The Odyssey of *Eidos*

Reflections on Aristotle's Response
to Plato's Status of Form

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Aristotle on Plato's Forms as Causes

Christopher Byrne

Much of the debate about Aristotle's critique of Plato has focused on the separability of the Forms.[1] Here the dispute has to do with the ontological status of the Forms, in particular the ontological priority that Plato claims for them in relation to perceptible objects. The separation of the Forms from perceptible objects, however, is not the only flaw that Aristotle finds in Plato's ontology. He also argues that Plato's Forms cannot perform the explanatory and causal roles that Plato claims for them. This second criticism is independent of the first; even if the problem of the ontological standing of the Forms were resolved to Aristotle's satisfaction, say, by making them universals that exist only immanently in particular perceptible objects, this second criticism would still stand.

The difficulty here is not that there is no room for Aristotle's four causes in Plato's ontology. On the contrary, antecedents for all four can be found in Plato's works. The problem, in Aristotle's view, is that all of Plato's explanatory principles, in particular his Forms, fail to meet the general requirements for the material, efficient, formal, and final causes of perceptible objects. Hence,

1. Aristotle states his criticisms of Plato's theory of Forms principally in his *Metaphysics*, Book I, chapter 9. A good exposition of those criticisms is found in W.D. Ross's edition: Aristotle, *Metaphysics*, 189–211 and xlv–lxxi. The classic work on this topic is Cherniss, *Aristotle's Criticism of Plato*. Fine, *On Ideas*, gives a detailed account of Aristotle's criticisms in his *Peri Ideon*, in particular, the relation between Plato's Forms and Aristotle's universals.

even if the Forms were immanent in perceptible objects, they would still explain nothing about them. In what follows, I consider first what Plato says about these four explanatory causes in his *Philebus*, *Timaeus*, and *Phaedo*, as well as the more general principles governing perceptible objects that Plato and Aristotle hold in common. I then consider why, according to Aristotle, all of Plato's explanatory causes, in particular his Forms, cannot function as explanatory causes of perceptible objects.[2]

The Four Causes in Plato's Philebus, Timaeus, and Phaedo

The clearest Platonic analogues of Aristotle's four causes are found in Plato's *Philebus* and *Timaeus*. Early in the *Philebus*, Socrates distinguishes between four kinds of being: 1) the infinite, or limitless (ἄπειρον); 2) the finite or what acts as a limit (πέρας); 3) perceptible objects that result from the mixing of the first two (συμμισγόμενον); and 4) the cause that brings about the mixture of the first two (αἰτία τῆς συμμείξεως).[3] Examples of the first are hot and cold, dry and wet, fast and slow, and large and small; all are inherently variable, admitting infinite degrees of more and less, without an inherent limit or finite quantity.[4] The second kind of being, finite limits, include fixed quantity, measure, and order of many kinds.[5] Mixing the finite and the infinite gives rise to the third kind of being, everything from finite perceptible objects and the seasons of the year, to all the goods of life, including health, beauty, and strength, as well as law and social order.[6] The fourth kind of being is the cause of the mixing of the first two; as a result, it is the maker or agent (τὸ ποιοῦν καὶ τὸ αἴτιον), which produces that which is made or comes to be (τὸ ποιούμενον καὶ τὸ γιγνόμενον).[7] Here we have recognizable analogues to Aristotle's material, formal and efficient causes. There is also a final cause inasmuch as under the influence of the correct agent, the result of this mixing is something good that manifests some form of order, symmetry, and harmony.[8]

2. As many commentators have pointed out, Aristotle's four causes are best thought of as explanatory principles or reasons, as they are all answers to why-questions. Thus, they are the four 'because's'. See, for example, Hankinson, "Philosophy of Science," 109–139, and especially pages 120–22.

3. *Philebus* 23c–d.

4. *Philebus* 24a–25c.

5. *Philebus* 25a–b, 26a–b.

6. *Philebus* 26b–d.

7. *Philebus* 26e–27a.

8. *Philebus* 25e, 26b.

In his *Timaeus*, Plato again appeals to these four explanatory principles to give an account of the perceptible universe. First, there is an underlying kind of being in which all perceptible objects come to be; given its role in the generation of perceptible objects, it is called the receptacle (ὑποδοχή).[9] Its own nature is to be indeterminate and disordered in both its spatial arrangement and motion; hence, it is also called the straying or errant cause (πλανωμένη αἰτία).[10] It is combined with the differentiating and ordering principles of all bodies—the Forms—in a way that is analogous to the combining of gold with any and all shapes.[11] These differentiating Forms are brought into existence in the receptacle by a cause that Plato compares to an artisan: it gives order to otherwise disordered raw materials by imitating the Forms.[12] Given the goodness of the divine artisan, who is responsible for the creation of the perceptible universe, as well as the creative activity of his offspring, most of what comes to be is ordered for the best.[13] In effect, by using reason to introduce order and symmetry into disorder, the divine artisan creates the best of all possible physical worlds, that is, the physical world in which as much order and harmony as possible has been generated, subject to the constraints imposed by the underlying receptacle.[14] As in the *Philebus*, this ordered world is again understood to be of mixed birth (μεμειγμένη γένεσις), resulting from the union of two radically different and mutually irreducible principles; instead of the finite and infinite, the two principles in the *Timaeus* are reason and necessity, where necessity is understood to be the ineradicably errant nature of the bodies from which all perceptible objects are made.[15] There are, then, three kinds of being: that which comes to be and is ordered for the best; that in which something comes to be, namely the receptacle; and that which is modeled by what comes to be, namely the Forms.[16] In addition, a fourth kind

9. *Timaeus* 48e, 49e–50a.

10. *Timaeus* 30a, 48a.

11. *Timaeus* 50b, 47e.

12. *Timaeus* 50d.

13. *Timaeus* 48a, 69b.

14. *Timaeus* 30a1–4.

