

The World of Parmenides

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I first heard of Parmenides during a philosophy class the second year at the Gymnasium. His philosophy that nothing did not exist hence that there were no changes, no differences, struck me as beautiful. Our philosophy teacher a big fat man educated as a theologian laughed and said that this was clearly absurd, and I thought that he could not possess a philosophical temperament, the statement should clearly not be taken literally, only fools do that, but taken poetically. It stayed with me even after I left school and would after that not concern myself with philosophy for more than thirty years, and yet I would not forget his name, nor that of his rival and apparent opponent - Heraclitus - who claimed that everything was in a flux, i.e. everything changed. Of the two Parmenides had my sympathy, he struck me as deeper than Heraclitus whose claims are so much more apparent. This experience may have been the reason that I have come to think of philosophy as the poetry of science. A statement not meant to denigrate philosophy, although as I have found out it grates on the sensibilities of professional, academic philosophers, who are no more desirous of anything else than being seen as hard-nosed scientists¹; but intended to be laudatory.

And in fact it is as poetry that Popper reads Parmenides, not just because, as I later found out, that Parmenides actually wrote in poetry, and Poppers long argument is nothing but an extended analysis of a piece of poetry, and as with all such exercises there is always the danger of reading in too much. On the other hand the historical question of what Parmenides really intended is moot, a piece of art transcends its creator, and what Popper does is to expound on his experience in confronting it, and that can be said to be a piece of art by itself.

Parmenides makes a clear distinction between the world of unchanging truth, accessible only to the gods, and the deceptive world of appearance which is known only to man and is changing and illusory. His poem consists of two parts, one devoted to the unchanging real world, the other to the world of change and illusion, of which the latter part is only preserved in fragments. The insight is the fruit of a revelation by the goddess Dike which bore fruit as the two poems referred to. Now what does that really mean? And how did it come about really? As to the latter we can only speculate, and as the speculation of Popper may be put down rather briefly. Parmenides is credited with the realization that the Moon does not change when it undergoes its phases. It is in fact unchanged, it is only the play of light on it that produces the illusion of its waxing and waning. The Moon is a sphere illuminated by the sun, and this unchanging fact explains the illusion². To realize

¹ Nothing wrong with such an ambition, especially compared to others philosophers may have.

² What is the illusion? Does an illusion have an objective existence qua illusion? Just like a hallucination has an objective existence qua hallucination. Hence one cannot hallucinate a hallucination, one is actually having a hallucination. Thus illusion pertains to an interpretation which is deemed faulty. The

that, Popper speculates made a tremendous impact on Parmenides and made him have the insight he attributes to the promptings of the goddess Dyke.

Parmenides is a rationalist, his ambition is by pure thought alone using impeccable compelling logical arguments, prove that there can be no change. The arguments must by necessity be based on analytic tautologies because anything else would be subject to doubts. But, as Popper remarks, the possibility of deducing synthetic statements from purely analytic ones is up for doubt, and he even claims that we now know that this is impossible. This by itself is also up to doubt, it certainly is a matter of faith not formal logic. The argument of Parmenides goes as follows. First there is a premise to the effect that only what is truly the case (such as what is known) can truly be. Basically it is the conviction that there can only be one truth (because otherwise it would not be truth). This is in the nature of religious faith, in fact it corresponds to the monotheistic variety of there is one and only one God. In fact, in the most abstract interpretation of God, God is identified with Truth. This is by far the most abstract and most removed from an anthropomorphic God imaginable³. It also shows that when it comes to the basics, science and religion merge and one can only rely on Faith. Now the first conclusion of that premise is that the non-existing cannot be, which sounds very close to an empty tautology. The second conclusion is a zooming in and amounts to that the void, being the nothingness of space, cannot be. Now we are getting closer to a synthetic statement. The next step involves a further zooming in and explanation, namely that the world is full; that it is a continuous block without any divisions. And finally the fourth conclusion, as the world is full there can be no movement, in particular no change, no change of position which is the essence of movement. This becomes a very synthetic statement, and one that can be falsified unlike the initial ones that seem only to be a play on words, And in fact the conclusion was challenged by the atomists, but presenting a conclusion that can be challenged is no failure, on the contrary it provides a stepping stone, something that can be improved and thus provide a flagstone in the paved way towards truth. And in fact Parmenides conclusion is not totally rejected by the atomists, the way he phrases his argument indicates that in order for there to be movement matter cannot form a solid homogeneous block, there must be voids, in fact most is void, and hence matter must be in the form of small moving particles, individually indistinguishable, another nod to

actual change of the visible illuminated surface of the moon is real, this is not an illusion, but to interpret it as a periodic decrease and increase of the Moon as a physical entity is one. More literally, Parmenides denies light, there is only night. But that is poetic metaphor

³ Many of the statements in the Bible about loving God and not denying him make perfect sense when God is identified with Truth, but when thought of as a glorified human only bespeaks unbounded egotism and petty vengefulness. One may also note that in all ostensible polytheistic religions there is a tacit approach to monotheism. The gods themselves may embody some common divine principle, which then, admittedly on a more abstract plane than not merely singling out one as the first among equals, recognizes uniqueness. This is particularly clear in Hinduism which also exhibits a dichotomy between the bewildering sensuous world of a proliferation of gods and their antics, and a far more abstract world of principles. Had Popper taken the trouble to study Hinduism he may have found much grist to his mill. On the other hand such a study would have involved a bewildering profusion out of which anything could be extracted.

