are called the Laws of Nature. And in accordance with these laws God made, directly or indirectly, everything else which was made – seen and unseen, known and unknown, Knowable or unknowable by any other creature.

And in particular, God created the Idea that a four-dimensional continuum which came to be called Space-time, or the Universe. And this universe was without form, and void, and full of darkness. And so God said, “Let there be light”, thus creating the Idea of Light: and the rays, along which light would shine, everyway to and from every point, gave Form to the continuum. From every point there extends different parts, divided by rays, and these came to be called Absolute Past, Absolute Present, and Absolute Elsewhere. (These names, and that of “Here-now” - see below – for the said point, were introduced by Arthur Eddington.) Now though the universe thus had Form, it was still Void, and therefore Flat. And then, God created Energy; and because of the mass of this energy, space became Curved.

Probably, in the beginning, all the energy was created at one point of space-time, the curvature was infinite, and all space existed only at that point: but space was also expanding (initially with infinite speed). What then seems to have happened is that the energy, filling all of the volume when it was still infinitesimal, burst into particles, located (in so far as they had location) at every point of space and moving with the speed of lights in every direction. And from this point and moment of Creation (later called the Big Bang), evolved, in accordance with the laws of Nature, all the present contents of the Material Universe, filling all of the Absolute Future of that point.

Some items of these contents are quite long in the past-future direction, and these are called “objects” or “Things”. Some Things are so long that they reach back nearly to the Big Bang; some – like the present writer - are several hundred million times shorter than that. Other Things are even shorter: some items in the Universe are millions or billions of times shorter than we are, and these things tend to be called “Events”.

Events are important because they change Things. A law of Nature states that only that part of a thing which in the Absolute Future of an event can possibly be changed by the event, because “No signal can travel faster than light”. (It is perhaps worth pointing out that probably all direct causative signals, i.e. not involving any other Things on the way, travel <u>at</u> the speed with which light travels when not interacting with Things.)

It is not really important whether God specially created Life, or whether living things were allowed to evolve from the Big Bang, as did atoms, molecules, galaxies, stars, planets and so on. Whether we call them “living” or not, all these Things follow precisely predetermined paths, and so exist in the foreknowledge of God. (Perhaps this word is more appropriately spelt “fourknowledge”? Stannard for example says, in effect, that to God every thing and event in the continuum is known equally and timelessly.)

However, many of us, who call our species “Homo sapiens”, presume to think that, to make us, God interrupted evolution in a special act of creation. (One of us wrote “God said, ‘Let us make Homo in our own image’”.) We describe members of our own species as “intelligent” and, more significantly, “conscious” things/beings. Homo is, in particular, “Conscious” of being able to decide to cause changes in things, including bringing them together to form new things; and of being able to <u>invent</u> ideas, in terms of which invention of things, and of other ideas, may later be made. We describe this ability by various names, of which “freewill” is a good one. Are we deluded, in making up stories for ourselves that we choose what was determined already?

Donald Mackay has shown that it is illogical for any Homo to deny his (*) own ability to make such decisions independently of all events in his Absolute Past. (*Hereafter, regrettably, continuing the careful use of non-sexist pronouns of other language will be impractical.) He must therefore hold, at least in respect of changes that would flow from any such decision if he made it, and would not occur if he did not, that at least that part of the Universe which is in his Absolute Future is incompletely determined (and thus, that he cannot escape responsibility for his decisions).

Consciousness, that has the power thus o over-ride determinacy, must be seen as a great mystery. Moreover, each Homo is conscious of being "conscious at" a specific point in the four dimensional continuum, a point which he calls "Here-now": and is conscious that Here-now continually moves in the direction from past to future along his length in this direction. This passage of time in one's consciousness is another great mystery. It seems to be shared by all other conscious beings – moreover all seem to be conscious of any specific (nearby) event at the same moment and , except perhaps on very rare occasions, to be not conscious of <u>being at</u> any other event, past, elsewhere or future relative to Here-now. (Being conscious of being <u>at</u> a past event is quite different from remembering it; memory is not specially mysterious.)

All events in the Absolute Past of our Here-now can in principle be seen to have followed with perfect determinacy from initial conditions, and so, ultimately from the Big Bang. The continuum of space-time extends beyond Here-now into our Absolute Future (and into our Absolute Elsewhere): all that existed in our Absolute Past still exists at the present moment. Determinism is the belief (widely held among scientists) that, because the space-time is continuous and timeless (that is, "our-time"-less), the future must, being continuous with the past, be equally with the past totally determinate. But according to Heisenberg's Uncertainty Principle we can, even in principle, only find out by experiment, and therefore ever know, a maximum of one-half of the data necessary to predict the future. This belief is therefore unprovable.