15. *Timaeus* 31b, 48a. F. Cornford, *Plato's Cosmology*, 161–77, and G. Morrow, "Necessity and Persuasion in Plato's *Timaeus*," argue that necessity and reason are mutually irreducible in Plato's account of perceptible objects in the *Timaeus*, and to justify this claim and to show how both necessity and reason can be at work in one and the same perceptible object, both authors appeal to Aristotle's account of necessity, chance, and the order introduced by formal causes found in Book II, chapters 4–9 of his *Physics*, in particular his account of hypothetical necessity.

16. *Timaeus* 50d.

of being is required to act as the cause (αἴτιον) of the mixing of the Forms with the underlying raw materials.[17]

In sum, analogues to all four of Aristotle's explanatory causes can be found in Plato's *Philebus* and *Timaeus*. In addition, in both these works and in his *Phaedo*, Plato sets out several general principles dealing with the composition and behavior of perceptible objects that Aristotle also holds.

a) Perceptible objects are composite beings. As we saw, Plato argues that discrete perceptible objects have a mixed nature.[18] They are composed of two very different principles, one that is inherently unlimited, or infinite, and one that is inherently limited, or finite. As a result, when the two are combined, the second principle limits the first. The upshot is that discrete perceptible objects are composite beings, put together by a moving cause so as to combine infinitely variable elements with a limiting component.[19] This analysis is analogous to Aristotle's account of perceptible objects as composites of a material and formal cause, where the material cause is undetermined in some respect, with the potential to be determined in that respect by a formal cause.

b) Change is an exchange of contraries. This claim is clearest in Plato's *Phaedo*, where Socrates says that all change involves something coming to be out of its opposite.[20] Since the opposites involved in a change do not persist through that change, Plato also recognizes the need for something different from the Forms to persist through the change, namely the thing that successively participates in the opposed Forms being exchanged.[21] Here again, we see an anticipation of Aristotle's claim that all change requires three principles, a persisting subject and a pair of contraries that belong to the same genus.

c) An efficient cause is required to bring about a change.[22] The efficient cause is the agent that brings about the exchange of contraries in an underlying subject. This agent is different from both the underlying subject and the contraries involved in a change.

17. *Timaeus* 28a.

18. *Philebus* 23c–d; *Timaeus* 47e.

19. *Philebus* 27b; *Timaeus* 31b, 48a.

20. *Phaedo* 69e–72e.

21. *Phaedo* 103a4–c2.

22. *Philebus* 26e–27a; *Timaeus* 28a. Several commentators have argued that Plato discusses efficient causality in his *Phaedo* as well, in the long digression on natural philosophy at 95c–105c; on this topic, see Gallop's notes in Plato, *Phaedo*, 197–213; and Byrne, "Forms and Causes," 3–15.

d) In at least some cases, the agent causing a change acts for the sake of the best possible outcome as it attempts to bring some good into being in the world.[23] In the case of the divine craftsman who makes the perceptible universe, this goal-directed activity is guided by looking at the Forms and attempting to incorporate as much of their perfection as possible into perceptible objects.

e) Material Necessity: The goal-directed activity of causal agents is constrained by a simple and ineluctable necessity found in the material elements.[24] These elements, and the material cause from which they are made, have a nature of their own, prior to any organizing activity by causal agents, and this primitive nature cannot be set aside.

f) Hypothetical Necessity: Because of this simple material necessity, causal agents do not create perceptible objects *ex nihilo*, but rather produce composite objects from pre-existing raw materials. In this process, the causal agent makes use of the fixed characteristics of the raw materials, which the resulting composite object needs in order to function properly.[25] Thus, in addition to the simple necessity of the material elements, the production and operation of composite perceptible objects is constrained by a kind of hypothetical necessity: if these objects are to come to be and function properly, they must be made out of the right kind of raw materials.

As we shall see below, all of these general principles are also found in Aristotle's account of perceptible objects. The upshot is that we can find in Plato's works not only antecedents for all four explanatory causes, but also several of the general principles that Aristotle follows in applying these causes to the understanding of perceptible objects. Given Aristotle's account of his philosophical predecessors, this anticipation of his own views is hardly surprising: according to Aristotle, all of the earlier Greek philosophers from Thales to Plato made use of one or more of the four causes and of no causes other than these four.[26] Given our tendency to tie the doctrine of the four causes to Aristotle, it is important to remember that, by his own account, he did not

23. *Philebus* 25e, 26b; *Timaeus* 30a, 48a, 50e, 69b.

24. *Philebus* 24c–e, 26a; *Timaeus* 31b, 48a, 49e–52d, 68e–69a.

25. *Timaeus* 31b, 48b, 68e–69a, 74e–75e.

26. Aristotle, *Metaphysics* I 7, 988a18–23, b16–19. Following Liddell and Scott, I use the following abbreviations for the works of Aristotle: *APo.* = *Analytica Posteriora*; *Cael.* = *de Caelo*; *de An.* = *de Anima*; *EN* = *Ethica Nicomachea*; *GA* = *de Generatione Animalium*; *GC* = *de Generatione et Corruptione*; *HA* = *Historia Animalium*; *MA* = *de Motu Animalium*; *Metaph.* = *Metaphysica*; *Mete.* = *Meteorologica*; *PA* = *de Partibus Animalium*; *Ph.* = *Physica*.

discover or invent any of them. His own contribution, then, must lie in the distinctive way that he understands their application to the world, particularly to perceptible objects. It is here that he finds Plato's account deficient.

Plato's Forms and Aristotle's Material Cause

It is perhaps unfair to Plato to begin with Aristotle's material cause, as, of the four types of causal explanation, this is the one that Plato's Forms are pretty clearly not supposed to provide. The trouble, however, is that if one gets the material cause wrong, one will misunderstand the other causes as well. To see precisely where Plato's account goes wrong in Aristotle's view, one has to distinguish between the two points on which they agree—the role of material causes as raw materials and the ordered series of material causes—and the one where they disagree, namely the connection between the material cause and privation.

