

MASS, INSTANCE, ATOMS, AND THE SEVENTH HYPOTHESIS OF PLATO'S *PARMENIDES*

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Article abstract

The purpose of this essay is to glean some concepts out of the seventh hypothesis of Plato's *Parmenides* that can provide a contribution to the often unsatisfying modern debates about the nature of atoms, mass, and what might constitute an instant. The seventh hypothesis (hereafter H7, similarly for the other hypotheses) of Part II of the *Parmenides* is one of the more neglected of all the hypotheses in the dialogue, despite the fact that it introduces some very novel terms and arguments. A brief overview of Part II of the dialogue is followed by a detailed analysis of the argument in H7. The conclusion brings this essay around to the relevance of H7 for contemporary reflections in theoretical physics and cosmology.

MASS, INSTANCE, ATOMS, AND THE SEVENTH HYPOTHESIS OF PLATO'S *PARMENIDES*

FRANCIS K. PEDDLE

Early Greek philosophy gave us physicists who were philosophers speculating about the nature of the cosmos as a whole as well as being careful observers of particular natural processes and events. Eclipses, earthquakes, fossils, and meteorology intrigued Thales, Anaximenes, Democritus, and Empedocles as much as did postulating about first principles, or archai, such as water, air, atoms, or love and strife. From the ancient world through the Renaissance and into the modern world, from the atomic philosophy of Leucippus, and his disciple Democritus, and from the atomism of Lucretius' in his cosmological poem, *De Rerum Natura*, atomism has had the greatest staying power with respect to a first principle, or the first principles, of physics. While today it would be more accurate to talk about elementary particles than atoms, the "atomic hypothesis" still reigns supreme.

Richard Feynman, arguably the most famous theoretical physicist of the twentieth century, posed and answered the following question:

If, in some cataclysm, all of scientific knowledge were to be destroyed, and only one sentence passed on to the next generations of creatures, what statement would contain the most information in the fewest words? I believe it is the *atomic hypothesis* (or the *atomic fact*, or whatever you wish to call it) that *all things are made of atoms*.¹

A Platonist, and certainly a Neo-Platonist, would respond to Feynman's question that the "One" contains the most information in one word, let alone a sentence. The One of Plato's *Parmenides* did not, however, give us the ability to produce nuclear fission and fusion, or to create artificial metals in laboratories. Medieval alchemists were unsuccessful in using atomic theory to convert base metals into gold.² On the other hand, this is something of a

1. Available at www.feynmanlectures.caltech.edu.

2. Nature herself is quite adept at making gold. Purportedly, there was produced 236 sextillion tons of pure gold, 40 times the earth's mass, when in 2017 two neutrons stars were observed

rhetorical juxtaposition. When it comes to intelligibility, and the determination of what has significant meaning for us, modern theoretical physics, with its muons, luons, and axions, its panoply of elementary particles, still leaves us very much perplexed.

To modern science the search for greater certainty with respect to the nature of the cosmos will probably never end. The original uncuttable “atom” (the word comes from *temnô*, to cut, and *tome*, with *atomos* being the privative) of Democritean physics has long disappeared into the aether since the discovery of protons, neutrons, and electrons. In other words, the atoms which make up all visible matter, or baryons in modern parlance, are composed of subatomic units and are not atoms in the strict sense of the word.

What constitutes a “unit” was one of the pre-eminent conundrums of ancient philosophy. Speculation about a “unit” or a “point” occupied the minds of the great philosophers and mathematicians of the period such as Pythagoras, Parmenides, Zeno, Plato, and Euclid. The opening definition of Euclid’s *Elements* gives the following definition of a “point:”

A point is that which has no part.³

A point is a unique element, a signifier (*sêmeion*) literally.⁴ To call something an “elementary particle” certainly seems to be a pleonasm. Physicists, however, are not linguists and we should sympathize with their struggles to find words for the “indescribable,” to invoke the final words of Goethe’s *Faust*. A unit, a point, an element, an atom, their required existence yet necessary intangibility, appears to be as much a requirement for physical matter, as for mathematics, as for linguistics. Atoms and points, tantalizingly invisible and indeterminate, lie at the basis of the visible world with its geometries, extensions, phonemes, and simple universals. The words “seem” and “appear” are employed here deliberately as they have a prominent place in the *Parmenides* and especially in the seventh hypothesis.

Plato’s dialogue, *Parmenides*, is the greatest contribution that ancient Greek philosophy made to the debate about the one and the many. “The Problem of the Many” tends to dominate modern philosophy, but the core concept of the one, the unical, unicity, univocity, always resists surrender.⁵ The ancient

colliding using gravitational wave detectors. *Vide*, Katia MOSKVIICH, *Neutron Stars: The Quest to Understand the Zombies of the Cosmos*, Cambridge MA, Harvard University Press, 2020.

3. EUCLID, *The Elements*, in *Greek Mathematics*, Vol. I “From Thales to Euclid” (The Loeb Classical Library). Cambridge, Harvard University Press, 1939, p. 437. A “point” is often called the fiction of geometers.

4. For Proclus, an element (*stoicheion*) is a leading theorem or an all-pervading first principle, i.e. something whose “understanding leads to the knowledge of the rest,” *vide*, *A Commentary of the First Book of Euclid’s Elements*, tr. Glenn R. MORROW, Princeton NJ, Princeton University Press, 1970, p. 59.

