

IIIβ: Metaphysics Λ1-6

IIIβ2: Λ6: From eternal motion to an ἀρχή that is pure ἐνέργεια

IIIβ2b: From eternal motion to its ἀρχή

Eternal motions, their movers, and the Timaeus

Much of what we have said brings Aristotle close to the Timaeus, and certainly one way Aristotle thinks of Λ6 is as offering a critically corrected version of the Timaeus' account of the world and its efficient ἀρχή. As we know, Aristotle shares with the Timaeus and also with Anaxagoras and Empedocles the search for an efficient or moving ἀρχή of the physical world, good in itself and a source of goodness to the world; with Plato and Anaxagoras, he describes this ἀρχή as νοῦς. However, with Plato and against Anaxagoras and Empedocles, Aristotle is looking for an incorporeal and unchangeable ἀρχή. Looking for causes of motion is not the most obvious way to find something unchangeable (as Aristotle says, the Platonic Forms, the first and most obvious candidates for incorporeal ἀρχαί, are "rather causes of immobility and of being at rest," Metaphysics A7 988b3-4). But Plato too has the idea of looking for something incorporeal as the cause of constancy in motion itself. In the Laws it is soul, a self-moving rather than an unchangeable mover, that is the immediate cause of motion to bodies. But in the Timaeus, the demiurge--who is apparently free from all change--is the cause of uniform circular motion to the world-soul (36b6-d7), and thus to the heavenly bodies that are moved by the different portions of the world-soul; the demiurge is also described as directly giving the world-body a uniform circular motion, "the [kind of motion] that is most connected to νοῦς and φρόνησις" (34a1-3). And even in the Laws, the world-soul (or a particular celestial soul) moves itself in uniform circular motion (and so produces uniform circular motion in the heavenly bodies) only to the extent that it moves rationally (Laws X 897b7-898c8), which is only to the extent that it "takes νοῦς as its companion" (897b1-2), so that here too it will be νοῦς (presumably unchangeable) which is the ultimate source of uniform circular motion to souls and bodies.

I have argued at length in Plato on God as Nous that the demiurge of the Timaeus, and of the Statesman myth, is to be identified with the νοῦς of Laws X, the "νοῦς which has ordered all things [νοῦς τὸ πᾶν διακεκοσμηκῶς, echoing the πάντα διεκόσμησε νοῦς of Anaxagoras B12]" of Laws XII (966e4), and the νοῦς which is "king of heaven and earth" at Philebus 28c6-8; all of these dialogues are taking up the project, suggested at Phaedo 99c6-8, of redeeming Anaxagoras' promise to explain the world through νοῦς and the good. The νοῦς which these dialogues posit as an ἀρχή is not a rational soul or the reason immanent in a soul, but the Reason-itself in which souls participate in order to think and act rationally (the Philebus calls it indifferently σοφία καὶ νοῦς, 30c6). Such an ἀρχή is needed, beyond the Forms, and beyond a material ἀρχή (such as the receptacle of the Timaeus) which participates in the Forms, to explain why different parts of the material ἀρχαί participate in different Forms in a rational and orderly way. While Plato's νοῦς inherits many of the functions of Anaxagoras' νοῦς, there are crucial differences: most obviously the connection with separate Forms, and also the fact that its action on bodies is mediated through souls. Also--and importantly for Aristotle--while both the Platonic and the Anaxagorean νοῦς act on the world chiefly by causing the circular motion of the heavens, Plato conceives this motion quite differently from Anaxagoras. For Anaxagoras, the motion of the heavens (that is, the overall westward motion) is produced by a vortex, a tornado which violently

takes up all bodies in its path, and which is also responsible for the separation and sorting of like to like of the different material constituents of the cosmos. For Plato, the westward and zodiacal heavenly motions are not ascribed to a vortex or to any sort of violence; rather, $\nu\omicron\upsilon\varsigma$ causes circular motion because circular motion is the most rational or $\nu\omicron\upsilon\varsigma$ -like kind of motion, and it causes this motion primarily to the different portions of the rational world-soul, and thereby to the world-body. Indeed, given the recognition of the mathematical complexity and regularity of the heavenly motions, a vortex explanation becomes simply incredible; what is needed is an $\acute{\alpha}\rho\chi\eta$ or $\acute{\alpha}\rho\chi\acute{\alpha}\iota$ which will produce precise mathematically complex motions, presumably by producing several different simple motions which combine to yield the observed phenomena.¹ (Plato ascribes the sorting of like to like, by something like a vortex, not to $\nu\omicron\upsilon\varsigma$ but to irrational $\acute{\alpha}\nu\acute{\alpha}\gamma\kappa\eta$, Timaeus 52d4-53b5.)