> a) Material causes as raw materials: For Aristotle, a material cause is always the material cause *of* something; it is "that out of which something comes to be, being present in it."[27] To be a material cause, then, is to possess a relational property: it is to act as the raw materials for something else, namely whatever is made from those raw materials. More precisely, to be a material cause is to stand in a two-place relation to something else, a relation that is transitive (the material cause of something is also a material cause of everything made out of the latter), asymmetrical (the material cause of something cannot have the latter as its own material cause), and irreflexive (something cannot be its own material cause). This relational property is also extrinsic: being a material cause does not, by itself, entail anything about what kind of thing the material cause is or what other properties it has. Thus, the term 'material cause,' like the term 'raw materials,' is not a natural kind term; it does not name a kind of thing or attribute any intrinsic, non-relational properties to whatever acts as a material cause. As a result, the concept of a material cause has been called a functional concept; to be a material cause is to have a job or function to perform, namely, to act as the raw materials from which something else is made.[28] All of this is consistent with Plato's account of perceptible objects in his *Philebus* and *Timaeus*.

27. *Ph.* I 9, 192a31–32; II 3, 194b23—195a26; *GC* I 4, 320a2–3; *Metaph.* VII 7, 1032a17.

28. McMullin, "Matter as a Principle," 169–208, esp. 201–3; Wieland, *Die aristotelische Physik* (1970), 140n29, 173–87, and 209–11; Frede, "On Aristotle's Conception," 93–107, esp.100; Fine, "Aristotle on Matter," 37–57; Hankinson, *Cause*, 130.

b) Ordered series of material causes: Because something is a material cause by virtue of an extrinsic, relational property, it can both act as the material cause for something else and have a material cause of its own.[29] As a result, in many perceptible objects there is an ordered series of material causes: the bronze of a statue both acts as the material cause of that statue and has a material cause of its own, the material elements from which bronze is made. The material cause from which an object is immediately made is its proximate material cause; the last or ultimate material cause from which it is made is its first material cause, traditionally called prime matter.[30] Here again, Aristotle's views are consistent with Plato's account of perceptible objects in his *Timaeus*, where the material elements themselves result from the combination of geometrical forms and the underlying extended receptacle, and these elements, in turn, act as the raw materials from which other, more complex perceptible objects are made.[31]

c) The material cause and privation: Although being a material cause does not, by itself, entail any intrinsic, non-relational properties in the raw materials, being the material cause of a particular kind of thing typically does. The reason is that the material cause of a particular kind of thing has to be the right kind of raw materials, with the right intrinsic properties of its own; it is not the case that anything can be made from anything.[32] This requirement is clearest in Aristotle's account of the hypothetical necessity that holds between material and formal causes in hylomorphic compounds: such compounds, he argues, must be made out of the right raw materials if the resulting composite object is to come to be and function properly.[33] Aristotle's favorite example is that of a saw: if it is to cut wood, it must be made out of something hard, such as iron, rather than something soft, such as wool. Although, as we saw above, Plato pays deference to this principle in his *Timaeus*, it is with respect to this requirement that his account of the material cause fails. More precisely, it goes wrong in three ways, corresponding to the three jobs of the material cause in perceptible objects. These are as: (i) the substratum persisting through generation and destruction; (ii) the subject combined

29. *Metaph.* V 4, 1015a7–10; VIII 4, 1044a15–25; IX 7, 1049a18–27; *Ph.* II 1, 193a9–21.

30. *Metaph.* V 4, 1015a7–10; 24, 1023a26–9; VIII 4, 1044a15–25; IX 7, 1049a18–27; *Ph.* II 1, 193a9–28.

31. *Timaeus* 31b, 49c–50c, 52e–54b.

32. *Ph.* I 5, 188a30–4; VII 4, 249a2–3; *GA* II 6, 743a21–7; *Metaph.* VIII 4, 1044b1–3; IX 7, 1049a1–3, 14–16; XII 3, 1070a19–20.

33. *Ph.* II 9, 200a7–13; *PA* I 1, 642a9–14; *Metaph.* VIII 4, 1044a27–9.

with the Forms—or, in Aristotle's case, the formal cause—in the composition of perceptible objects; and (iii) that which individuates perceptible objects that are the same in kind, that is, that have the same formal cause or Forms.[34]

With respect to the first, as the substratum that underlies the change from one Form to its opposite, the material cause is different in kind from the Forms; the Forms come and go in this substratum, but the substratum itself is not a Form. If, in turn, the Forms are the things that truly are, and everything else possesses only a lesser kind of being, derived from the Forms, then the material cause becomes the opposite of being, namely non-being. The result, Aristotle says, is that Plato thinks of the material cause of changeable objects as the absence of being, namely privation.[35] This identification of the material cause with privation, Aristotle argues, will not work because the role of privations in change is to act as one of the opposites that are gained or lost by the persisting substratum. In other words, they are precisely what does not persist through change. As a result, if the material cause is simply the privation of a Form, it cannot persist through the change in which that Form is gained; a Form and its privation are mutually exclusive. Thus, privations cannot act as a substratum of change, even when that change is generation or destruction, for the latter also require a persisting substratum.[36] Persisting through generation and destruction, however, is for Aristotle the principal role of the material cause.[37]

The correct view, Aristotle argues, is to distinguish between the substratum persisting through a change and the opposites gained or lost in that change. The crucial point here is that the privations gained or lost in a change are over and above what the persisting substratum already is in its own right. In the case of a block of marble, for example, one has to distinguish between what it is as marble and what it is as lacking the kind of shape that would make it to be a statue. Every privation is a qualified, restricted kind of non-being, the absence of some determinate kind of being, not sheer nothingness. Even the privation belonging to a substratum that persists through generation and destruction is a restricted kind of non-being, namely the absence of some determinate Form or formal cause. If the material cause underlying generation

34. For a discussion of the different roles of the material cause in perceptible objects, see Byrne, *Aristotle's Science*, ch. 3 and 4.

35. *Ph.* I 3, 186a28–34; 7, 190a14–17, b23–5, b36–191a3; 9, 192a3–6, 20–5; *GC* I 3, 319a29–b4.

36. *Ph.* I 7, 190b1–5; *Metaph.* VII 7, 1032b31–1033a1.