5. The modern “Problem of the Many” is usually framed in the following terms. There is one cloud in the sky. How are the edges determined? Maybe include one water droplet and

Greeks, from Thales to Proclus, prioritized the one over the many and the whole over the parts. From Einstein's quest for a unified field theory to the attempts to use the Large Hadron Collider to find the "God particle," until recently thought to be the Higgs-Boson hypothesis, the deep *nisus* toward unity has been a fundamental driver of research and thinking in theoretical physics. This back and forth between unity and dispersion or manyness is a common theme in philosophy and physics.

The purpose of this essay is to glean some concepts out of the seventh hypothesis of Plato's *Parmenides* that can provide a contribution to the often unsatisfying modern debates about the nature of atoms, mass, and what might constitute an "instant." The seventh hypothesis (hereafter H7, similarly for the other hypotheses) of Part II of the *Parmenides* is one of the more neglected of all the hypotheses in the dialogue, despite the fact that it introduces some very novel terms and arguments. A brief overview of Part II of the dialogue is followed by a detailed analysis of the argument in H7. The conclusion brings this essay around to the relevance of H7 for contemporary reflections in theoretical physics and cosmology.

Part II of the *Parmenides* (137c4 - 166c)

There is no consensus on what Plato was trying to achieve in the hypothetical reasoning of Part II of the *Parmenides*. One can start, and should, with the terse declaration of the "program" at Stephanus pages 135c - 136c by the dialogue's chief and eponymous interlocutor. Only four hypotheses might be expected from Parmenides' description of the program or exercise. You must hypothesize if there is one and if there is many, and also hypothesize if there is not one and not many. However, there are multiple senses and ambiguities in the term "one" as there is in the term "many." Whether or not the one has being is the foremost ambiguity exploited in the first two hypotheses. Analyzing the subject matter of hypotheses about the one and the many yields negative and positive consequences relative to the affirmation and negation of both. Only the arguments themselves reveal these multiple, and sometimes surprising outcomes. Parmenides' program of analysis at 135c - 136c only takes us so far. It is in the dialectical working out of that program that its full potential is laid bare. This is as it should be for Plato, if anything, wants us to think for ourselves.

exclude another. To do so yields a different cloud, with a different composition. How is it that we can say there is but one cloud in the sky and not many. This is, of course, the famous *sorites* argument that so agitated the ancient Greeks. It is also the mental world of the seventh hypothesis. For a thin discussion of the Problem of the Many in contrast to Neo-Platonic speculation about the one, *vide*, Editors' Introduction, PROCLUS, *Commentary on Plato's Republic*, Dirk BALTZLY, John F. Finamore, and Graeme MILES (eds.), Cambridge, Cambridge University Press, 2018, p. 29.

A sampling of the menu on display in Part II of the *Parmenides* goes something like this. It could be taken as a high level and genuine dialectical exercise as distinct from eristics or sophistic babbling, though sometimes it is said to be just such a parody. Its taxonomy as a logical exercise is a series of dianoetic hypothetical deductions. Ontologically, the *Parmenides* canvasses the majority of the high level structural Forms (*Eidè*) of the mature Plato. Since these Forms are true reality, the really real (*ontōs on*), the dialogue gives us the cartography of the upper levels of true being. Parmenides himself says as much to Socrates when summing up the proposed exercise, “All of this you must do if, after completing your training, you are to achieve a full view of the truth.”⁶

These approaches usually assume that the *Parmenides* elaborates a complete philosophical system. There is an air of finality and completeness to Part II of the dialogue that is generally absent from the Platonic corpus, especially the earlier Socratic dialogues. One can take this in a circular or linear fashion. The nothingness of the eighth hypothesis can be seen as a return to the pervasive negative results of the first. The ground for treating Part II of the dialogue as a cosmology is simply that the One is a principle of all things. On this view, primarily Neo-Platonic, the progress through the eight hypotheses is devolutionary from the splendors of the austere, ineffable, yet all-powerful, One of the first hypothesis, to the absolute nothingness of the eighth, which could be likened to matter, or evil, or just nothingness.

Late antiquity viewed the *Parmenides* through a theological lens. The various hypotheses portray the procession of the gods down into the lower levels of being. Beginning with the non-discursive One of the first hypothesis, which Neo-Platonists of all stripes equated with the Good at the top of the Divided Line in Book VI of the *Republic*, and following on with a progression through intelligibility, being, life, the soul, and on into nature and matter, an elaborate structure of intermediate beings and gods was envisaged. Proclus’ *Platonic Theology* is the divine exemplar of the integration of the categorical intellectuality of the *Parmenides* with the theory of the universe found in the *Timaeus*, the two “summit” dialogues at the final stage of late Neo-Platonic pedagogy. Marsilio Ficino’s monumental *Platonic Theology* of the late Renaissance showed that such musings had a long shelf life.⁷

6. PLATO, *Parmenides*, trs., Mary Louise GILL and Paul RYAN, *Complete Works*, John M. COOPER (ed.), Indianapolis IN, Hackett Publishing, 1997, 136c, p. 371; *Parmenides*, John BURNET (ed.), *Platonis Opera* (Oxford Classical Texts), Vol. II, London, Oxford University Press, 1901, 136c5. Hereafter *Parmenides* (OCT).

