

## Sara Richards: The Possible World Machine

### What illuminating parallels can be drawn between a philosophical account of the nature of space and a philosophical account of the nature of time?

Time present and time past

Are both perhaps present in time future;

And time future contained in time past.

If all time is eternally present

All time is unredeemable. T.S. Elliot

Mankind has always been concerned with space and time, the earliest explanations growing out of mythology and the current cosmology finding new ways of expressing similar things. The Old Testament placed Genesis at the start of time, with God creating heaven and earth and naming the passing of the time of creation as days. The Inca civilisation on the other hand regarded time and space as a single concept named *Pacha*. Plato defined time as the period of motion of heavenly bodies and space as that in which things came to be.

The definition of time can be slippery. Time stretches behind us and before us, we measure it in seconds and hours, days, years, centuries, and yet time is not the same as its measurement. We talk of a “moment in time” but the moment is one aspect of time, not time itself, and when it has passed – what exactly has passed? As J C Smart asks “If motion in space is feet per second, at what speed is the flow of time? Seconds per what?” Whenever we ascribe a rate of change to anything at all other than the passage of time, we are implicitly expressing it in terms of the passage of time itself.

We view future time as a period of possibility, something we can affect, but past time as being history, actual, or regretfully what might have been. The present is like an escalator travelling between the two, away from the past, through the present and into the future – but never reaching the future as it, in turn, becomes a series of present moments in which effect cannot precede cause. We possess memory so we can remember the past – but we do not possess precognition – it is impossible for us to forecast the future, except in very vague terms. What would happen if we did know the future and could alter it? We would then be free to choose how to act – or we would already know how we were going to act – which are contradictory statements!

Aristotle asked two questions about the nature of time in *Physics*. He wanted to know whether time existed and if so – what its nature was. These questions can also be asked about space, as in Zeno’s paradox of place, and other questions follow on. Do time and space have any direction? How do we define them as they are invisible to the eye and do they have any real existence? Are the existence of time and space distinct from the objects and events that exist in time and space, or are they dependant on those objects and events – or even on the human mind? Is it true that when you travel through space you also travel through time? And if one were to travel through time – would one be travelling through space?

The immediate and obvious difference between time and space is to do with direction. Space is three dimensional and

it is possible to move freely within those dimensions. Time, as we understand it, moves forwards, away from the past, and apparently only has one direction. This flow of time has been called “the arrow of time” and a recent novel by Martin Amis of the same name tells the story of the holocaust in which people who are dead enter gas chambers only to come out alive and go towards their earlier healthy selves only to disappear after they have become babies – another form of death.

Neither space nor time is a substance. They cannot be affected causally and are causally inaccessible being invisible and infinite. Both consist of many points without dimension, but it is possible to measure the distance between those points for instance as metres, or hours. Space can be considered a system of relations for instance material bodies – so is space merely a collection of such relations? Could space exist with nothing in it, in other words, if everything were to be removed from space, exactly what would be left? How do we represent both space and time as neither is visible, and how do we represent them to ourselves?

Nowadays space and time are seen to be part of a four dimensional universe known as the space-time continuum but this is a 20<sup>th</sup> century departure and philosophers of previous generations had their own theories. After the Greek philosophers the church stifled scientific knowledge so that much that had been known was lost.

Galileo was an early dissenter against the church teachings, but threatened with death recanted. He proposed a thought experiment in which, in a locked cabin aboard a ship, the distance jumped was the same whether the ship was sailing or was still. He was trying to make a point about space and motion and this was to be taken up first by Descartes and then Sir Isaac Newton.

Newton stated that, “absolute time and mathematical time, of itself and from its own nature flows equally without relation to anything external.” He thought the same about space, or as he named it, “God’s Sensorium” which he thought of as that area, in which the things that God is aware of, exists. Both time and space were seen as containers in which objects and events occur, and both were deemed to have an absolute reality in the sense of being quantifiable objects. Real time, according to Newton, does not depend on any particular clock or any particular material object in the universe, and it was this definition of time that was used in the unchanging laws of physics.

Substantivalism was the name given to the the view that space and time are substances, that is, things capable of independent existence, although not true substances but rather “pseudo substances” (more like a substance than property but not quite a substance) as Newton proposed. Leibniz objected to Newton’s view and the matter was debated in the Leibniz-Clarke correspondence.

Leibniz put forward the relational view in his 3<sup>rd</sup> paper to Clarke, “As for my own opinion...I hold space to be something merely relative, as time is, that is I hold it to be a matter of coexistence, as time is an order of successions.” Leibniz held that space and time are continuous, homogenous and infinitely divisible, and that it was only possible to ascribe these properties once they were recognised as being “ideal” and in this way his views on space and time were further removed from those of Newton. Leibniz’s view was that space and time are conceptual constructs made by our minds as a way of systemising the perceived relations between things – such as three seconds earlier or two metres to the left.