37. *Ph.* I 9, 192a31–2; *GC* I 4, 320a2–3; *Metaph.* VII 7, 1032a15–20, 1033a8–10; 8, 1033b16–19; 10, 1035a25–30; 15, 1039b29–30; VIII 4, 1044b8–11; 5, 1044b27–9.

were simply the privation of a Form, it would seek its own destruction in the process of generation because in that process the privation of a Form is lost, and the corresponding Form is gained.[38] The upshot is that the substratum persisting through change of any kind, including generation and destruction, cannot be simply privation; whatever this persisting substratum is, it must be distinct from privation and remain as it was before. Thus, a material cause cannot be made to be what it is through the Form with which it is combined to generate a composite object. If it is to persist through the change in which a Form is gained or lost, a material cause must have a nature of its own, independent of that Form.

Aristotle advances similar arguments to show that when the material cause is understood as privation, it cannot fulfil its other roles as well. In addition to being a substratum of change, the material cause is also one part of the mixed, or composite nature of perceptible objects, namely the subject that is combined with the Forms on Plato's account, or with a formal cause on Aristotle's. As we know from both Plato and Aristotle's account of hypothetical necessity, only certain kinds of thing, with the requisite intrinsic properties, can act as the sort of subject that can be combined with the formal cause of perceptible objects; a subject that is nothing on its own cannot be the subject of anything, including the subject of Platonic Forms. Thus, the Forms cannot be combined with privation to yield a composite object; if the material cause contributes nothing of its own to a perceptible object, that object is simply a Form or a collection of Forms. The mixed nature that Plato ascribes to perceptible objects is lost if their material cause is nothing on its own; perceptible objects are no longer composed of two radically different principles if the infinite is completely reduced to the finite and the necessary to the rational.[39]

The third role of the material cause in perceptible objects is to individuate spatially discrete objects that are the same in kind, that is, that have the same formal cause or Forms. Because these spatially discrete objects have the same defining Forms or formal cause, it must be their respective material causes that account for the differences between them, including the difference in their spatial location. Again, only a material cause with a nature of its own can do this. In particular, that material cause must be something physical in its own right because only a physical material cause can spatially individuate a perceptible object. Such is the case because the material cause of perceptible objects gives to these objects a particular location in space and makes them

38. *Ph*. I 9, 192a1–25.

39. As we saw in note 15 above, Cornford, *Plato's Cosmology*, and Morrow, "Necessity," also argue against the reduction of necessity to reason and of the infinite to the finite in Plato and Aristotle.

subject to locomotion and other types of change.[40] Only a physical material cause can do this because Platonic Forms on their own are immaterial, unchangeable, and not located in any particular place.[41] The material cause of perceptible objects also makes them to be spatially extended, and every extended body is infinitely divisible, that is, not composed of unextended parts.[42] Here again, Aristotle argues, Plato misses the material nature of perceptible objects because, he claims, Plato mistakenly thought that a three-dimensional body can be resolved into two-dimensional planes.[43]

In sum, Aristotle's criticism of Plato here is that he gives the material causes of perceptible objects three jobs to perform, but not the means to do them. It is impossible not only for something to come to be from nothing, but also for a perceptible object to come to be, persist, and function without the right kind of material cause. In the case of perceptible objects, that material cause cannot just be privation; on the contrary, it must possess certain physical properties in its own right. In the end, perceptible objects are always made out of physical matter of some kind or other, whose own nature cannot be understood by separable, immaterial Forms.

Plato's Forms and Aristotle's Efficient Cause

Plato's failure to provide for the material nature of perceptible objects also leads, in Aristotle's view, to his failure to understand efficient causes. Here again Aristotle's criticism appears to be unfair when taken out of context. Aristotle criticizes Plato for making the Forms into the causes of not only the being of perceptible objects, but also their generation and destruction.[44] The latter, Aristotle says, is impossible because it leaves unexplained both why things such as houses and jewelry, which have no Forms, are generated and destroyed, and why those things that do have Forms are only intermittently

40. Aristotle argues that all and only movable bodies have a place: *Ph*. IV 5, 212b28–9; 4, 212a6–7. All movable bodies, in turn, must be made from physical matter because only material bodies are capable of locomotion: *Metaph*. I 8, 989b31–3; VI 1, 1026a2–4; XII 2, 1069b24–6. Because all other types of change presuppose locomotion, all changeable objects must also be made from a physical material cause: *Ph*. IV 1, 208a31–2; VII 2, 243a39–40; VIII 7, 260a26–261a28. On the connection between matter and motion, see Byrne, *Aristotle's Science*, §1.1 and §3.3.

41. *Phaedo* 78b–e, 80b.

42. *Ph*. III 7, 207a35–b1; IV 2, 209b6–11.

43. *GC* I 2, 315b24–33; 316b19ff.; 5, 320b14–17, 22–8; II 1, 329a13–24; *Cael*. III 1, 299a2–11; 7, 306a23–30.

44. *GC* II 9, 335b7–16; *Metaph*. I 9, 991b3–9; see also *Metaph*. I 9, 992a24–6, b8–9; XII 6, 1071b14–17.

generated and destroyed. In defense of Plato, one might respond that Plato's Forms were never intended to act as efficient causes.[45] After all, as we saw above, Plato posits a fourth kind of being as the cause of change, distinct from the Forms and the material substratum. Fair enough, but just as Plato's account of the material substratum turns out to be insufficient for Aristotle, so too Plato's account of efficient causation fails to satisfy what Aristotle takes to be clear requirements for efficient causes. In other words, the point of Aristotle's criticism here is not so much the Forms themselves, as Plato's failure to give an adequate account of efficient causation.[46]

Put simply, what Aristotle misses in Plato's account is a clear understanding of causal agents, as well of the objects on which they act. In the first instance, for Aristotle, causal agents are things that produce change, not just their causal powers or essential attributes.[47] It is the builder, he says, that moves bricks and builds a house, not the art of building.[48] Similarly, it takes a human being to generate a human being.[49] Thus, the soul, which is the formal cause of a biological organism in Aristotle's account, is not sufficient to cause biological generation; it typically takes a biological organism of a certain kind to generate another biological organism of the same kind.[50] As a result, Platonic Forms by themselves cannot produce change in perceptible objects; by their very nature, they are not physical agents.[51] Causal agents must be physical objects, according to Aristotle, because perceptible objects can act on one another only through physical contact; there is no action at a distance.[52] Thus, the proximate mover and the thing it moves must be spatially contiguous, and only physical bodies are capable of such physical contact. Whenever something is set in motion, one body is pushing or pulling on another; even carrying or turning something in a different direction result from a

45. See, for example, Vlastos, "Reasons," 291–325.

46. At *Metaph*. I 7, 988b2–4, Aristotle concedes that Plato's Forms are not supposed to be efficient causes.

47. *Ph*. II 3, 194b29–32, 195a21–3, 30–6, b5–6; III 2, 202a9–12; *GC* I 7, 324a8–14; *Metaph*. VII 9, 1034b16–19.

