

Parmenides, Hegel and Special Relativity

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This paper explores two different responses to the metaphysics of Parmenides. It highlights the importance of Parmenides in the development of the Hegelian Dialectic. And it examines some of the parallels between Parmenides ideas and certain interpretations of special relativity theory.

Being

Parmenides raised the crucial epistemological question of the appropriate means for achieving knowledge of reality. Finding an apparent contradiction between perception and pure thought, he came down in favour of pure thought. He was thereby led to postulate a true reality, or ontological absolute, “unborn and imperishable”, “entire”, “alone of its kind”, “unshaken and complete”, “single” and “continuous”. He also strongly implies that it is homogenous and eternal.

Parmenides highlights a contradiction between the “being” represented by the “is” in the statement “it is not” and the non-existence represented by the “not”. He argues that not-being cannot — by definition — exist, and that nothing can therefore come from nothing. As he says, “You could not recognise that which is not nor could you mention it...nothing cannot be” (Barnes, 2001:80).

Change involves the coming into being of something which didn’t previously exist — that was previously characterised by not being, or the passing of that which has being into not-being. But it cannot be that something can come from nothing or go to nothing. There is nothing for things to come from or go to. So there is no change.

Plato portrayed Zeno’s paradoxes as designed to defend Parmenides’s philosophy. Zeno argued that an arrow shot from a bow never moves; at each instant of its flight it is in a place exactly its size — and therefore motionless. But if it’s motionless at each instant of the supposed period of its flight then it is motionless for the whole period. Motion is an illusion of our perception, rather than a true reality.

J. B. Kennedy highlights another argument that probably played a part in Parmenides’s thinking — the impossibility of transition between contradictory states or properties. If a thing is changing from one state or property — e.g. rest — to its

contradictory state or property — motion — then the thing must have exactly one or both or neither of the properties. It can't have exactly one property because that would put it in the state before or after the change, rather than being in process of change. It can't have both or neither because the properties are contradictories — can't both be true, can't both be false. So it's not the case that a thing can be changing from one property to its contradictory property (Kennedy, 2003:82–83).

Nor can the world consist of different existing things — separated by space where nothing exists. For nothing can't exist. Zeno was probably extending or defending this aspect of Parmenides's argument when he noted that plurality implies separators distinct from the things they separate. There cannot be nothing between two things or they would not be distinct. But in order to be distinct from the things separated the separators themselves must be separated from the others — leading to an infinite regress (Kennedy, 2003:92–103). So there is just a single, homogenous, unchanging existing thing.

This paper considers two different sorts of responses to the Parmenidean arguments by subsequent philosophers. The first, associated with Hegelian dialectic, attempts to show how thoroughly anti-Parmenidean ideas can be logically generated from such ideas themselves. The second, associated with special relativity theory, claims to show how modern science, has, in fact, vindicated key elements of the Parmenidean ontology.

Hegel and Parmenides

Hegel sees in Parmenides's work “thought” first becoming aware of itself as such — as a conscious attempt to apply rational thinking to the task of discovering a universal organising principle or underlying structure of reality. This is the point at which fundamental categories or ideas of such organising principles, previously implicit in human perception, thought and action, and in the world as perceived, or thought about or acted upon, first begin to become objects for thought; the first explicit formulation of such a fundamental organising category.

Hegel argues that Parmenides is actually striving to articulate the idea of Being as prior to all predication or determination. For Hegel, pure immediate, unspecified and indeterminate “being” is the starting point of metaphysics insofar as it is the most general form of all reality. As Errol Harris explains, “whatever anything may be, before any distinction of form or content, it must be. It is presupposed in all perception, thought or imagination” (Harris, 1983:24).

This first step in the process of abstraction produces a deeply abstract result — but it carries the seeds of further progress, through dialectical self-development of ideas — to increasingly concrete and differentiated conceptions of ultimate reality. Abstraction shows us that pure being is what all existing objects have in common. So is it the immediate form of subjective awareness — as awareness merely of existence.

As Parmenides suggests, Being is the opposite of Nothing. But Hegel observes that insofar as pure Being has no external limit, is not distinguishable from anything outside itself, and has no internal differentiations or distinctions, it is completely empty and indistinguishable from Nothing. Hegel refers here to an “identity of opposites”, insofar as not-being is both Not and Being.

But Hegel also highlights the intrinsically dynamic character of this unity of opposites. Thought, in trying to fully grasp one is inevitably led back to the other. Hegel refers to this as the dialectical movement of Becoming. And he agrees with earlier Greek thinkers that a movement from being to nothing and back to being is “the principle of all change, all movement, all acting in the actual world”, as well as the principle of all thinking.

As Errol Harris says, this first identity of opposites is the key to Hegelian dialectic. Subsequent phases become more complex and the process is consequently modified. But such modification is itself “implicit in this first Triad” (Harris, 1983:96).

Hegel has Parmenides as the first philosopher in his logical reconstruction of the history of metaphysics, rather than the historically earlier Thales or Anaximander. Parmenides provides the thesis, followed by Anaximenes’s antithesis, arguing a case for Nothing (the void) as Absolute principle, and then Heraclitus’s synthesis, with Becoming as Absolute.