But how can indeterminacy that necessarily accompanies the existence of freewill in conscious beings be reconciled with the belief (Stannard's, for example) that the whole of space-time has equal existence in God's timeless knowledge? I make bold to suggest that God shares in and acts in this "our" time: and that, as each of us makes a free choice at any event in the continuum, God changes the Absolute Future of that event according to the consequences of that choice under the laws of Nature. So everything that exists in the continuum remains perfectly known to Him; but He changes those things and events (which being in our Absolute Future, can be for us only predictions or guesses, until our time reaches them), in continual acts of re-Creation.

2. Fall and Redemption

If God's purposes are not totally mysterious to us (and if so be that we are made in the image of God, then maybe we are not totally unable to understand them), then I suggest that God takes pleasure in thus <u>exercising</u> His Creative power. Surely an Omnipotent Creator, such as Laplace said might have wound up the Universe and simply left the machinery to run, would lack occupation! Would not a better picture of God be that of a grandmaster of chess? – playing on an infinite four-dimensional board! Again, simply (!) watching the initial position play itself out, in exact accordance with the immutable laws of the game which he Himself created, would not occupy Him to the extent that (we may claim) He would wish. So (it may be), He specially created us "players": and as each player makes a "move", He rejoices in "analysing the position" afresh, after He has created (in our "future") all the consequences of that move.

For God, this is not "simply" an intellectual occupation. We are told that He wills every part of His Creation to praise Him. In the book of Job it is poetically stated that "the morning stars sang together" at the beginning of Things. Now, whether one takes the word "stars" realistically, to mean huge lumps of gas, starting to keep themselves hot by nuclear fusion, or imaginatively, to mean the Principalities and Powers of heaven, one must surmise that their praise was/is predictable, because predetermined. In comparison with theirs, we may properly suppose that praise from conscious beings is of special value

because being such is given by free choice. And like a benevolent grandmaster, God rejoices as the novice players become better at the game; and seeks graciously to correct those who go wrong. His condemnation falls on those who propagate the error, teaching and practicing as habits "moves" contrary to the rules of the game, which are the Laws of God.

Douglas Hofstadter in his recent book "Godel, Escher, Bach" dissociates himself, as do many others, from the belief, ascribed to Homo sapiens in general, that we are necessarily the result of a special act of creation. We now see the workings of brains as comparable in many ways with those of computers, and it seems more and more plausible that brain-computer systems evolved by imperceptible steps from nerve cells to the central nervous systems of higher animals. In this evolution, a stage was inevitably reached at which what Hofestadter calls the high-level responses of the system began to be no longer determined by its surroundings, although the latter act with complete determinacy on the system's low-level constituents.

At such a stage we begin to say, proverbially, "why did the chicken cross the road?" – because, as a matter of practical study, we are unable to assign any precise causation. Extrapolating from the simple case of the chicken's brain, through those of much higher (i.e. more intelligent) animals, I suggest – and believe I am being properly humble in doing so – that consciousness, and with it the first indeterminacy of freewill, would have, and therefore may as well be assumed to have, appeared at some point in the evolution of anthropoids from ape to man, spontaneously.

Once this had occurred, the laws of chance (part of the laws of God) would lead not only, many times, to decisions that were "wrong", i.e. contrary to the laws of God (or, rules of the game, in the chess metaphor used earlier), but further, to false teaching that such a wrong decision was not wrong: followed by acceptance of such teaching. (The "Fall" came not when Eve took the apple, but when she told Adam that it was good to eat it, and he followed her example!) What made one such occasion fatal was that free action contrary to the rules became, from that moment onwards, a <u>habit</u>: it got built into the developing "software" of the species, which of course was evolving as Homo sapiens developed.

I find remarkable the facts that (1) as a computer program is developed, it remains relatively easy to understand it, and to amend its performance, so long as the "operating system" – that lower-level program which directly instructs the computer hardware to execute the higher-level or "applications" programs, here supposed to be under development – is unchanged; whereas (2) with an operating system only slightly changed, any given applications program is likely to be completely inoperative. The problem of making a program 'run' on a computer whose operating system is unknown, and so must first be decoded, becomes more difficult – almost certainly, becomes so at an enormously rapid rate – as the complexity of the (computer-plus-operating system) increases. (some idea of this difficulty is conveyed by Carl Sagan's novel "Contact", in which the decoding of a first radio message from "extraterrestrials" is described. One should note moreover that <u>there</u> the task was vastly eased because that message was <u>designed to be decoded</u> by its readers.)

As changes in the operating system became habits of the species, the "Fall of Man" became ingrained: and beyond the wit of Man to rectify. My mental picture of the situation leads me to some understanding of the problem which it presented to God; and to a distinctive appreciation of the Devine solution to that problem: namely the Incarnation. After the error free i.e. sinless, life of Christ, right through to death, His return to God (we call it the Resurrection and Ascension) delivered to God a copy of the (defective) human operating system, with which Jesus was equipped by birth. This copy is, I feel, what is represented in Revelation, chs 5 to 7, by the scroll with seven seals, which the Lamb was uniquely able to open. Chapter 8 tells that, after the scroll was opened, "there was a silence in heaven for what seemed half an hour". To me, this aweinspiring phrase suggests the incredible magnitude of the technical difficulty of reconciliation, i.e. of re-establishing <u>rapport</u>, between God and the human species: even when this complete listing of the current operating system was available, it still had to be decoded.