48. *de An*. I 4, 408b11–15; *GC* II 9, 335b20–9.

49. *Ph*. II 2, 194b13; 7, 198a24–7; III 2, 202a9–12; *GC* I 5, 320b17–21; *Metaph*. VII 7, 1032a25; 8, 1033b33; 9, 1034b17; IX 8, 1049b24–7; XII 3, 1070a8, 27–8, b34; XIV 5, 1092a16.

50. *de An*. I 1, 403a24–b19; 4, 408b11–15; b30–1; III 4, 429b13–14.

51. *Ph*. V 1, 224b5–8; *GC* I 7, 324b14–18; II 9, 335b18–24; *Metaph*. I 9, 991a8–11; 992a25; VII 7, 1032a12–25; 8, 1033b26–1034a8; VIII 3, 1043b16–18; XII 6, 1071b14–16.

52. *Ph*. III 2, 202a3–9; VII 1, 242b59–63; 2, 243a32–5, 243a11–244b2; VIII 5, 256b18–20, 258a20–1; *GA* II 1, 734a3–5; 4, 740b22–741a4.

combination of pushing and pulling.[53] Because all other forms of change presuppose locomotion and causing locomotion requires one body pushing or pulling on another, all efficient causation involves pushing and pulling; more may be involved, but there is always at least that. The upshot is that efficient causation always requires physical contact between the agent and the object on which it is acting. Such contact, in turn, is possible only between physical objects, that is, extended, movable bodies. Thus, only perceptible objects can act as efficient causes of change in perceptible objects; the causal powers that produce change in perceptible objects do so only insofar as they belong to physical causal agents. Immaterial entities cannot act as efficient causes of change in perceptible objects.

Aristotle's requirements for efficient causation go beyond the need for a physical causal agent. In order to produce the changes for which they are responsible, causal agents must also have the appropriate internal structure and parts.[54] Not only do causal agents require the right sorts of causal power, but those causal powers also require the right internal parts in the causal agent. Causal powers may be defined, in the first instance, in relation to the effect that they produce. Still, the exercise of these powers presupposes the appropriate mechanism, organs, or functional parts in the causal agent. Similarly, the object being changed must have the right kind of material cause, with the right kind of internal arrangement, if the causal agent is to act on it in some way. It is not the case that anything can produce any kind of change, in anything whatsoever.[55]

In sum, for Aristotle, both causal agents and the things on which they act must be physical objects of some kind. The physical nature of perceptible objects, however, is precisely what Plato fails to ground. As a result, although the Forms may not have been understood by Plato as efficient causes, they end up having to perform this function, for, without an independent physical material cause, there is nothing left in Plato's account but the Forms to do this.

Plato's Forms and Aristotle's Formal Cause

Of the four causes, the Forms seem closest to Aristotle's formal cause. After all, they are supposed to answer the question of what something is, what defines

53. *Ph.* VII 2, 243a11–244b2.

54. *de An.* I 1, 403a24-b12; 4, 408b11–15; III 4, 429b13–14.

55. *Cael.* IV 3, 310a27-32; *GA* II 6, 743a18-27. For a more extensive discussion of Aristotle's causal powers, see S. Makin's commentary in Aristotle, *Metaphysics Theta* , 17–269; and Byrne, *Aristotle's Science*, ch. 2.

it.[56] Here again, however, Aristotle argues that Plato's Forms are insufficient; they cannot act as formal causes of perceptible objects, because they lack the features that such formal causes require to explain the behavior of perceptible objects. Again, the problem is not just that the Forms are separate from perceptible objects; they also lack the intrinsic properties required to be the formal causes of perceptible objects.

When thinking about Aristotle's formal cause, we must bear two distinctions in mind: i) the distinction between the formal and the material cause; and ii) the distinction between essential and accidental properties. With respect to the former, Aristotle holds that all perceptible objects are, at some level, composites of a formal and a material cause; perceptible objects, he says, have a dual nature, one due to their formal cause and another due to their material cause.[57] This composite nature is perhaps most easily seen in artifacts such as bronze statues and wooden beds, but it is also found in natural substances. The latter too have a dual nature: they cannot exist without their material cause but also cannot be understood just by means of their material cause.[58] This composite nature is also implicit in the hypothetical necessity that holds between the material and formal causes of perceptible objects; as we saw, the formal cause of perceptible objects can typically be realized in only certain, specialized raw materials. If the material cause is to contribute its intrinsic properties to the composite object made from it, it must persist in that object; composite objects depend immediately and continuously upon their material cause. Thus, the formal cause of a perceptible object must be understood as something added to the material cause, something over and above what the material cause already is in its own right.[59]

This incremental view of the formal cause—as something added to the material cause, not something that displaces the material cause—is confirmed by Aristotle's account of generation and destruction. Generation in perceptible objects, he argues, is the generation of neither the material cause nor the formal cause, but of the object composed of them.[60] In effect, a perceptible object is generated by bringing together a formal and a material cause, and both

56. *Phaedo* 99d–100c; *GC* II 9, 335b11–14; *Metaph.* I 6, 987b23–5, 988a7–11; 7, 988a34–b6; 9, 991b3–9.

57. *Ph.* II 2, 194a12–17 (δύο αἱ φύσεις), 21–7; 8, 199a30–2. On the dual nature of perceptible objects, including natural substances, see Byrne, *Aristotle's Science*, ch. 7.

58. *Ph.* II 2, 194a14–15.

