

Time's Four Dimensions

©davidalbertrathbone2009

The naive assumption of linearity with respect to temporality is as deeply embedded in the scientist's mind when they speak of the big bang as it is in the post-modern theorist's when they speak of the pre-modern, modern and postmodern worlds all lined up in a row. This assumption of the linearity of temporality is as groundless as the once widespread assumption of the flatness of the Earth, and its overcoming as initially elusive but ultimately no less obvious. The re-conception of the Earth's shape was only possible in tandem with a radically new conception of force, when the old Aristotelian teleological physics was replaced by the new concept of "gravity".

Likewise it is the geometry of time which must now be rethought, not only as a curvature but also as a fragmentation. Thinking of historical time makes the idea of temporal fragmentation clear. Just as the body-builder's child is not born with big muscles, just so the intellectual's child is not born with its parent's intellect, nor the humanitarian's child with their humanity. Each of these must be re-acquired by the child, or not as the case may be. Increasing the year by one on an annual basis misleads us into thinking that reality moves as inexorably forward as the integers and with no less divergence from straight and narrow linearity. But reality, oblivious of these naive assumptions, resonates in directions we are only beginning to understand.

It is relatively simple to distinguish arbitrary temporal concepts from actual temporal concepts. Days are arbitrary for example, while months are actual. There is no reason why there are seven days in the week - a system of five or nine days would work just as well. But there are very tangible phenomena, both celestial and biological, which measure out twelve of what we call months each year. Likewise years themselves are meteorological and astronomical phenomena, but minutes and seconds are arbitrary conventions.

Notice that it is only the arbitrary temporal concepts which are by definition linear. The real phenomena are not quite so well behaved. They are without exception phenomena of repetition: the return of winter, the regular waxing and waning of the moon, the cycles of the planets. But these cycles are complex and interactive. They are punctuated by bursts of chaotic solar eruptions and awash

in a background of objects ranging in size from comets to alpha-particles. The bare minimum number of dimensions required to represent the complexity of these rhythmic and harmonic interactions is four. This is not to construe time as a fourth dimension along with the three spatial ones - Einstein's error. Time is not a di-mension at all - not something that can be measured in opposite directions, like up/down, forward/backwards, left/right. Time is not even a mono-mension: time is the pre-condition for any mensuration at all. The widespread metaphysical muddle embodied in the pseudo-fiction called "time-travel" is based on a failure to realize that even the time-traveler still goes forward in existence. Time, strictly speaking, is the phenomenon of the fundamental asymmetry of all eventuality, and as such it is the precondition for the existence of dimensions 1 - 3 : each being a *way* things can change, a *way* time can happen. Each dimension of space is only thinkable timewise, and time is conversely unthinkable as anything other than what makes spatial dimensionality possible.

What then is the fourth dimension? Not some mystic channel of occult communication nor unthinkable mathematical abstraction. Quite simply, the fourth dimension is the whole.

The jellyfish floating in the ocean can hardly be said to know where it is. Even so, this simple form of life, although perhaps so poor in world that it can hardly be said to exist in the sense of being *there* at all, is nevertheless to be distinguished from a mere piece of flotsam in that it is "into" its environment to the extent that it does interact with the temperature and chemical composition of the water, the blowing of the wind and the flowing of the currents. Clearly it has no sense of the whole beyond this minimal sentience, and the place it is in can hardly be said to appear to it at all.

I raise this example to illustrate what seems to me to be the first step in learning to think in a way that Heidegger called "topological" about existence - namely, that existence can be "in," or perhaps better "into," the place in which it exists to a greater or lesser degree (the late Reiner Schürmann and the current Jeff Malpas being two prominent philosophers following Heidegger's lead here). A shark is in this sense "in" the ocean more than the jellyfish is, but less than I am. The shark is responsive to its environment to a degree the jellyfish cannot even dream of. In fact, it bears mentioning that there is also a sense in which the shark is more "in" the ocean than even I am - it can "smell" blood in the water down to a couple of ppm, whereas I'm lucky to sense a couple of ppt; also, it has a network of sensors in its snout which detect the minute amounts of electromagnetic radiation generated by the electrical

activity of my nervous system, and a strip down either side of its body sensing water temperature and pressure much more accurately than I can. But even with those superior sensory abilities granted, the shark still does not know that it is in the ocean (never having left it and so having nothing to contrast this being-in *to*), let alone that it is in what we humans call The Pacific, let alone that the Pacific Ocean is on planet Earth, third planet from the Sun at such-and-such a location in the galaxy we call the Milky Way. For the sake of argument, let's say I escape the shark and make it back to the beach, where some children are waiting for me, and let's say these children are quite young. They are not 'in' the world to the extent I am either, knowing about the planet's topography of oceans and land, and the solar system and the galaxy no more than the shark.

The scientific world-view is blind to the phenomena I have just briefly described. To it, the jellyfish, the shark and me are all 'in' space in exactly the same way - as extended matter of a specific quantifiable volume, mass and composition located at spatial co-ordinates x,y,z at time t . This is an abstraction from all existence which interprets the world as what it calls space-time. Energy in general and matter in particular is to be understood as an infinite series of momentary still shots called inertial frames, which are linked up by a variable t into what physicists call the space-time 'worm' of an entity's trajectory through space across time.