Motion

In his book *In Contradiction*, contemporary philosopher Graham Priest refers to Bertrand Russell’s analysis of motion in his *Principles of Mathematics* (of 1903) as the “orthodox” response to Zeno’s arrow paradox. As Priest says, in this account, “motion consists in the fact that, by occupation of a place at a time, a correlation is established between places and times; when different times, throughout any period however short, are correlated with different places, there is motion; when different times throughout some period however short are all correlated with the same place, there is rest” (Priest, 1987:216).

But “a sequence of states, even a dense and continuous one, indistinguishable from corresponding rest states does not seem to be a state of motion” (Priest, 1987:217). “Technically, though the measure (=length) of the points traversed in an instant is zero, the measure of points traversed in a sum of instants may be non-zero (provided there are sufficiently, ie. uncountably, many points).” But “how can going somewhere be composed of an aggregate of going nowhere?” (Priest, 1987:218).

As Priest notes, Hegel develops his idea of Becoming as unity of Being and Nothing to provide an answer to Zeno’s refutation of motion which also provides an alternative to Russell’s “orthodox account”. “Hegel is not denying that if something is in motion it will be in different places at different times. Rather, the point is that this is not sufficient for it to be in motion. It would not distinguish it ... from a body at rest at each of these moments. What is required for it to be in motion at a certain

time is for it both to occupy and not to occupy a certain place at that time.” (Priest, 1987:219–220).

Parmenides rejects motion and change by virtue of the contradiction he sees as inherent in such motion and change. But Hegel seeks to show that the contradiction is transcended by recognising the abstract character of both Being and Nothing as moments within a process of Becoming. And Priest argues that motion can really only be distinguished from rest by reference to the material reality of contradiction.

Special relativity

Some would say that Aristotle has answered some of Parmenides’s key points. To say that *x* does not yet exist or has ceased to exist does not mean that it is as yet, or has passed into, (an existing) nothingness. Its pre-existence consisted in some properties, powers or potentials of previously existing things, including the raw material of which it would come to be composed. It comes into being through the shaping up of such raw materials into a new form or structure. And that form will eventually cease to exist—while its matter persists in some other form. While nothing can indeed come from nothing, new beings or properties of beings come from pre-existing beings or situations, pre-existing materials take on new forms of organisation or disorganisation.

It is true that there cannot be nothing between distinct things. But the fact that one sort of thing has a qualitatively different matter or form from another seems to be enough to explain its distinctness from a neighbouring thing insofar as the boundary marks the point or surface where character *A* ends and *B* begins.

However, Einstein’s special relativity theory casts major doubts upon the ontological prioritisation of change and diversity and possibility. It provides good reasons for believing that Parmenides could, indeed, have been correct in seeing such things as appearances, rather than ultimate realities.

The key idea here is the constant speed of light measured by observers in different states of uniform motion relative to each other. It turns out that this empirically supported fact requires radical changes in our ideas the nature of space and time. And it does so, in the first instance, through undermining everyday conceptions of simultaneity.

The loss of simultaneity is typically illustrated by reference to a train or spaceship moving rapidly — lets says — leftwards relative to a stationary observer beside the track or on a planet. A light situated at the mid point of the cabin of the craft is switched on and light beams traced towards two reflecting targets at either end of the craft. An observer on the vehicle — at the light source — judges the beams to have arrived at their destinations simultaneously — both beams travelling equal distances with equal constant speeds and returning at the same moment (Stannard, 2008:17).

The ground based observer also sees the light beams leave at the same time. But because of the movement of the back of the craft towards the beam (in the course of

the journey of the beam) and the front of the craft away from its beam, this observer see the backwards directed beam hitting its target first. The backwards beam then has further to travel to reach its source on its journey back and the front beam has less far to go and the two beams arrive back at the source simultaneously.

Whereas the two observers are agreed about the simultaneity of events that occur at the same point in space, they do not agree about the simultaneity of events separated by a distance. The problems for those who want to attribute reality only to what exists at the present moment — with past dead and gone and the future not yet in existence — are clear. Different observers, simultaneously present at the same location but in different states of relative motion, will each identify a different set of more distant events as part of their “present moment”. Events which are simultaneous with that moment of contact for observer A will be identified by observer B — moving towards such events — as in the past and for observer C moving away from such events as in the future.

But whereas such observers disagree about the time and space separating particular events, special relativity theory provides a formula allowing all such observers to calculate, and agree upon, a single, objective picture of the separation of all such events in four dimensional space-time, called the space-time interval. This led Hermann Minkowski to suggest that perceived space and time displacements were really just projections of a deeper four-dimensional reality.

Just as Parmenides is led to postulate a single continuous unchanging thing, so does Einstein follow Minkowski in postulating a four-dimensional continuum of time and space of which objects are merely parts or properties — as world lines or paths — no part of whose history has any ontological priority or greater reality than any other. More specifically, they are what are called “time-like” world-lines, consisting of successive events linked by causal influences propagated at less than light speed, in an eternal block universe.