The special status of the heavenly bodies, mediating between $\nu\omicron\upsilon\varsigma$ and the sublunar world, is brought out strikingly in the Timaeus' description of the formation of the human soul and body. The demiurge forms the rational and immortal part of the human soul himself, but he delegates the task of forming the human body, and the mortal irrational parts of the soul, to the "young gods" that he has already produced, that is, the heavenly bodies. His stated reason is that, if he formed these things himself, they would be immortal, like the young gods, since "the things which have come-to-be through me cannot be dissolved against my will" (41a7-b1; the text is troubled but this much is probably safe) and since "[only] a bad [agent would] be willing to dissolve something that has been put together rightly and is well" (41b1-2); and yet it is better for the cosmos to contain both immortal and mortal animals, and so the immortal animals must complete the cosmos by producing the mortal animals themselves, or rather by adding the mortal components to the immortal part which the demiurge has produced (41a7-d3, 42d5-e4). But on the face of it there is something odd about the demiurge's reasoning. He is saying, on the one hand, that it is better to have some non-immortal things, and, on the other, that if he produced them himself, and therefore produced them well, it would be wrong for him to dissolve them or to allow them to be dissolved. But if it is best, for the completeness of the cosmos, to have some things that exist only for a finite time, why is it wrong to destroy some things that it was right to make, or why is it wrong to make some things that it will be right to destroy? And if it really is wrong for the demiurge to produce something so imperfect that it is not wrong to let it be destroyed, can he wash his hands by telling his subordinates to do the dirty work of making sublunar things themselves?

But we can make better sense of the demiurge's point if, instead of asking what it is right or wrong for the demiurge to produce, we simply ask what it is possible, given his nature, for him to produce. The reason why anything he produces will be immortal is that he is always in the same state, and therefore always produces the same effect: so if he produces/sustains a being X at time t, he will equally produce/sustain it at time t', and if he moves being Y with a certain amount of motion in a certain direction at time t, he will move it with the same amount of motion in the same direction at time t'. So the things that he produces directly--namely, on the Timaeus' account, rational souls whether celestial or human, the world-body as a whole, and the particular heavenly bodies--will be immortal. But because these things are not themselves always in the same state (because the demiurge is constantly producing motion in them), they do not always

¹here? later? note on the problems about Simplicius/Eudemus' attribution to Plato of the program of saving the phenomena, and the question whether the planetary motions are to be reduced to a composition of uniform circular motions (or rather just to periodic motions of some other type), in the Timaeus (which does look like it allows non-uniform motions, although that fits badly with its overall project) and in the Laws.

produce the same effect, and so can produce something at one time and destroy it or cease to sustain it at another time. Sempiternal things--things that never cease to exist but are not always in the same state--can thus mediate the causality of strictly eternal things ($\nu\omicron\upsilon\varsigma$ and the Forms) on sublunar things. This mediation would explain, not just why sublunar things are corruptible, but also why they are not perfectly regular (so that sublunar motions cannot be mathematically predicted as heavenly motions can) and not perfectly teleologically directed (they are byproducts, in some cases unintended byproducts, of how the demiurge constructs the heavens). At the same time, it would explain why there is some rational order in sublunar things, since they are governed by the heavenly bodies which in turn are governed by $\nu\omicron\upsilon\varsigma$. While the Timaeus does not work this out in detail, the demiurge does charge the young gods not only to produce mortal bodies and the mortal part of the soul, but also "having produced this and whatever is consequent on these things, to rule over them, and to steer mortal life in the best and fairest way possible" (42e1-3), which suggests that the heavenly bodies exercise a general control, at least over sublunar living bodies if not over all sublunar bodies; this is also suggested by the Timaeus' description of the Egyptians as having "discovered, out of these things which are divine [apparently astronomy, or cosmology in general], everything for human concerns, up to divination and medicine for health" (24c1-2). But the human rational soul, unlike other things in the sublunar world, is sempiternal, and so can be produced and governed directly by $\nu\omicron\upsilon\varsigma$, like the world-soul and the heavenly bodies; and it too receives a uniform circular motion from the demiurge, which it retains as long as it continues to participate in $\nu\omicron\upsilon\varsigma$ and is not disordered by its bodily environment.