The topological way of thinking begins not with this quantitative abstraction, but rather with the concrete phenomenon that existence is always *there*, in the place called its experience. This experience can be so minimal, as in the case of the jellyfish, that we can doubt it is even occurring, or it can be so rich that we might wonder if its really all that different to ours, in say the case of the other higher mammals such as dolphins or dogs or chimpanzees. But to experience means to be *there*, and to describe that experience is to describe this *there* according to whatever powers of description that existence has at its disposal.

The second step towards topological thinking, at least as I'm approaching it here, is firstly to appreciate that evolving ways of thinking about being temporalize differently, and secondly, to realize that each sees the whole differently. In ancient Greece experience is temporalized in a circular fashion, the world being taken to repeat itself periodically over a 'great year' of many centuries; in Christianity, experience is temporalized in an eschatological fashion, our trajectory being from creation to resurrection, life leading to Jugement Day as inexorably as a river runs to the sea. And under modernity, experience is temporalized according to the uniform temporalization of mechanized clock

time, meted out indifferently as a mere quantity, regulating the self-productive activity of the agent.

These two realizations are really the left and right side of one and the same phenomenon, namely the temporalization of space, or the establishment of a time-space in which existence unfolds its experience. This way of thinking runs counter to the abstraction from existence to a mere geometrical space-time which is then mistaken to be the container of all entities. The thought of a time-space does not posit a-temporal slices of being which are then set in motion in the way still frames are conjoined to make a movie, the mere illusion of change generated by a film, projector and screen that don't change but merely work, and moreover do not and cannot appear in the movie itself, as does the thought of a space-time. Instead, a time-space takes all dimensions of existence to be temporalized, and holds the key to being able to think the whole in a new way.

Each and every experience of the three-fold possibility for change in place also involves at least the implicit assumption of the way in which this three-fold possibility of change expresses the whole of which it is a part. It was Kant who first established this point in the transcendental aesthetic of the first *Critique* when he described space as an infinite given magnitude. Think of your experience of space right now: it is certainly limited to one small region, but going to any other region will not show you anything more about space itself. No matter how far removed or how big or small, your experience will still be in the same form: a three-D manifold of possible change. This thought he says is able to make us realize that we can turn our form of intuition into a formal intuition. We can realize that if, in a transcendental analogue to our empirical eyeballs themselves, we realize that our way of seeing goes with us *a priori* wherever we go. We can't literally see our seeing, but we can *think* our seeing, and that thinking reveals the form of experience itself, which amounts to an intuition of that form itself. Notice I said *intuit*, for this is quite different to the deduction of the category of extension in the *Analytic*. This is not an understood concept: it is an experienced intuition of an infinite given magnitude. *All* of space is literally given in each and every part of it.

Now although Kant's notion of this so-called *formal* experience is the thin end of the wedge of abstraction that the scientific world view drives between existence and experience which leads to the confusions of scientism I was alluding to above, and although this fatal abstraction reduces Kant's account of the infinite with the mere formality of the empty unity of apperception in place of the requisite phenomenology of time-space, Kant's account does have one great merit. This merit is the realization that space is a holistic phenomenon. Like the DNA in every cell of your body, the whole of

space is in the experience of each and every part. To turn Kant's formal-transcendental insight into an informal-phenomenological observation, we need only to see that the way of thinking the whole of space shapes existence's experience of every place it can be in. Every Christian experiences the place of their experience as the space created by God for their existence. Likewise every Ancient Greek experiences the place of their experience as the recurrence of a cyclic repetition, which is thus also the anticipation of its return in the cosmic merry-go-round of revealing-concealing. And moderns understand the place their existence occurs in as the product of the forces of nature which "make" space and time according to the theories of general relativity and quantum mechanics.

This fourth dimension of the whole is properly so-called, because unlike time, the whole is both a dipole and a measure. Its polar nature is seen in the way in which it is a balance of what is implicit and what is explicit, what is realized and what is concealed. All visions of the whole exhibit this balance of revealing and concealing in their ineluctable defeasibility. To see this we need to make a simple but elusive distinction between the concepts of "all" and "whole." Think of a shot of the Earth from a satellite, our beautiful blue-green globe as it is now familiar to all. We know as we look at this that we don't see *all* of the planet: one side faces away from us, for a start. But even more so, we know that any point on that globe can be zoomed-in on, and an endless well of detail is contained in reality at every point. An enormous telescopic zoom-in, down to, say, one square millimeter is itself only the beginning of the microscopic zoom-in down to the atomic level, which itself is only the beginning of the particle-accelerator zoom-in down to quarks and super-strings, itself a quantum threshold to who-as-yet knows what. Doubly infinite, no traveler is seasoned enough to be able to claim to actually have seen ALL the Earth, just as no physicist will nowadays claim to have reached an absolute bottom line of indivisible simplicity.