7. Ficino has bequeathed to us a massive commentary on the *Parmenides* that is the Renaissance equivalent to the efforts of Proclus. Specifically, see his comments on the seventh (his eighth) hypothesis, Marsilio FICINO, *Commentaries on Plato* (The I Tatti Renaissance Library), *Parmenides*, Vol. II, ed. and tr. Maude VANHAELEN, Cambridge MA, Harvard University Press, 2012, pp. 328-337.

Large scale metaphysics and cosmology of the Neo-Platonic sort has little attraction for contemporary philosophers. If driven to speculation about the universe they would prefer to pivot off what is currently known empirically, or by plausible inference, from the observation of fast radio bursts and flashes of gamma radiation. Nonetheless, many contemporary philosophers gravitate to Plato's *Parmenides* for a number of less edifying reasons. Many of the hypotheses in Part II can be seen as "cultural" markers. The basis for science is laid out in H2 and H3, art in H5, nihilism in H8, and religion in H1. These markers articulate the fundamental contexts for the conduct of such endeavors as science or religion. Science does not deal with the ineffable of H1, but with the fluid realms of being surveyed in H2, from the genus/species exercises of evolutionary biology to the search for the universal laws of nature anchored in such categories as sameness and difference, motion/rest, and temporality. For modern physics time only moves in one direction, one of its few absolutes. H2 on the other hand postulates the possibility of a dual directionality of time in terms of the older and the younger.

Part II, insofar as it is a response to Parmenides' critique of Socrates in Part I of the dialogue, can be seen as crucial to solving the problem of "participation," a core theme in Platonic studies. As such the *Parmenides* is fundamentally a set of stratagems to respond to the aporetics posed in Part I. Part I identified problems with Socrates' theory of Forms at multiple levels. There are, however, three general categories of aporetics in Part I: (i) the scope of the Forms; (ii) the participation of sensibles in the Forms as well as in each other; and (iii) the knowability of Forms if they are "in themselves" (*auto kath'auto*) and totally separate from that which they are alleged to explain. The last problematic is said by Parmenides to be the "greatest difficulty" in Socrates' theory of Forms.

Another approach to the *Parmenides* is from the standpoint of critical theory. Though the eight hypotheses are presented ahistorically, each one can be interpreted as a critique of pre-Platonic theorizing about the universe. For example, H2 could be interpreted as a critique of Anaxagoras. It would be ironic, but certainly in the Socratic spirit, if the Clazomenean philosophers show up in Part I of the dialogue in order to take on a static theory of the Forms and end up seeing their own philosophy collapse. Even more ironic would it be that Zeno, and perhaps Parmenides himself, end up at a dead end intellectually in Part II. The *Sophist* as well shows us clearly that Plato was not timid when it came to criticizing Parmenides, the grandfather of all ontologists. For purposes of this paper, the critique of atomic theory in H7 is the most important.

The *Parmenides* can also be seen as addressing the perennial problems of dogmatism and scepticism. If there is one thing that *Parmenides* teaches us it is the limitations of propositional logic. In the twentieth century logical atomism has pretty well run its course, but abstract truisms, or "univocal totalization"

to use a phrase of William Desmond's, need to be constantly tested by dialectical clarification and reflection.⁸ Like modern science the ancient Greeks held precision in very high esteem, as Plato constantly reminds us in the *Philebus*. Scepticism is usually spurred on by a superficial adherence to the law of contradiction. The *Parmenides*, when read along alongside of the *Sophist* and the *Philebus*, shows us the limitations of both dogmatism and scepticism as well as the necessity of their mutual complementarity. Categorical precision requires internal relations with other categories. The *Parmenides* presents a large scale topography of categorical, or Form to Form, interrelations.

Is there a progression, or regression, through the hypotheses in Part II? This question runs the risk of overly Neo-Platonizing the dialogue, but the order of the hypotheses naturally gives rise to the question. If you conjoin Being to the One, as in H2, a very different universe unfolds than if the One is taken in its pure unicity. The total negativity of H8, an absolute nothingness, has a very different ambiance from the consequential negativity of H1. The negativity reciprocity of the positive and the negative is much more apparent in H8 than the sheer undoing of every category of the One in H1.

One can also discern a downward vertical progression categorically in each hypothesis. H2 aligns the One immediately with Being then goes on to consider totality, multiplicity, the unlimited (*apeiron*), number, whole/part, geometry, motion/rest, same/different, and so on. The categorical grid mirrors H1 but it is now far richer, a veritable Parmenidean *empleon* (full being), teeming with the determinateness of nature and all existence. In a sense, everything is here revealed, open to observation, classification, and aetiological reflection. This is the basic, though obvious and trite, assumption of science. Overall it shows us the limitations of a scientific world-view as opposed to an artistic or religious.