God's plan is to allow conscious beings to make their won choices. And so, having restored to us, by that act of reconciliation or Redemption, the possibility of doing so, He leaves it to each Homo to amend his or her own software – in accordance with the model He has given us in the person of Christ.

I must add that I have come to feel sure that the total software of a person is the essence of thatch person; that its transfer to any other compatible hardware system would reconstitute the person in every significant respect; and that the human body or hardware, which ultimately must decay, has value only while and because it is the vehicle for that software. Software, because it is non-material in nature, is not necessarily subject to the disintegration that is the inevitable end of all material things. Survival, i.e. continuance alive, of the human software, or soul, after death of the body, depends entirely on its being loaded into a compatible hardware system. Redemption has made that possible.

My name is Christopher John Milner. Legend has it that my patron Saint Christopher was a ferryman who waded a river on demand, and on one occasion did so bearing the infant Christ (who he recognised by the huge weight of his invisible load, comprising the whole world's sins). My hope is, to have by this writing added one more to that ferryman's many daily journeys – perhaps across that stream which divides The Two Cultures?

Appendix: Russell Stannard, "Making sense of God's time", copied from The Times, Saturday August 22 1987.

'The theory of relativity describes space and time as integrally bound up in a unified space-time. As Einstein once said, it is now more natural to "think of physical reality as a four-dimensional existence, instead of, hitherto, the evolution of a three-dimensional existence".

Accordingly, in some sense at least, we must regard all time – past, present and future – as being in existence together, just as we are accustomed to think all space existing together. Each temporal instant has the same status as any other. Relative to each there are earlier and later times, but the distinction is relative only.

Physics itself recognises no special moment called "now" – the moment that acts as a focus for the process of "becoming" and divides the "past" from the "future". In four-dimensional space-time nothing changes, there is not "flow' of time, everything simply "is".

So where do the additional features of time – now, becoming, past, future and flow – originate? To answer this, we must leave the domain of the physical states (consisting of sensations, thoughts, feelings, etc.) These momentary states of mind are arranged in sequence. What separates one form another? We say they are separated in "time". In a way that is not well understood, we can estimate and compare these separations, or intervals, of time.

But although we call this separation "time", it is not the same time as that which appears in the physical world. For one thing, thoughts occur in time but not in space, and we have seen how indissoluble is the link between space and the kind of time that appears in the physical domain. It is only in consciousness that we come across the particular time known as "now" – the time that is distinguished from all others by the way it marks the end of the sequence of mental events. It is only in the context of mental time that it makes sense to say that all of physical time is. One might even go so far as to say that it is unfortunate that such similar entities as physical and mental time should carry the same name.

The reason they do is that there is a close correspondence between them. A sensation that is part of the mental sequence (e.g. the hearing of a shot now) is correlated to a feature of space-time (the firing of a gun at a certain place and time). The "now" of mental time is correlated with the particular instant of physical time. A short while later (according to mental time, that is), the "now" correlates to a different physical time.

The difference between the two physical times, judged on a clock, when compared with the perceived lapse of mental time, gives rise to the "flow" of time. Without the two distinct types of time, there could be no flow – one cannot compare sometime with itself.

A homely analogy might help. You are at home listening to a story on the radio. You hear the voice of the author narrating a particular incident. You remember what he has previously told you, and anticipate how the story might develop in the future. You are caught up in a story that is evolving in time.

But in the radio studio it is different. The author is not making it up as he goes along; he is reading it from a book. There in front of him is the page from which he is currently reading – a page that is correlated with what you at home are hearing at this particular moment. But the other pages of the book are also there – earlier pages and later ones. For the author the story is written in the book – the entire story – exists. It does not evolve: it does not change; it simply is.

Then book represents the four-dimensional physical world; its pages are the successive instants of physical time; the process of listening is out own progressive conscious experience of life. The story is to be equated to the history of mankind etched into the four-dimensional reality. Contained within it is out ow individual life history – the history we are still progressively experiencing a little at a time.

In the realm of consciousness, we are for ever changing and developing through our interactions with the world and with God. But neither the world nor God change; out effects on them are already part of the story being revealed to us.

As you might expect, the author of the book stands for the God for whom the beginning and end of all things are equally known. Just as an author does not write the first chapter, then leave the others to write themselves, so God's creativity is not to be seen as uniquely confined to, or even especially invested in, the event of the Big Bang. Rather, his creativity has to be seen as permeating equally all space and all time; his roles as Creator and Sustainer merge.

God's relationship to time remains deeply mysterious. It defines commonsense. But that notwithstanding, it appears strangely in tune with the possibilities now opened up by a modern scientific understanding of time.

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