Parmenides, with properties being reducible to combination of particles. As Popper rightly points out the atomistic theory has been crucial in the development of modern physics and hence science. True, Descartes did not describe it really, envisioning a space with no emptiness in order to give casual mechanistic explanations (involving his vortices). To Newton attraction at a distance over empty space was an embarrassment. And the more modern view of fields pioneered by Maxwell may be thought of if not as a repudiation of atomism but a serious reconsideration, and quantum theory relevant on the atomic scale makes us reconsider the naive conception of atoms as small hard balls, a conception which, incidentally, the Greek materialists were too sophisticated to fall prey to (in particular they claimed that as atoms did not consist of smaller parts, it was thus impossible to describe them as ordinary physical objects).

Then there is a general way to change change, so to speak, to unchange. One simply consider a thing along with its changes as one entity, which by construction is unchanged⁴. Now this begs the question of what is meant by change, in fact as Heraclitus realized there is a problem with the notion of change. The notion does not make sense unless there is something that is unchanged. A thing undergoes changes, but for that to make the aforementioned sense there must be some unchanging essence of the thing which allows us to keep track of it during all the changes. And once again we are back to Parmenides.

In modern physics the search for invariants is fundamental, and, as Popper reminds us, the basis for the prevalence of equations in physics. In mechanics we have the invariance of momentum and energy, and the latter has an even wider applications than those to mechanics and is fundamental in all exploration in physics, and when violated as in Einstein, to be replaced by a sleigh of hand with the invariance of the sum of energy and matter (with a suitable exchange rate), and better still realizing that there is no difference between energy and matter. It is from the various invariances of physics a lot of fruitful both as to prediction and explanation, are derived by equations. The physical world, as well as the mathematical world, is filled with individual facts and curiosities, but what really counts are the underlying principles, the former more on the level of illusions, because different as those facts may be, those differences are superficial.

The whole modern approach to seek explanations of phenomena beyond the surface of things (and it is here that natural science, especially physics, differ from the social sciences⁵). Now being human, what we may really appreciate about physics and mathematics are the individual idiosyncratic aspects, but to someone seriously engaged (and thus not

⁴ Say if you have a function $f(x)$ depending on a parameter. The values of the function are not necessarily constant, in fact typically not, but the way you construct the value from x , or more generally how the value of f is related to x is constant. But assume that this is not true, but this changes with time t (or some other variable), then we can create the function $F(x, t)$ to take that into account. Thus paradoxically by creating a function F which depends on time, it as a consequence does not depend on time! (To be more precise, the very dependence on time, does not depend on time).

⁵ Freud's attempt to explain, and hence cure, neurosis is a laudable attempt to look for hidden sources and to explain not the unknown in terms of the known, but the known in terms of the unknown. That it largely failed is of secondary importance, as Popper would put it, it became unnecessarily dogmatic and hence closed off the avenue of disinterested exploration with its concomitant development by criticism and modification.

being merely human) those are but distractions of an illusory character⁶.

Now, as Popper points out, Parmenides was one of the first, if not the first, who made a distinction between primary and secondary characteristics. A distinction between those that reside properly in the material object, such as mass and extension, and those which are illusory so to speak, namely those that are merely part of our perception and generated in us, such as color. The distinction is not entirely a fortunate one he thinks, but is of course more than ready to overlook such a minor difference of opinion, or should we say emphasis?

The influence of Parmenides on Plato's world of forms should be obvious. The preaching of the former is the distillation of the approaches of the latter. But of course if Parmenides only gives us a rather stark and crude picture, that of Plato is a highly developed elaboration. Just as the cosmology and science of Parmenides is impossibly crude compared to that of modern science. Yet because of its very crudeness, it allows many interpretations and readings. It is like the fertilized egg in the process of embryological development, any more or less finished organism, be it man, horse, frog or fish, can look back upon it and with confidence trace all of its present qualities as emergent already in the egg.