Tracking new categories and concepts as they emerge in each hypothesis is a crucial aspect of interpreting Part II of the dialogue. What is anticipated and what is novel is important for understanding the significance of H7. For example, the section on motion in H2 introduces the concept of nature (*physis*, to grow, to bring forth) that is not present in the section on motion in H1, where there is just the more abstract concept of becoming (*gignetai*) which is necessary before nature can be considered. It is instructive to remember that Form (*eidos*) only first enters the discussion in H2 at 149e7 in the section on the equal and the unequal, which mirrors the introduction of Form in the *Phaedo*. Sometimes new sections containing a cluster of concepts are introduced, such as the material on contact or touch (*haptesthai*) in H2 [148d5 - 149d7]. For purposes of the novel linguistic density of H7 the new concepts that have the

8. William DESMOND, *The Voiding of Being: The Doing and Undoing of Metaphysics in Modernity*, Washington D.C., The Catholic University of America Press, 2020, p. 8.

most relevance are “mass” and “scene-painting,” but also important is the re-introduction of the “instant” (*exaiφhnēs*, 156d3), which first appears in the Appendix (H2A) to H2. The addition of new material and thought-orientations as one proceeds through the hypotheses is viewable as an enriching of the initial abstractions of H1. The *Parmenides* has been for millennia the most variably interpreted dialogue in the Platonic corpus. The process of ongoing categorical enrichment, which in turn makes possible further hypothetization, is at the center of this rich hermeneutic.

Situating the Seventh Hypothesis (164b5 - 165e1)

Commentators from the ancient world to the modern have argued about how many hypotheses there may be in Part II of the *Parmenides*. Neo-Platonists have espied as few as two and as many as twenty-four.⁹ Nowadays, the argument is generally whether there are eight or nine, with those Neo-Platonically inclined tending towards nine, while modern interpreters from Francis Cornford onwards generally accept that there are eight.¹⁰ For purposes of this essay it is assumed that there are eight hypotheses and that, following Cornford and Gill, the so-called third hypothesis after the second [155e4 - 157b6], is in fact a corollary or an appendix to the first. The chief advantage in this interpretation is that it preserves, just about, the overall symmetry of Part II.

The primary *diairesis* (division) of the subject “the One,” following *Sophist* and *Statesman*, is between positive and negative, which is the original assumption of all dialectical analysis.¹¹ *Diairesis*, Plato’s method of collection and division, is not the same as dialectics. This is one of the chief lessons of the *Parmenides*. In accordance with modern commentators, the overall scheme of Part II is as follows:

9. PROCLUS, *Commentary on Plato’s Parmenides*, trs., Glenn R. MORROW and John M. DILLON, Princeton NJ, Princeton University Press, 1987, Book VI, 400 - 402.

10. See Francis CORNFORD, *Plato and Parmenides*, New York NY, The Liberal Arts Press, 1957; Mary Louise GILL, *Philosophos: Plato’s Missing Dialogue*, Oxford, Oxford University Press, 2012, pp. 47-57; Constance MEINWALD, *Plato’s Parmenides*, Oxford, Clarendon Press, 1991, and Samuel C. RICKLESS, *Plato’s Forms in Transition: A Reading of the Parmenides*, Cambridge, Cambridge University Press, 2007. Some of these commentators differ as to the nature of the passage in *Parmenides* (OCT), 155e - 157c as to whether it is a corollary, an appendix, or a unity of H1 and H2. It is not necessary to resolve this debate for purposes of this essay. Its chief significance for H7 is that it introduces the notion of an “instant,” which does not appear again in the text until H7 [164d7].

11. It could be argued that Parmenides’ poem “The Way of Truth” is not open to dialectical analysis, because it does not allow for the negative. Parmenidean Being is, however, in a negative relation with the world of the mortals portrayed in “The Way of Seeming.” Juxtaposed, the two fragments are a poetic dialectic, though Parmenides’ logic of exclusivity, which does not allow for any negativity, or differentiation, does not admit of such interaction. *Vide*, “Parmenides,” *Early Greek Philosophy* (Loeb Classical Library), eds. and trs., André LAKS and Glenn Most, Vol. V, Cambridge MA, Harvard University Press, 2016, pp. 3-151.

- (i) hypotheses - positive (H1 - H4)/negative (H5 - H8);
- (ii) subject - one (H1/2, H5/6)/others (H3/4 - H7/8); and
- (iii) consequences - negative/positive (H1/2, anomalous), and positive/negative (H3/4, H5/6, H7/8).

The seventh hypothesis (H7), in this scheme, has as its underlying suppositions that: (i) the one is not; (ii) the subject of its consequences is “the others;” and (iii) its consequences are in some sense positive. The characterization of H7 in this manner is important for not only the internal dynamics of this hypothesis, but also for relating H7 to the rest of the hypotheses in Part II. It is also important for revealing the significance of H7 in relation to the rest of the Platonic corpus, such as the Divided Line in Book VI of the *Republic* or the Divine (Promethean) Method of the *Philebus*.

Hypothesis construction for the ancient Greeks takes the form of “if,” “then” clauses. For H1 the “if” (*ei*) clause reads “if one is” (*ei hen estin*).¹² The consequence is that it cannot be many (*polla*). For H7 the “if” clause reads “one if it is not” (*hen ei mē esti*). Since Greek is an inflected language the word order, unlike in English, does not necessarily determine the meaning. In H7 the argument focuses on what properties (*peponthenai*) the others (*alla*), as subject of the consequences, may have. Both the statement and the consequences can be positive (H1 - H4) or negative (H5 - H8) and (H2, H3, H5, H7 and H1, H4, H6, H8) respectively.