Kant’s views on space and time were stated in his Inaugural Dissertation of 1770 in which he wrote, “Space is not something objective and real, nor a substance, nor an accident, nor a relation; instead, it is subjective and ideal, and

originates from the mind's nature in accord with a stable law as a scheme, as it were, for coordinating everything sensed externally." (AK2.403) Here are listed most of the important questions about space already mentioned but laid out clearly. Do we consider space to be real or ideal, is it a substance or merely a property of some substance, is it dependant on the relations amongst objects or is it independent of those relations? What is the relationship between space and mind and how do these issues interact with each other?

Kant's discussion about space and time took place against the background of the Leibniz-Clarke correspondence, and he thought that both accounts were wrong in crucial ways. On Newton's view, it was impossible to be acquainted with space and time although they were a form of real thing. Leibniz proposed a view that was only possible on the basis of the prior knowledge of both space and time themselves, because it is only with that knowledge that one can speak of something being three seconds earlier or two metres to the left.

Kant proposed that the nature of time and space was a form of what he called "intuition" – that is, "the receptivity of the mind that enables an individual object to be given to cognition." (Wood, 30) Neither space and time, or their properties could have any existence apart from our capacity to intuit objects and any changes in them. Kant proposed that space and time had to do with the way we relate to objects and that space and time as they appear in the world are not an objective feature of it, but a function of our experience of the world. Because space and time are "necessary conditions of any intuition... our intuition of them is a priori, that is, independent of the particular content of the sensations we receive from any of the real things we intuit in space and time." (Wood, 37) Kant thought of space as being defined by Euclidean geometry, which was the only form of geometry known at that time and he considered that a priori, in that it was knowledge that applied to all objects and their spatial occurrence in the world. He also thought that not only were space and time "ideal" but also the objects contained in space and time, and he referred to them as "transcendental."

Kant further examined the theories of space and time in the First Antimony of Pure Reason. The first thesis states "The world has a beginning in time and is also limited with regard to space." The antithesis states that, "the world has no beginning and no limits in space, but in relation both to time and space, infinite." He then proceeded to examine the proofs of both and other theories. Kant's theories about Euclidean geometry and space were to be superseded when other non Euclidean geometries were discovered by Riemann, Minkowski and others.

However, as Wood says, "Kant's theory ...though no longer tenable is of continuing interest because it is one of the last plausible attempts to achieve a unified theory of space and time simultaneously from both a scientific and an everyday epistemological perspective. This is something we need even if we do not know any longer how to obtain it. Physics itself will never again be an intellectually satisfying department of knowledge until we somehow regain a conception of time that reconciles science with everyday lived experience." (Wood P38)

Other theories of time have been suggested. One theory, the Tenseless theory of time (also called the block universe) holds that time is much like space; the other tensed theory of time holds that time flows or becomes, that it is a dynamic entity unlike space. Although hints of this can be found in Aristotle, Augustine and others, the issue is also a modern concern arising from debates among the philosophers McTaggart, Russel and C.D. Broad. Tenseless time states that just as different places exist, but not at the same place, so past present and future all exist, but not at different times.

In 1908 McTaggart published a paper about time, once again arguing against its reality on the grounds that an

occurrence in the future becomes one in the past, and that a past event such as the death of Queen Anne recedes into the distant past as time goes on.

In 1905, understanding of the world changed when Einstein published his theory of relativity when ideas about time and motion, and observation of them, was turned on its head. Previously it was held that simultaneity is independent of particular observers, as there was one unique global time. In Einstein's world that is no longer the case and as his teacher, Minkowski stated, "Henceforth space by itself and time by itself are doomed to fade away into mere shadows and only a kind of union of the two will preserve an independent reality."

Now space time is thought to be a single entity and evidence suggests that it is curved. Time is considered the fourth dimension in the new physics. Time travel remains a dream for the future, although with all its paradoxes, I think it may remain a dream for some time to come.

We live in the here and now, and in the space that we occupy at any given time. When we are engrossed in something time passes quickly, when we are bored it appears to slow down .We plan for the future, while hoping that our past actions have not caused harm. We live on a planet that is in constant motion, moving through space and time, and we move in and through own world. We use the terms infinity and eternity although it is not clear what those terms actually mean, as time appears to have commenced at Big Bang – or did it? Perhaps it was there prior to singularity? And where was space before time began? Are there another universes containing other spaces? What about time and music, where music uses time and where, sometimes, time seems to stand still during the performance of something particularly affecting.

The philosophical questions around time and space and the parallels between them continue to exercise both minds and imaginations.

### Bibliography

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