59. Cooper, "Hypothetical Necessity," also argues that on Aristotle's account of hypothetical necessity material causes must already have a nature of their own, which they contribute to the composite substance made from them.

60. *Metaph.* VII 7, 1032b30–3a5; 8, 1033a24–b19; 9, 1034b7–19; 10, 1035a25–9; XII 3, 1069b35–70a4.

causes persist in the generated object. Similarly, in destruction the persisting material cause loses the formal cause that was added to it in generation.[61] In sum, perceptible objects have a composite nature, grounded in both their formal and their material cause. The formal cause is not responsible for everything necessary to a perceptible object.

The second distinction that we must remember in thinking about formal causes is between essential and accidental properties. As Aristotle argues in his *Metaphysics* and elsewhere, essential properties belong to a subject either always or for the most part, whereas accidental properties belong to a subject only sometimes.[62] In the case of perceptible objects, distinguishing between their essential and accidental properties is particularly difficult because they have an infinite number of accidental properties.[63] Since only essential properties belong to an object's formal cause, most properties of a perceptible object do not belong to its formal cause. Thus, when it comes to determining what belongs to the formal cause of a perceptible object, we must bear in mind both the distinction between the formal and material causes of that object and the distinction between its essential and accidental properties. These two distinctions are not coextensive; as we saw above, some of the necessary properties of perceptible objects belong to them by virtue of their material cause and some by virtue of their formal cause. Only those properties that are both necessary to a perceptible object and over and above its material cause constitute its formal cause.

Aristotle's answer to the question of what those properties are, is, in a word, nature, where the term 'nature' is understood to refer to the distinctive causal capacities of a perceptible object. Aristotle divides perceptible objects into two groups: natural substances and physical human artifacts.[64] This distinction, in turn, is grounded in two further distinctions. The first is with respect to their origins: artifacts are things that we make, and natural substances are things that we do not. In the first instance, then, natural substances are perceptible objects that exist independent of our making. Aristotle argues that this first distinction is largely coextensive with a second one, namely the distinction between perceptible objects that have the capacity for self-motion

61. *Ph.* I 9, 192a31–32; *GC* I 4, 320a2–3; *Metaph.* VII 7, 1032a15–22, 1033a8–10; 8, 1033b16–19; 10, 1035a25–30; 15, 1039b29–30; VIII 4, 1044b8–11; 5, 1044b27–9.

62. *Metaph.* VI 2, 1026b31–33. Aristotle also argues that part of the definition of a perceptible substance is that its formal cause must be found in a material subject of a certain kind: *Metaph.* VI 1, 1025b28–1026a6; VII 5, 1030b14–1031a14; 8, 1033b12–26; 10, 1035b27–32; 11, 1036b23–30, 1037a1–2; VIII 2, 1043a4–28; 3, 1043a36–b4; XI 7, 1064a19–28; *de An.* I 1, 403b1–9; *Ph.* II 3, 195a16–21; 9, 200b5–8.

63. *Metaph.* VI 2, 1026b2–12.

64. *Ph.* II 1, 192b8–13.

or self-change, and those that do not.[65] In other words, natural substances are perceptible objects that can move or change themselves; artifacts, insofar as they are artifacts, cannot. Aristotle takes this second distinction to be more fundamental than the first, but since it is largely coextensive with the first, Aristotle also takes the distinction between what is made by us and not made by us to be important; humanly produced objects really are different from naturally occurring ones.

Despite these differences, there is an important similarity between natural substances and human artifacts, one that Aristotle uses to make clear what the formal causes of natural substances are.[66] Artifacts typically have a particular set of functions to perform, and the instrumental organization they require to perform these functions is typically not found in their raw materials.[67] As a result, they require some further, organizing principle that enables them to perform their distinctive functions. The latter is the job of the formal cause. It dictates not only what raw materials are required, but also how those raw materials are to be put together and behave while part of the artifact. The behavior of the raw materials while part of a complex whole is constrained behavior, restricted by the functional requirements of that complex whole.

The same is true of natural substances.[68] Like the sciences that deal with the production of artifacts, the natural sciences need to use formal and final causes to give an adequate account of the composition and behavior of natural substances.[69] This similarity holds, Aristotle argues, even though there is a conscious artisan at work in the construction of artifacts, but not in the generation of natural substances.[70] Thus, we now have a basis for deciding which properties belong to perceptible objects by virtue of their formal cause: whatever necessarily belongs to them by virtue of their incremental causal capacities, that is, the intrinsic causal capacities they possess as composite

65. *Ph.* II 1, 192b8–34, 193a29–30; 7, 198a27–b1; *Cael.* I 2, 268b16; *de An.* II 1, 412b15–17; *GA* II 1, 735a2–5; *Metaph.* V 4, 1015a13–15; VI 1, 1025b18–21; IX 8, 1049b5–10; XII 3, 1070a7–8. The first distinction is largely coextensive with the second, but there are some exceptions; bird's nests and spider's webs, for example, are not made by human beings, but they have no principle of self-motion of their own (*Ph.* II 8, 199a26–30). We might call them 'natural artifacts', but Aristotle himself does not use this term.

66. *Ph.* II 1, 193a28–b5; 2, 194a21–7; 8, 199a8–20; *GC* II 9, 335b24–35; *de An.* II 1, 412b6–17; *PA* I 1, 639b15–21; II 9, 654b27–33; *GA* I 18, 724a20–b1; 22, 730b5–32; II 1, 734b20–735a5; 4, 740b25–37; 5, 741b7–9; 6, 743a18–27, b20–5; V 8, 789b6–15; *Metaph.* V 4, 1014b26–32; VII 7, 1032a12–22; 8, 1033b24–6; IX 6, 1048a30–b4.

67. *Ph.* II 2, 194a33–b8; 8, 199a12–20; 9, 199b35–200a7; *PA* I 1, 639b15–19; *GA* II 1, 734b27–31.

68. *Ph.* II 1, 193a28–b12; 2, 194a12–27.

69. *Ph.* II 8, 198b10–199b33; *de An.* II 4, 415b15–20; *PA* I 1, 639b12–640a20.

70. *Ph.* II 8, 199a20–1.

objects over and above the capacities they already have by virtue of their material cause. It is in this sense that the formal cause captures the nature of a perceptible object.