The program or exercise laid out by Parmenides in Part I allows for the hypothetization of any category, or any Form (*eidē*). The dianoetic section of the Divided Line also allows for this. To say that for any value “F” that “it is” obviously implies beingness. If one allows the beingness of “F” to be hypothetized this means, both literally and putatively, that it be placed under being. In H7 beingness is putative because its subject matter is always tenuous. The degree of hypotheticalness, i.e. the degree of conditionality of a subject’s beingness or not-beingness, depends on the structural level of the Form. For example, the Forms arrayed under the One/Being (H2), such whole/parts, or rest/motion, have a higher degree of beingness than particulars like natural objects, such as a certain cow or the birch tree in my backyard. This is very much the inverse of modern thinking which places a universal like the One on a lower existential level. Any hypothetized Form has greater truth and beingness than any hypothetized particular. If a certain cow exists, then it will have certain traits of “cowness.” Its existence is, however, dramatically more conditional than the universal traits of “cowness” that allow us to identify this particular animal as a cow. It is also important to remember that the consequent of the hypothetical has equivalent ontological, or meontological, impli-

12. Ancient Greek has no indefinite article. There has been much discussion about the insertion of definite or indefinite articles in the hypothetical statement, see Francis CORNFORD, *Plato and Parmenides*, pp. 115-118, and Mary Louise GILL, *Philosophos*, pp. 57-61.

cations.¹³ For example, in H1 the hypothetical is taken in its most absolutely pure meaning to such an extent that the ontological implications are totally negated and one is left with an utterly non-discursive realm of non-predication, or the apophasis of negative theology.

The Neo-Platonists equated the One of H1 with the indeterminate Good of the *Republic*, which means in one sense we are dealing with that which cannot be hypothetized or something which cannot be placed under being.¹⁴ The Good is an "unhypothesis."¹⁵ The One of H1 is therefore unknowable, unnameable, certainly insensible, and not something about which we can opine. Nonetheless, the Neo-Platonists imputed great power causally to this ineffable One. About it we have a certain sort of knowledge, but not of an intelligible or scientific kind. The same is not true of H7, even though the "if" statement of H7, "if one is not," puts an overarchingly negative dome over its content. The Others, the subject of its consequences, are positive in some, albeit floating, ontological sense and the consequences for postulating these fleeting existents are also positive. It is the status of these de-unitized Others, hypothetically and conditionally, that is the concern of H7. To put it somewhat in the language of the classical German Idealists, the others are positively posited as existents in H7. This opens up the possibility that we can opine about the nature of the Others in H7, unlike in H8. There is an epistemological value to what is being discussed, or what is dianoetically articulated, in H7 and that discussion involves an assumption of a degree of existential determinateness. To put it another way, how is it intellectually (dianoetically) possible to hypothesize, name, and talk about the *eikastic* (imagistic) and *doxastic* (plausible) objects of the phenomenal world or the lower two levels of the Divided Line? On this view, i.e. solely from the assumptions of H7, philosophy would be hypothesis-construction (H2 to H7). This is a very modern approach. On the other hand, the realms of ineffability (H1) and complete nothingness or radical nihilism (H8) would be seen as the domains of religion, mysticism, or even total self-abnegation.

Detailed Analysis of the Seventh Hypothesis

In H7 the Others (*alla*) are synonymous with the different (*alla hetera*), but they are not different from a non-existent One, which is the main premise of the hypothesis. The Others as such in H7 are therefore on their own without the unitary supports available in the first four hypotheses. The argument is

13. "Meontological" is a peculiar term in English not widely used except in technical Platonic analysis. It simply means "not-being" (*mē on*).

14. *Vide*, Eric Robertson DODDS, "The *Parmenides* of Plato and the Origin of the Neoplatonic 'One,'" *Classical Quarterly*, 22 (1928), pp. 129-142.

15. *Republic*, 510b.

about the properties that such Others may have. Removing the One from the ontological field, as opposed to the stronger sense of the One present in the first four positive hypotheses, means that the Others are only different from other Others. The Others of H7 are therefore very different from the Others of H3 where the positive hypothesis about unity allows for a limited plurality of ones. There cannot be one Other or one Other and another.

H7 paints a world of indefinite multitudes, such as the number of water droplets in a cloud or how many people might be in a crowd. Our phenomenal experiences are replete with these multitudes. H7 sensitizes us both to their omnipresence and their significance for the fluidity of lived-time and amorphous things, places, and spaces. These “other” Others have properties which need to be investigated, lest they undo certain conceptions about the Forms. H7 picks up exactly where H6 left off. The Others must have an “otherness” for us to be able to talk about them. Talking about them allows for all manner of taxonomical shading. This in turn licenses the construction of provisional scientific hypotheses about these peculiar Others, while fully understanding that their status, dianoetically, is more tenuous than anything in the upper reaches of the Divided Line.