To speak about just one Truth may be seen as a case of dogma. To believe that there are many truths is of course better and more tolerant, paying homage to a multifarious and diverse society extolling differences. But this is to fall prey to a deep misunderstanding. When Popper speaks about dogma, it pertains to theories, which never may be more than intelligent and resourceful guesses. To assume that a theory is true, come what may come, that is dogma. Thus dogma is only applicable to the illusory world, to pretend to have divine access to the real world of Truth⁷. This leads us to another one of Popper's obsession, namely Xenophanes. He is a Greek scientist, philosopher and poet, with whom Popper finds a deep affinity, maybe even greater than that with Parmenides. Xenophanes preaches that only the gods may know truth, mere man will forever be content with guesses⁸. Poetry, especially ancient one in a foreign tongue, tends to be opaque, and it was only when he had himself formulated the process of conjecture and refutation, that he was able to see the same ideas expounded on. A fact that greatly gratified him. When it comes to philosophy dealing with fundamental existential themes, to see yourself anticipated is actually reassuring, unlike finding that a mathematical discovery you have made has already been discovered. In the first case we find an ally in the search for Truth, while in the second case Truth as such is not the issue, but that of personal vanity. Actually in the volume there are several essays on Xenophanes more or less identical, with only slight variations. One of the issues is taking exception to professional Classicists.

⁶ One may be reminded by Grothendieck who abhorred tricks in proofs but aimed for natural ones from which the statements would follow naturally and smoothly and above all with the force of inevitability. To me this is very Parmenidean in temperament.

⁷ People extolling multi-culturalism and relativity of opinion, one being as good as another, usually think of Democracy in ways we would characterize as dogmatic, it being beyond the pale of criticism. The inquisitional mindset has not vanished, but maybe even grown stronger. To reject all dogma, is a dogmatic stand to paraphrase the saying of R.G.Collingwood : to reject metaphysics is to take a metaphysical stand.

⁸ In fact Xenophanes allows the possibility that man may know the truth, but if so he would not know that he does, in particular he cannot derive truth.

Popper professes that when it comes to technical matters he is out of his depth, and thus his interest is that of an amateur, but being an amateur with a different perspective, maybe more sympathetic to the protagonists, he is able to understand them better. Thus he provides alternate translations (being also a student of Ancient Greek) and challenges some of their conclusions that he finds preposterous. There is much to be said for that. A mathematician is better qualified to interpret an ancient mathematical text than a professional historian be he an expert on the society of the times. (Needless to add, this does not exclude mutual complementarity and hence enhancement.)

There are also three other essays in the collection. One titled 'Beyond the Search for Invariants' goes in particular beyond Parmenides. In it he recalls the discussion he has previously presented about how much the Old Greek has influenced contemporary science from Newton, Laplace up to Einstein with his space-time continuum, the ultimate Parmenidean world in which nothing happens, everything is⁹. Popper takes issue with Parmenides extreme rationalism, his conceit that he can actually prove things, contrasting it with what he calls critical rationalism, which is much more in the spirit of Xenophanes. As reasoning beings we cannot prove things, only come up with conjectures challenged to be refuted and thus lead to improvements. Parmenides is put in this context, his proof of the reality of things, the way of truth, as he called it, is, somewhat ironically, illusory, but as already noted very useful as a conjecture to be refuted. A critical rationalist is critical against himself, thus always open to refute this theories. Newton ridiculed his gravitational theory of acting across a distance, Darwin downplayed the aspects we now find central to evolution and which we refer to as Darwinism, claiming that there might be many other processes at play¹⁰, and Marx professed not to be a Marxist¹¹. Einstein was ready to abandon his theories, would they run aground on empirical reality. And finally, Popper also discerns, or hopes, to discern anti-parmenidean in the Greek poet. Now Popper accepts the reality of change, not to do so would be absurd (just as my philosophy teacher claimed). Intimately related to change is time, and the arrow with which it seems to be endowed. But is the arrow of time merely illusory, meaning subjective, and thus with no collective coherence? This leads to the paradoxes of statistical mechanics, the irreversible phenomenon of increased entropy, which gives an objective direction and hence make sense of death following birth, both being irreversible, going to the heart of man's existential dilemma. Boltzmann tried to prove the increase of entropy starting from the axioms, so to speak, of classical mechanics. He thought he had done so, but realized that he had failed. Poincaré pointed out that his mission was doomed to fail, because how you could from reversible assumptions prove something irreversible? This counterargument, incidentally, ties up with Parmenidean ideas, of the essence of the cause being present in the effects, that nothing can be found in the effects, which were not already present in the cause. Boltzmann speculated about there being local increases in entropy and thus that time would have different arrows at different locations, and thus the experience of the flow of

⁹ Cf. footnotes above on erasing change by incorporating it, by making a function actually independent of time, by making it formally dependent on it!

¹⁰ Darwin was not primarily interested in general theories but more focused on the wonderful diversity of the illusory world of organisms.