By connecting the formal cause of a perceptible object to its distinctive causal capacities—the ones that belong to it over and above those of its material cause—Aristotle also shows us how formal causes depend upon the perceptible objects in which they are found. Because these distinctive causal capacities presuppose a material substratum with intrinsic properties and causal capacities of its own, they necessarily belong to a physical subject. The trouble with Plato's Forms, then, is that they are causally impotent. The problem is not just that they possess no causal capacities of their own. In addition, the formal causes of perceptible objects must be found in a physical material cause in order to move and affect other physical objects; when separated from their material cause, formal causes lose this ability.[71] Plato emphasizes that the Forms are really themselves, in their purest state of being, only when they are separated from perceptible objects.[72] In Aristotle's account, the opposite is the case; the formal causes of perceptible objects, including the formal causes of natural substances, are complete only when joined to the body of a perceptible object, for it is only then that these defining causal powers can be realized and exercised.

Without this connection to the causal powers of perceptible objects, Plato's Forms are flawed in a second way; because they cannot distinguish between the causal and non-causal properties of perceptible objects, they also cannot distinguish between the essential and accidental properties of perceptible objects. The upshot is that in order to be an Aristotelian formal cause, Plato's Forms would have to be connected to perceptible objects in two ways: first, they would have to be found in the physical raw materials of perceptible objects; and, second, they would have to organize those raw materials in such a way that the resulting composite object had a second nature, a second set of causal capacities, over and above those of their persisting material cause. Otherwise, they are merely accidental, and accidental properties define nothing.[73]

Plato's Forms and Aristotle's Final Cause

Given the importance of the idea of the Good in Plato's *Republic* and the claim in the *Timaeus* that the divine artisan creates this world to be as good as it

71. *GC* I 7, 324b18–22. More generally, agents that do not have their formal cause in a material cause cannot be affected by other, movable objects; those that do, can: *GC* I 7, 324b4–6.

72. *Phaedo* 65d–66a, 74b–75d, 78d–79a, 80b.

73. *APo*. I 22, 83a31–6.

can be, one would expect Plato to have a robust account of final causes. Here again, however, Aristotle argues that Plato's account is deficient. In particular, Plato fails to show the connection between the good, on the one hand, and change, efficient causes, and formal causes, on the other.

The first point of disagreement between them here has to do with the connection between the good and change. Aristotle defines final causes in relation to change: a final cause is the good for the sake of which a change takes place.[74] Thus, Aristotle explicitly connects final causes to the occurrence of change. Without change, Plato's Form of the Good cannot be a final cause, and without final causes, nothing happens for the sake of the good, which is clearly not what Plato wants.[75] In fact, Aristotle's criticism is even harsher: he argues that where there is no change, there is no place for the good. Mathematics, for example, deals with immutable objects that are not subject to change of any kind. As a result, Aristotle argues, goodness is not a property of mathematical objects.[76] Mathematics does consider properties such as beauty, symmetry, and order, but not goodness, because the latter belongs to activities, and activities are not found in mathematical objects. Thus, it is not only the case that where there is no change, there are no final causes; it also the case that where there is no change, there is no activity, and where there is no activity, there is no good. The Form of the Good is not nearly as widespread as Plato thought.

Final causes, then, are necessarily connected to change. This connection, however, is not because final causes are efficient causes. On the contrary, by themselves, final causes produce no change.[77] As we saw above, only physical causal agents can cause change in perceptible objects; all efficient causation among them requires mutual physical contact. Consequently, the proximate causal agent is itself always moved by the thing it moves or changes.[78] Precisely because final causes are not efficient causes, they can move something else and yet remain unmoved themselves.[79] As objects of desire, for example, final causes move things that desire them, but this is not efficient causality; the role of the efficient cause here belongs to the agent desiring the final cause.[80]

74. *APo*. II 11, 95a6–8; *Ph*. II 3, 194b32–195a3, 23–6; 7, 198b8–9; 8, 198b17; *GA* II 1, 731b23–4; V 8, 789b5–6.

75. *Metaph*. I 7, 988b6–16.

76. *Metaph*. XIII 3, 1078a31–b2.

77. *Ph*. II 3, 195a8–11; *GC* I 7, 324b14–18; II 9, 335b20–9; *Metaph*. I 3, 983a30–2; VII 8, 1033b26–1034a5; 9, 1034b16–19; VIII 3, 1043b16–18; XII 6, 1071b14–16.

78. *Ph*. II 7, 198a24–b4; III 2, 202a3–9; VII 1, 242b59–63; 2, 243a34–5; *GA* II 4, 740b22–741a4.

79. *de An*. III 10, 433b10–21; *MA* 6, 700b23–701a2; *Metaph*. XII 7, 1072a26–7, b1–4.

80. *de An*. III 10, 433a17–26; *MA* 6, 700b35–701a2.

Thus, although Aristotle connects final causes to change, their role in the explanation of change is not that of an efficient cause. Final causes are the results or effects produced by efficient causes, not the causal agents of those changes.

In addition to being necessarily connected to change, Aristotle imposes a further restriction on final causes, and this is where he finds Plato's account most deficient. Aristotle argues that a change has a final cause only if it has a beneficial result.[81] A final cause is more than just the termination of a change; otherwise, death would be the final cause of life.[82] In addition, the result of the change must be beneficial either for the thing undergoing the change or for something else affected by it. Thus, Aristotle distinguishes between the good that is the final cause of a change and the thing that benefits from that change.[83] Health, for example, is the final cause of medicine, and the sick patient benefits from the healing caused by the physician. More generally, for a final cause to be good, it must be good *for* something. If nothing benefits from a change, there is no good for the sake of which that change can take place.