It is clear that in H7 Plato is talking about a multitude (*plēthē*) that is simply the Others of Others (*allēlōn alla*), i.e. without limit (*apeiron*) [164c7].¹⁶ This terminology invites comparisons with the unlimited pluralities of H2 and H3, especially H3, where the Others make their first appearance *per se* in Part II of the *Parmenides*. In H2 and H3 there are limits which stabilize the existents and their categorical structure. This stabilization is provided by a positively hypothetized One. No such stabilization is available to the Others in H7. This is amply demonstrated in the very first section of the hypothesis [164b5-164c8]. The immediate consequence of the postulation of a field of highly de-stabilized Others is that the markers of differentiation are hopelessly transient and always frustratingly re-defining themselves. This is a key characteristic of the Platonic characterization of the phenomenal world, especially at its lower *eikastic* levels. It reflects the indefinitely expandible world of the ontologically “thick” second hypothesis, but bereft of the pervasive limitations of the *Eidē*. In H7 the *Eidē* are thoroughly problematic, as in Socrates’ recoil from seeing the Forms in such ignoble things as hair, mud, or dirt.¹⁷ In late antiquity we have Plotinus struggling with Forms of individuals and Amelius grappling with the Forms of evil.¹⁸

16. Cornford is of the view that the passage simply mimics the characterization of the apeiron in *Philebus*, *vide*, *Plato and Parmenides*, p. 236.

17. *Parmenides* (OCT), 130c5-7.

18. PLOTINUS, *Ennead* (Loeb Classical Library), V, 7, tr. Arthur Hilary ARMSTRONG, Cambridge MA, Harvard University Press, 1984, pp. 219-231; Dirk BALTZLY, “Amelius and Theodore of Asine,” *Brill’s Companion to the Reception of Plato in Antiquity*, Leiden, Brill, 2017, pp. 381-399.

The Others are multitudes (*plēthei*) but not as one being (*mē ontos henos*, 164c8). The overriding condition determinative of all things within the orbit of H7 is that the one is not. These multitudes are indefinite and ill-shaped. The Others standing on their own, apart from a positive One, have the pervasive effect of vitiating oneness in any sense of determined limit or abiding definition. Furthermore, it demotes beingness to the level of indeterminacy which in itself is a defining characteristic of the phenomenal world. The negative principle of H7 thus precludes anything “behind” the beingness of the Others that would authenticate their being and make them intelligible in the normal dianoetic or noetic sense. What kind of entities, or Others, are we dealing with in H7 and to what degree are they intelligible?

The first specified Other or “entity” that appears in H7 after the introductory section is *onkos*, “mass” (ὄγκος, 164d1).¹⁹ We generally think of mass as something tangible, solid, or having no interstices. The term *quanta*, or discrete units, is also a viable translation. In H7, however, we are dealing with continuities, not discrete ones because the latter are thoroughly subject to the negative force of the overriding hypothesis that the One is not. In physics mass is defined today as something that stays the same, which is not the case in H7.²⁰ The eternity of atoms as such was a key characteristic of a particle for the early Atomists. *Onkos*, generally translated as mass or bulk, is not an uncommon term in Plato.²¹ The term can also mean a softening or rolling of edges, which fits the overall indeterminateness being portrayed by Plato in H7. Any openly malleable continuum, such as a cloud, or a crowd of people, or the Neo-Platonic idea of “power” (*dynamis*), contains Others as masses. There must be always a multitude of them. They are susceptible to endless pluralization.

The paradoxes of Zeno's continua depend on a hard delineation of endpoints. They start from fixed empirical points within such continua as motion, or bulk, or mass. Intellect then unleashes an infinite dissection of all things between A and B. The paradox arises from the juxtaposition of limit and non-limit. Thought dissolves the possibility of reaching the endpoints, though our senses constantly affirm them. The limits of the endpoints or boundaries, A and B, must be reachable if there is to be motion or if anything is to have bulk. There has to be a beginning and an end. H7 challenges the rigid contours of

19. The dictionary meaning of mass says it is something that has no “definite shape.” *Onkos* is often translated as quantum. It is the equivalent of *atomos* in Democritean atomism. *Vide*, Hermann DIELS and Walter KRANZ, *Fragmente der Vorsokratiker*, Berlin, Weidmann, 1974, Wortindex, Vol. III, *onkos*, p. 301.

20. For instance, we say the mass of a person stays the same whether in the weightless environment of space or one in which there is some gravitational force that gives him or her weight. *Baros* is the Greek word for “weight,” which the early Atomists ascribed to atoms.

21. *Vide*, *Timaeus*, 56c2, 62c7 and *Theaetetus*, *mēte onkō mēte arithmō* (neither mass nor number), 155a4. In the latter passage nothing can become either greater or less unless it is equal to itself. The concept of equality in H7 is dealt with below.

Zeno's empirical assumptions, which is a tactic he uses to defeat the naive empiricism of Parmenides' opponents. The continua of H7 are extremely amorphous. In fact, they are at the very edge of the definition of what might be called a continuum. How to define a cloud empirically in terms of mass, shape, or weight, i.e. apart from compositional abstractions, like water droplets or molecules, is not possible. In a manner H7 is the last gasp of the possibility of both definition and continua. H8 gives us the total negation of unicity and otherness, a realm in which neither definition nor continua, or any idea of a spectrum, are possible.