¹¹ Which Popper considers the most admirable thing he said

time would only have local effects and be locally constrained as all subjective experience. Schrödinger threw himself into the fry and Popper reports on his ideas, although with little enthusiasm. Popper himself also tries his wings on what can seriously be thought of the border between science and philosophy, where he feels that he can test himself against the greatest of physicists on something close to equal terms, something he would be unable to do in more technical territory¹². But Popper as a scientist is rather disappointing compared to him as a philosopher. Undeniably clever and competent, but lacking that extra amount of daring and creativity, at least for what is demanded¹³. But more philosophically, one of his more interesting conclusions, is that consistent instrumentalism, as manifested by Mach, who believed in no world one of Truth, only the world of opinion formed by the senses, leads to an idealistic stand very close to that of Berkeley. Mach famously did not believe in atoms, except as a convenient fiction, but was apparently convinced on his death-bed through the phenomenon of Brownian motion, studied and explained by Einstein¹⁴.

Popper concludes with modern developments that transcend the vision of Parmenides, such as change and the increase in entropy, the indeterminacy of quantum mechanics, the invasion of probability, and the expanding universe. Finally he takes up the case of economics, where traditionally any exchange was considered a zero-sum game, tacitly assuming the invariance of wealth giving rise to the by Adam Smith's discarded mercantilism. He concludes the essay by setting up a system of anti-theses between the world of truth and the world of opinion.

Necessity	:	Chance		Perfection	:	Imperfection		Precision	:	Approximation	
Reversibility	:	Irreversibility		Repetition	:	Variation		Things	:	Processes	
Invariance	:	Emergence		:	:	:		:	:	:	

In 'The Self and the Mind-Body Problem' he makes the provocative statement that the greatest and most fundamental achievements of mankind were made in the past. He refers to language, the use of artificial tools to make other artefacts, and the discovery of our self and that of others, and the sobering realization that we are all fated to die. Now those achievements are of very different categories, and some of them may predate modern humans, such as self and realization of personal mortality¹⁵. One may also note that any achievement of today can be traced back in time, and then it is tempting, if only

¹² It is remarkable how naive the great mathematicians of the 18th century were on subjects such as the philosophy of mathematics. Leibniz ideas on logarithms of complex numbers being strikingly primitive, or their failure to formulate reasonable criteria for rigor for calculus. This demands some kind of more penetrating explanation than that they were bored with such matters, although it goes some way.

¹³ One may formulate and proof rather striking things on general principles but which eventually turn out to be irrelevant. There are many striking theories which strike the layman as equally profound as the established ones, but for some reason and other fails the unforgivable tests.

¹⁴ Here we had a manifestation of atoms sufficiently direct to be appreciated by the naked eye, never mind aided by the microscope.

¹⁵ Popper makes elsewhere a big point that sociology cannot be derived from psychology as the former antedates the latter and has a pre-human provenance. One is tempted to concur thinking of some striking similarities between the sociology of wolves and men.

for rhetorical purposes, to translate it to its perceived origin.

Otherwise the most interesting idea is to connect Baconian Induction to the platonic theory of amnesia when it comes to learning. This is on the face of it paradoxical, because the point made by Bacon is that we should not let our observations be influenced by our prejudices; and the point of the amnesia theory (as later explicated (or recapitulated?) by St. Augustine) is that certain knowledge is hidden in us, and did not enter through the senses, in glaring contradiction to Bacon teaching us only to get information through our senses. On the other hand Baconian induction means that unerringly conferring patterns from what we observe, and this means that sense data comes with unique patterns that we can recognize by remembering. In particular we see and infer patterns by intuition, rather than in the Popperian view where we may use intuition to formulate hypotheses, but not to judge them by intuition but by guided observation.

The final chapter along with its appendices, is the slightest of his essays. It addresses Plato and geometry, and the great value he laid on it, as a result of the breakdown of arithmetics through the discovery of irrational numbers. He discusses at some length Plato's idea that all irrational numbers can be expressed in terms of $\sqrt{2}$ and $\sqrt{3}$ (both appearing naturally in connection with the square and the equilateral triangle) and suggests that π could be taken for $\sqrt{2} + \sqrt{3}$ (it is actually a good approximation¹⁶). But what about $\sqrt{5}$ which comes up in connection with the regular pentagon, which the Greeks new how to construct. Did they have any expression for that in terms of $\sqrt{2}, \sqrt{3}$?

More seriously though is his claim that there are proofs in geometry which are not deductive and based on axioms, and he gives a few striking examples (there are some others in Mach's book on *Erkenntnis and Irrtum*¹⁷) all of them assuming the parallel axiom, which if anything shows the power of the axiomatic method above that of intuition.

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¹⁶ Just as $\sqrt{3} - \sqrt{2}$ is a good approximation of $1/\pi$

¹⁷ Reviewed in these volumes