While the Timaeus, especially the demiurge's address to the young gods, probably implies that the demiurge's activity must be unchanging, the Statesman makes this explicit: because the god remains always in the same state (269d5-6), "it is not lawful [$\theta\acute{\epsilon}\mu\iota\varsigma$] for him to move [$\kappa\iota\nu\epsilon\hat{\iota}\nu$, i.e. to move the heavens] at one time in one way, and at another time in the contrary way" (269e6-7). Here, curiously, having argued that the cosmos cannot always turn in the same direction and that the same god cannot turn it in different directions, and having also rejected the Empedoclean alternative that "two gods, thinking thoughts contrary to each other, turn it [in alternation]" (270a1-2), Plato opts for the alternative that the god sometimes steers the world himself, and sometimes leaves it to its own devices, so that it unwinds in the reverse direction. We might think that, for the same reason that the god cannot move the heavens eastward at one time and westward at another time, he also cannot move them eastward at one time and fail to move them at another. But the Timaeus is in the same difficulty: for the same reason that the god, if he produces/sustains a being X at time t, will continue to produce/sustain it for all later time, it should also follow that, if the god produces/sustains X at time t, he must have been producing/sustaining it for all previous time. Plato's commitment, in both the Statesman and Timaeus, to the unchangeable eternity of the demiurgic $\nu\omicron\upsilon\varsigma$, seems to rule out both the Statesman's Empedoclean alternation between chaos and cosmos and the Timaeus' Anaxagorean once-for-all transition from chaos to cosmos. The only apparent alternative is a sempiternal cosmos, always being produced and always being moved in the same way by the divine $\nu\omicron\upsilon\varsigma$. And this correction of Plato is one of Aristotle's main points in Metaphysics $\Lambda 6$. But Aristotle is very largely following the Timaeus in saying that the eternally unchanging $\acute{\alpha}\rho\chi\acute{\eta}$ acts directly on sempiternal things, and through them on generable and corruptible things. This Timaeian picture of causality offers an alternative to the narrative model of how to get from eternal $\acute{\alpha}\rho\chi\alpha\acute{\iota}$ to generable and corruptible things, and Aristotle thinks this is the only way to avoid the absurdity of having $\nu\omicron\upsilon\varsigma$ begin to act without any sufficient reason why it should act now after not acting

before. Unfortunately, Plato remains with the narrative model, and does not take his own hint, at least not in the Timaeus or Statesman (the Laws does not have a narrative cosmogony, but it may not have a fully developed alternative). In this sense Aristotle is developing a Platonic alternative to Plato's own accounts of the cosmos and its relation to its ἀρχαί.

Why movers at all?

A final question can be raised about Aristotle's strategy for inferring from generable and corruptible things, through an eternal uniform motion, to an eternally uniformly acting mover: why does an eternal motion need a mover at all? If (say) the heavens have been rotating in the same way from all eternity, why do they need anything other than their own nature to cause this?

A first response is simply to say that no Greek philosopher had ever believed there could be motion without a mover.² Perhaps the philosopher who had come closest was Democritus, who thinks that the atoms have been in motion from eternity, with no ἀρχή κινήσεως to start them moving or to explain why they are in motion rather than at rest. But even Democritus thinks that each individual motion of an atom has a cause, namely the collision that initiated it. Aristotle thinks that this explanation would only be adequate if Democritus ultimately traced the violent post-collision motions back to an original natural motion, and that an infinite regress of collisions is unexplanatory, but at least Democritus never says that any one motion is uncaused, which would openly defy the principle of sufficient reason.

However, even if no earlier Greek philosopher had posited a motion without a mover, Aristotle's own theory of the natural motions of the elements in the De Caelo seems to do so, and seems to threaten his inference in Λ6 from an eternal motion to an eternal mover. According to the De Caelo, just as the sublunar world is made of four elementary bodies with natural motions toward or away from the center of the world, so the heavens are made of a fifth body, aether, with a natural circular motion around the center of the world; this circular motion continues has always existed and will always exist, and the De Caelo says nothing about its having a mover. Metaphysics Λ says nothing about a naturally rotating heavenly material, but it would be surprising if Aristotle did not believe something like the De Caelo account in Λ, since Λ2 thinks that the heavens are intrinsically incorruptible and have a different matter from sublunar things, a matter not needing to be completed by a substantial form; this matter is surely a natural rather than an artificial body, and so by the definition of nature it must have some natural motion, and what can this be if not rotation around the center? But then why does this motion need a mover, other than the nature of the heavens themselves? Indeed, the De Caelo account seems preferable to Democritus' account of beginningless motion, since one objection against Democritus was that he never describes an original natural motion from which bodies' other motions would be derived, whereas the De Caelo traces the motions of the heavens back to their natural disposition for motion around the center.