The first casualty of the equation of mass with an indefinite multitude is number. As the *Philebus* tells us the *apeiron* is always a tendency to the greater or the less. In the absence of any quantitative measure mass is always converted into one or the other so that the possibility of something being greater or less continually disappears. The restless othering of the Others in H7 does away with minima and maxima, numerical differentiation, and the identification of qualitative states, such as hot and cold or hard and soft.

Plato at this point [164d2-3] introduces, in the same sentence, the ideas of the "instant" (*exaiφhnēs*) and the "dream-state" (*en hypnō phainetai*). The instant first makes its appearance in Part II of *Parmenides* in the Appendix (H2A) to H2 [156d3]. In H2A he calls the instant a strange or queer thing (*atopon*, better translated literally as something out of place, not in space) that involves a change from one state to another without there being a transition. It occupies no time or space for that matter. Things go into the instant and come out of it, e.g. in or out of motion. The logic of contrariety is noetically sustainable in H2A in terms of unity in difference. The instant in H2A can thus be loaded up with a set of logical options, such as either-or, neither-nor, and both-and. It is therefore neither in motion nor at rest, neither existent nor non-existent, nor many nor one. Equally, it can be both. In H2A the instant takes on the status of a speculative, metaphysical ultimate, uniting all the sub-categories of the one and many under one plenipotentiary concept.

The situation in H2A is very different from the appearance of the "instant" in H7. Here it is within a dream-like environment. There are only the vestiges of the logic of contrariety which dominates H2A. The H7 instant can give us speculative insight but only within a fluid phenomenal context. There is an atemporality and an aspatiality to the instant in H7, but only in the sense of the extremely transient and episodic, not as the unalterable speculative unity of opposing logical abstractions. The instant of H2A has all the power of the articulated beings or entities of H2 proper. There are no articulated beings in H7, only rapidly self-dissolving masses and multitudes. The indeterminate masses of H7 necessarily have the characteristics of instantaneousness and insubstantiality. The overarching negativity of the hypothesis produces endless chimeras and phantasies. This is the imaginative landscape of modern physics

that so attracts us. What Plato is forcing us to do in H7 is to not over-estimate what we might expect from our contemplation of that landscape.

The “between” (*metaxy*, 165a4) also has a repeat performance in H7, but its status is also radically different from its place in H2A [156d7]. The concept is further elaborated in the *Philebus* [16e1] within the context of a philosophy of measure and the idea of intermediates between the *apeiron* and the one. In H2A the between, as a unifying instant, is a reconciliatory principle in the logic of contrariety. In H7 the between is an appearance of equality (*phantasma isotētos*, 165a5). Discrete masses or quanta only seem equal, in terms of smallness or largeness, or in terms of volume, because any discrete quantum is vulnerable to a shifting of its status vis-à-vis other discrete quanta in terms of smallness or largeness. The between in H7 is therefore a varying and equivocating equalizer and not a principle of the unification of unity and disunity as may be supposed in H2A.

There is an aspect of H7 that is generally overlooked by recent commentators in the Anglo-American tradition. This concerns the doctrine of relation within the context of othering Otherness. Paul Natorp, in the German Neo-Idealistic tradition, deals with H7 in terms of “relational positing and non-positing” as distinct from absolute positing.²² All relations in H7 are conditional. This means that they can be immediately negated. For instance, a relation of large to small is easily inverted through the illusions of distance. Relations of beginning and end are easily interchangeable in circular patterns and shifting volumes. Natorp’s insight is that in H7 “relational positing” in general is at the same time “relational non-positing.” This could just as easily be the converse. In the absence of the absolutes of “oneness” and “beingness,” which are the key characteristics of the first four hypotheses, relationality as such becomes extremely problematic. It disappears entirely in H8. Overall, Natorp views H7 as describing the floating “x” of experience, somewhat objectifiable in the Kantian sense as the manifold of indeterminate objects in the phenomenal field.

The prevalence of the terms “seems” (*dokeō*) and “appear” (*phainō*) in H7 is indicative of the ontological demotion of all the categories associated with the determinations of being in H2. Wholes constantly disintegrate into parts, which re-form again into wholes. Limits are regularly undone and then re-assembled. The One or ones only appear dimly and when they do they just as quickly fade away. The principal lesson of the section on beginning, middle, and end in H7 is their interchangeability. In the multiplicative fecundity of H7 another middle always appears in the middle, which could as easily become

22. Paul NATORP, *Plato’s Theory of Ideas: An Introduction to Idealism*, trs. Vasilis POLITIS and John CONNOLLY, Sankt Augustin, Academia Verlag, 2004 (original ed. 1903, 2nd ed. 1921), pp. 254-258.

the beginning or the end of something else.²³ Just when you might think you have got to the ultimate end of something it becomes the beginning of something else. Interestingly, Plato introduces hypothesizing reason (*dianoia*) at the point where limit as beginning, middle, and end are raised as possible principles [165a8]. Within the phenomenal field hypothesis-construction with respect to a principle or starting-point (*archē*, 165a6) is still possible. This can be the construction of an image at the level of immediate experience or at a more organized intellectual level. These constructions are, however, still masses in the original sense of being further vulnerable to dispersion [165b6]. This is very different from the categorical constructions of H2, which have a high degree of permanency and oneness.