As a result, Aristotle argues, final causes are grounded in the formal causes of changeable objects.[84] Final causes require a change that benefits something, and the benefit in question depends on the specific nature of the object being benefitted. Given that formal causes determine the specific nature of perceptible objects, final causes always depend on formal causes. This connection is not surprising; a change is beneficial for something only if it contributes to the complete expression of that thing's nature, and the latter, in turn, is determined by what kind of thing it is.[85] In the case of biological organisms, for example, their formal cause enables them to perform their distinctive biological functions; thus, generation and growth are beneficial for biological organisms because their formal cause is actualized by these changes.[86] Even after a formal cause has come into being, the final cause of a perceptible object remains connected to that thing's formal cause, for the exercise of some faculty or other is beneficial to a perceptible object only if it is part of the proper exercise of that object's distinctive capacities, and those capacities are introduced through the addition of the object's formal cause to its material

81. *Ph.* II 2, 194a29–30; 8, 199a8–20.

82. *Ph.* II 2, 194a30–33.

83. *Ph.* II 2, 194a34–36; *de An.* II 4, 415b2–3, 20–21; *Metaph.* XII 7, 1072b2–3; *EE* VII 15, 1249b15.

84. *Ph.* II 7, 198a24–26, b1–9; 8, 199a30–2; 9, 200a7–15, 34–35; *Mete.* IV 12, 390a4–5; *PA* I 1, 639b15–17, 640a16–19, 641a25–27; *GA* I 1, 715a4–6; V 1, 778b12–16.

85. *Ph.* II 7, 198b8–9.

86. *Ph.* II 1, 193b12–18; 7, 198b3–4; 9, 200a33–34; *GC* II 9, 335b5–7; *de An.* II 4, 415b8–21; *PA* I 1, 639b15–17, III 2, 663b23–24; *GA* II 4, 740b25–34; V 1, 778b6–7; *Metaph.* V 4, 1015a10–11; IX 8, 1050a4–7.

cause.[87] Of all the causes, then, final causes are most closely connected to formal causes. Without a perfectible nature, there are no final causes.

It follows that not everything that natural substances do can be explained teleologically because it is not the case that everything they do is beneficial. Eclipses, for example, occur regularly and non-accidentally, but do not have a final cause of their own because they produce no benefit for the heavenly bodies involved.[88] Other changes lack a final cause because they are violent, that is, contrary to the natural motion or activity of an object, and indeed, may even harm or destroy it.[89] Finally, the basic physical properties of the sublunary material elements—hot, cold, fluid, solid, rare, dense—are neither good nor bad in themselves; they are beneficial only to the extent that they contribute to the proper functioning of something made from them, but in that case they are good only instrumentally, not in their own right.[90] It may be that, given the structure of the physical universe, every change ultimately benefits something or other, but it is not the case for Aristotle that every change has its own final cause.[91]

Given the dependence of final causes on formal causes, the limits on what the formal causes of perceptible objects explain are also limits on what their final causes explain. Because the material cause and its capacities are indifferent to the formal cause that they gain or lose in generation and destruction, the basic material causes of perceptible objects are also indifferent to the good of the composite objects made from them. The formal cause of a perceptible object presupposes a certain material cause but does not explain the causal capacities of that material cause. Thus, the explanatory range of formal causes is limited by material causes. The same restriction applies to final causes. Final causes do not explain everything about perceptible objects, because formal causes do not explain everything about them. Thus, even where the actualization of a formal cause brings about something beneficial for a perceptible object, the formal and final causes involved still do not explain

87. *Ph*. II 1, 193b8–12; 7, 198a26–27; *Mete*. IV 12, 389b26–390a12; *de An*. I 4, 408b11–15; II 1, 412a19–b6; 4, 415b21–28; *PA* III 2, 663b23–25; *GA* II 1, 732a1–5, 734a30–33; *Metaph*. IX 8, 1050a9–b6.

88. *Metaph*. VIII 4, 1044b12.

89. *Ph*. II 2, 194a30–34.

90. *Ph*. II 9, 200a30–32; *PA* I 1, 642a32–b4; IV 2, 677a1–18; *GA* V 1, 778a29–b2; 8, 789b20–22; *Metaph*. I 3, 984b11–14.

91. Thus, not all of the regular motions and changes of natural substances must be explained teleologically, contrary to the following commentators: Balme, "Greek Science," 129–38; Balme's commentary in Aristotle, *De partibus*, 76–84; Ross in Aristotle, *Physics*, 43; Demos, "The Structure," 255–68; Owens, "The Teleology," 159–73; Wieland, *Die aristotelische Physik*, 265. See Sorabji, *Necessity,* 144n3, for other commentators who argue that for Aristotle every regular and non-accidental change in natural substances has a final cause of its own.

everything about that object, because what belongs to that object's material nature is itself indifferent to the good. Formal and final causes supplement the material nature of perceptible objects; they do not replace it.[92]

In sum, not every change is beneficial to the object undergoing that change, and where there is a benefit, it is grounded in the formal cause of the changing object. Thus, final causes are always species-specific, and consist in the beneficial exercise of those incremental causal capacities that belong to perceptible objects by virtue of their formal cause, over and above those that belong to their material cause. According to Aristotle, Plato never gets clear about the dependence of final causes on the formal causes of perceptible objects, and the limited scope within which they can be applied. The Good cannot explain everything in nature because not everything in nature is beneficial, and where something beneficial does occur, it is because of the specific nature of the objects involved. Without formal causes, final causes are blind.

Conclusion

In Aristotle's view, then, Plato's theory of the Forms falls prey to a cumulative series of errors, arising from Plato's misunderstanding of the composite nature of perceptible objects and the causal capacities required to explain their behavior. The moral of the story here is that the four causes do not stand alone; they depend on one another and function according to an explanatory division of labor. In the case of goal-directed changes—changes that non-accidentally produce a beneficial result for a certain kind of perceptible object—all four causes are required to give a complete explanation. As a result, to turn Plato's Forms into formal causes, the other three causes are required. By themselves, Aristotle argues, the Forms explain nothing.

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92. *Ph*. II 8, 199a30–32. Johnson, *Aristotle on Teleology*, emphasizes the close connection between final and formal causes as part of an internalist account of Aristotle's teleology; only the intrinsic good of a natural substance can be its final cause. While agreeing that final causes are always connected to formal causes, I disagree with Johnson about how much final causes explain about perceptible objects because of the limits of what their formal causes explain about them; the part of their material nature that escapes their formal cause will also escape their final cause.

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