But nevertheless, there it is, the whole Earth, right there, right now. Now apply this thought to reality in general. Despite its obvious infinity, we can also "see the whole" - we see the physical world as one, and attempt to understand it as a whole. This is not a claim to understand it *all* or to have seen it *all* or even that it makes sense to speak of such a possibility. It is just the claim that despite our massive ignorance concerning what's included in the "all," we do know in advance that everything is part of the whole. No matter what bizarre scientific anomalies are discovered with telescopes and microscopes and particle-accelerators, they must all be part of the whole, and will need to be incorporated into our conception of that whole, perhaps even bringing about a revision in that very conception. The history of science can be described as the history of just these sorts of revisions.

Two important consequences follow from these fundamental considerations. On the one hand, we must build a healthy modesty into our estimation of our own comprehension. Once good people thought that the world was a vast rock resting on the back of a huge tortoise perched atop three massive elephants. Don't laugh: it was the best they could do with what they understood concerning the whole, and was certainly a great advance upon the previous utter incomprehension concerning the very question: "What is the whole?" On the other hand, we find the realization that although our concept of the whole is inevitably flawed in some way, and so must always be open to revision, having *some* concept of the whole is inescapable. Each and every mind in their infinite diversity must in some way contextualize itself, place itself in some sort of world. For the infant the whole is nothing but the crib and the breast; for the child it is the school, the playground, and the home. For the adult, it becomes the city, the country, the planet, the solar system, the galaxy, and the universe.



This is why I recommended against laughing above, for at this point the laugh would rebound upon us. For what is "at the edge" of the clusters of clusters of galaxies that we call the universe, and what is on the other side of that edge? Those into at least popular science, if not actually astrophysics and cosmology, have a kind of idea that there's this thing called the curvature of space, and that our

current understanding of the whole is that 3D space is curved in a fourth dimension, analogous to the way in which a 2D surface can be curved in a third dimension. To a tiny insect, the surface of a large ball is effectively flat. This might lead it to think that it is either infinite, or it has an edge. But actually neither is quite right. Obviously it has no edge, but nor is it infinite in the sense in which the insect might think. It can always keep going on the apparently flat surface, but if it starts leaving marks, it will eventually find traces long since left behind suddenly popping up from out of the future. The sense in which a 3D universe can also be a whole is the same sense in which the ball can be an infinite whole for the insect. No point on the ball's surface is its center, and nowhere is the edge or periphery to be found. If you traveled to the "edge" of the universe, it would still seem to be the center, and where you had come from would seem to be the edge. There is a general relativity of perspectives. No one in their right mind would ever dream of claiming to have had experience from anything but a tiny fraction of "all perspectives". But all are perspectives *of* the whole *on* the whole and *in* the whole.

To return now to the topological insight. We saw that retrospectively it was the realization that not only was the place of existence essentially temporal in all three dimensions, but that there was a fourth sort of possible change too, namely a change in seeing the whole. The history of these changes were seen to be threefold - Greek, Christian and Modern; no doubt a simplified scheme, but perhaps not as misleading as some maintain if its schematic nature is kept squarely in mind. For what it does *as a way of thinking* is to re-orient the mind concerning futurity. The realization that history has been not simply "one damn thing after another" in the same place, but rather an epochal history of the changing of the place of existence leads us right back to the jellyfish thought-experiment. For if indeed we can now see the whole in a new way, we are perhaps prepared for this realization: transcendence is the upshot of the realization of finitude, not infinitude, which is to be interpreted as allied with immanence instead - i.e. finitude \leftrightarrow transcendence : infinitude \leftrightarrow immanence. Note the both positive terms are here aligned on one side, and both determinate negations are aligned on the other - this is not an accident, but rather an indication that overall difference here indicated is itself parallel to the concrete:abstract difference. In other words, "transcendence" and "finitude" are two different names for the same positive phenomenon (i.e. a direct experience), whereas "infinitude" and "immanence" are names for *abstractions*, indicating not positive experiences, but abstract speculations concerning the removal of certain boundaries, and not names of actual or even possible experiences at all.

The child is born into the infinitude of immanence: every day seems to go forever, death is unknown, and if experienced in another, incomprehensible. Humans are born into a congenital

chauvinism, for whom the world seems inevitably to be centered on themselves. They are fully and utterly immersed in their own world, blissfully oblivious of the whole of which they are nevertheless still a part. Life seems an inexhaustible infinitude in which aging is unknown and mortality undreamed of. But this infinitude of immanence only appears to be infinite: sooner or later, the cold hard truth of the inescapability of mortality is apprehended, and a moment of transcendence takes place in the individual as they realize: "I am going to die one day". This is the moment when they first start to see themselves as a whole. Beginning with this moment, the child start to grow up. It begins to see that not only is it itself a whole, but that it is also part of a nested set of wholes: a whole family in a whole community in a whole country, and so on. Apprehending the mortality not only of our body but also of our epoch connects post- with pre- modernity in a new way, just as it connects the *übermensch* with the ape in a new way. Neither are a simple before and after: both reveal the deep meaning of *Gay Science* §54. Space is finite yet unbounded; we are mortal yet able to see the whole; we in a way *are* that whole - "inventing, loving, hating and inferring."