This “block universe” simply exists in a tenseless and unchanging fashion. As Stannard says, “changes occur in time. But space-time is not in time; time is in space-time”. In space-time, “all of space exists at each point of time” and “all of time exists each point of space” (Stannard, 2008:30).

Illusion of time’s passage

Even without reference to relativity it was pointed out long ago that there are major problems with an idea of “the passage of time”. The motion of an object is change in that objects spatial position (i.e. its relation to other objects) with respect to time. But it’s not clear how a moment of time can change its temporal position with respect to time.

Those who believe that only the present actually exists, meaning all of three dimensional space at a particular moment of time, so-called “presentists”, can identify the passage of time with the successive happening of sets of simultaneous events.

But any such ideas are undermined by the relativity of simultaneity. It's difficult to construct a coherent idea of "the present" or the passage of time from the perspective of special relativity theory. One view is that of "the back light cones of the transient now advancing along a world line" — meaning all of space-time able to causally influence such a space-time point. Another is that of "the successive happening of events along a — time-like — world-line", with the passage of time indicated by a clock on the world-line.

But these are definitions of "a" present rather than "the" present, where "a present" apparently means an event — or set of events — with the capacity to be "the present" of a conscious observer — or participant.

Subjectivity

There are deep problems of the true relationship between conscious subjectivity and the space-time continuum. An image frequently referred to in this context is that of "moving an illuminated plane up through the space-time solid"; as Rucker says, "first one cross section would be lit up, then the next, and so on" (Rucker, 1985:43). The problem of such an image is that it puts mind outside of space and time and introduces a "second level of time" — the time that lapses as the mind moves its attention through space-time. But if space-time is what exists, then "each of us is a space-time pattern in the block universe". The passage of time is, indeed, a kind of illusion, as Rucker says, "a feeling that goes with being a certain sort of space-time pattern".

We must also recognise that the "animated Minkowski diagram" as it has been called is not an accurate picture of the phenomenology of perception of space and time. We do not sit outside the cosmos experiencing a succession of different frozen "images" of it. Nor do we animate the present by reference to memories in the form of such frozen images.

Rather, phenomenological investigation attests to actual experience of an extended portion of space-time within which "things happen". We "replay" our memories within this extension, rather than creating the extension out of memories. It somehow seems to include both past and future in the sense of both the passing away and coming into being of things — within a unity of present-ness.

We can imagine the scope of such a present expanding to encompass all of past and future events. In which case, there is no longer any past or future — of lost or not yet born events — but only "before" and "after" in a continuum of space-time.

Disappearing space and time

Common sense says that space extends and persists even though we only directly experience a bit of it at a time. Our experience has nothing to do with the existence of space. So why, we could ask, do we imagine that our "movement" through time has anything to do with the reality of past and future time? Why should past time cease

to exist or future time not yet exist just because we don't happen to be experiencing them at the moment?

From a presentist perspective, the territory we visited at an earlier stage has now ceased to exist — but has been replaced by a new “piece of space” (conjured into existence by the previous space at that location as that previous space went out of existence) which is part of our new present. But even a presentist would accept that our movement has nothing to do with the ongoing regeneration and persistence of space. If we think of presentism as the illusion of disappearing time rather than the illusion of passage, this is perhaps a first step to dealing with the apparent contradiction — between common sense and the space-time continuum.

From a relativistic perspective there is no — separate — space or time, but only the events of space-time. The illusion of disappearing space is the same as the illusion of disappearing time. We merely think of space as separate from time because we think we can return to the same place we were at in the past, not to the same time. But really we are considering the world line of events which is us, rejoining some other world line of events, which we identify as a “particular place”. Insofar as the rejoined events are quite different events from those of the prior point of intersection, Heraclitus is correct in saying that we cannot step twice into the same river. On the other hand, such a world-line of (causally related) events is all that can be meant by the same river — or the same person — from the eternalist perspective.

Conclusion

The world of change and causation, of diversity and plurality and possibility, of past and future, doesn't have to be thought of as wholly “subjective”, illusory or unreal. Presumably it represents real structural features of the continuum refracted through conscious subjectivity.

Passage is not really an illusion but rather our awareness of the differences between contiguous events — or sets of events. What we call the coming into — or passing out of — being of a thing is really a part or property of the continuum — the fact that a particular worldline of structurally related events terminates or commences at a particular spacetime location.

Russell's orthodox, relational account of motion — in modified form — survives the transition to the four dimensional continuum. What Priest identifies as its major weakness, turns out to be a clear presentiment of the nature of that continuum.

While it is not true that the present creates the future, our understanding of causation still reflects deep structural relations between contiguous events and structures of events. Strands or worldliness of patterns of events exhibit a high level of “directional” structure and organisation — including both the emergence of local order through input of energy and the increase of entropy of the wider system.

Nonetheless, the fact that relativity theory seems to be both logically consistent, and to have sustained a solid record of empirical verification in the years since its

original formulation, provides reason to believe that Parmenides could have been fundamentally correct. The Aristotelian-Hegelian world of diversity and transformation is not the ultimate ontological reality.

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