The remaining categories of H1 and H2, such as like and unlike, same and different, motion and rest, coming-to-be and passing-away, in contact and separate are then arrayed by Plato in H7 under the rubric of “scene-painting” (*eskiagraphēmēna*, 165c7). This puts us squarely in the double-remove from reality of Book X of the *Republic*. The masses generated by this form of hypothetical thinking have illusions of distance, volume, and extension. Likes become unlikes and things may only seem to touch as much as they could become separate. Episodes of separateness are as frequent as those of contact. Mirages, kaleidoscopes, chiaroscuro still have properties. Plato challenges us in H7 to work out for ourselves how the categorical grid of the earlier hypotheses can help us sketch the import and value of the undulating appearances of H7 before they completely disappear into the nothingness of the not-One, not-Other, not-Being of the last hypothesis.

Conclusion - Mass, Instance, and Meta-Atomism

Modern theoretical physics and cosmology contain the restlessness and multiplicity of hypothesis-formation that is the primary theme of H7. The philosophical question for us is the degree to which H7 can be said to illuminate the thought-world of modern theoretical physics? This is obviously a speculative and not a heuristically mathematical or observational question. The othering activity of the Others in H7 appears on the surface to be the primary characteristic of contemporary physics. Be it multiple universes, the pluralization of particles, or the inability to define mass, modern theoretical physics seems is remarkably anticipated by the thought-orientations described by Plato in H7.

The search for an ultimate “God” particle in contemporary physics is as much an attempt to capture an “instant” as it is to identify something

23. This state of affairs is vividly described by John N. FINDLAY, *Plato: The Written and Unwritten Doctrines*, New York NY, Humanities Press, 1974, p. 251-252.

“between” non-existence and existence. Mass is somewhere in the in-between, but its extensiveness or its solidity is constantly undermined by the instantaneousness of the particles which supposedly make it up. The Higgs field, for instance, gives mass to fundamental particles. Before the Big Bang particles have no mass. When the Higgs field was “turned on” mass was given to elementary particles. In Einsteinian physics mass is a storage facility for energy. Some elementary particles have more mass than others, which is crucial for the universe as we know it. Any number of metaphors are used to describe how lighter and heavier particles interact with each other. Interestingly, for our consideration of H7, the Higgs field has been likened to a crowd at a party. As famous scientists, or A-list celebrities, pass through the crowd, people surround them, slowing them down, but less known faces (usually philosophers) travel through the crowd unnoticed. The scientists suppose that popularity is synonymous with mass. The more popular you are, the more you will interact with the crowd, and the more “massive” you will be. In Platonic terms multitudes interact with multitudes in a gossamer, yet massive, fashion.

The “scene-painting” of H7 is the thought-world of the Higgs field. It allows us to form temporary hypotheses and metaphors for the description of masses or quanta, large and small, or fast and slow. The construction of Feynman’s “atomic hypotheses” within the framework of H7 is meta-atomic because it is about self-dissolving continuities and not discrete entities that have a stable existence. The atoms of H7 are always, as putatively discrete things, beyond themselves. Relations momentarily hypothesized by these self-othering atoms are also immediately dissolved and beyond themselves. This ideational environment of formless Forms (non-*eidē*) is the final redoubt of the possibility of hypotheses about relations. Relation, and the undoing of relation, are in an endless give and take when Others are postulated without a supporting One.

For Plato, these types of exercises are a permanent feature of the human mind and a chief source of its creativity and imagination. H7 tells us that thought about space and time inherently goes beyond atomism, in terms of particles, units, elements, or phonemes, as much as the hypothetical construction of these atomic entities is altogether a necessary feature of our mental furnishings. Atomic hypothesis-construction requires starting and end points even though the generated hypotheses are always susceptible to sudden displacement within a structurally unstable field of indefinite multitudes. The seventh hypothesis of Plato’s *Parmenides* provides a trove of philosophical aperçu for the many faceted reflections of modern physics and cosmology.

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SUMMARY

The purpose of this essay is to glean some concepts out of the seventh hypothesis of Plato's *Parmenides* that can provide a contribution to the often unsatisfying modern debates about the nature of atoms, mass, and what might constitute an instant. The seventh hypothesis (hereafter H7, similarly for the other hypotheses) of Part II of the *Parmenides* is one of the more neglected of all the hypotheses in the dialogue, despite the fact that it introduces some very novel terms and arguments. A brief overview of Part II of the dialogue is followed by a detailed analysis of the argument in H7. The conclusion brings this essay around to the relevance of H7 for contemporary reflections in theoretical physics and cosmology.

SOMMAIRE

Cet essai se propose de glaner, à partir de la septième hypothèse du *Parménide* de Platon, quelques notions susceptibles d'éclairer des débats modernes, souvent insatisfaisants, concernant la nature des atomes, de la masse et de ce qui pourrait constituer un « instant ». La septième hypothèse (H7) de la deuxième partie du *Parménide* compte parmi les plus négligées de toutes dans le dialogue, en dépit du fait qu'elle introduise certains termes et arguments réellement nouveaux. Un bref aperçu de la deuxième partie du dialogue est suivi d'une analyse détaillée de l'argumentaire de H7. Ce qui amène à s'interroger en conclusion sur la pertinence de la septième hypothèse en regard de réflexions contemporaines dans le domaine de la physique théorique et de la cosmologie.