One possible response to this challenge would be to appeal to Physics VIII,4, which says that even natural motions require movers. Unfortunately, Physics VIII,4 does not really argue for this thesis, except by trying to find movers for the natural upward and downward motions of light and heavy bodies (the per accidens mover of such a body is whatever removes the obstacle that had previously kept it from moving to its natural place; the per se mover is whatever originally gave the body its natural disposition to motion, by generating the body and making it heavy or light, or perhaps by moving it out of its natural place and thus disposing it to move back there),

²Epicurus, later, would posit such a motion--the atomic swerve--but at the cost of the principle of sufficient reason

and none of these attempts seem to carry over to the case of the heavenly bodies. Nonetheless, it is easy enough to see why Aristotle would think that the nature of the heavenly matter is not a sufficient explanation. The different heavenly spheres move at different speeds and around different axes, and this too needs to be explained; and even if there were only one sphere, its speed and direction would still need explanation.³ Furthermore, even a single uniformly rotating sphere does not all move at the same speed: the parts near the equator move fastest, the parts closer to the poles are slower, and the poles themselves are at rest. The heavenly material might have a natural disposition to move, or even to move at a certain speed, but there is no reason why some parts of it should be disposed to move faster and in larger circles, and other parts to move slower and in smaller circles.⁴ Aristotle and his interlocutors were aware of this, and the different axis of each sphere's motion, and the non-motion of its poles and the greater speed of the regions further away from the poles, were among the phenomena that they expected the movers of the spheres to explain.

We can see some awareness of the problem already in the Timaeus, where, although the self-moving circles of the world-soul are to some extent a sufficient explanation for the motions of the heavenly bodies, we need the demiurge to set up those circles in the first place, with the circle of the Same rotating at one speed in one plane (of the celestial equator), and the seven sub-circles of the circle of the Different rotating at their different speeds in another plane (of the ecliptic). The Timaeus, though, is not worried about the non-motion of the poles and the swiftest motion at the equator, since it speaks only of circles and not of spheres, whether bodily or psychic.⁵ However, someone else in the Academy did speak of spheres, and was well aware of the difference between what happens at their poles and at their equators, namely whoever Aristotle is talking about (Speusippus? Eudoxus?) at De Motu Animalium c3 699a12-24.⁶ This

³although note how Aristotle handles this for the outermost sphere in the DC: it moves in the naturally prior direction, namely to the right (and the axis is top-bottom, and note DC II,2 on which way is up), and (according to texts cited in the previous subsection) its speed is the natural unit measure for speeds

⁴furthermore, while you might say that it has a natural disposition to move around the center of the world, perhaps even at a fixed period (which would mean the stuff that is further away from the center would have to move faster), the portions of any given sphere that are not on the equator of that sphere are not in fact moving around the center of the world, but around some eccentric point on the axis of that sphere

⁵though it seems impossible to avoid the implication that at least the fixed stars lie on a sphere somehow moved by the circle of the Same--and it would be odd if the circle of the Same and Different existed only at the equator and zodiac and not throughout the heavens, esp. given the account of their cognitive roles at 37a2-c5

⁶Tarán prints this as Speusippean (give ref), following Cherniss (ref.; and see Nussbaum pp.295-9). the evidence is that Speusippus believed in points, whereas Xenocrates and apparently Plato did not (and perhaps it is intuitively plausible that, as points are the ἀρχαί of geometricals for Speusippus, so moving or spinning points should be the ἀρχαί of astronomicals). but this does not rule out Eudoxus, who in Aristotle's presentation of his account of the heavenly motions in A8 is very interested in specifying the "poles" of each sphere (this is his way of specifying its direction of rotation; Plato would have done it by specifying the equatorial circle, not the poles). at a minimum, Eudoxus uses the poles for transmitting the motion of an outer sphere to an inner sphere (whose poles are in, and are borne along with, the outer sphere), which already means making the poles (though mere points) remarkably substantial beings, and sources of motion to their spheres. it seems an easy step to make the poles responsible for the distinctive motion of the inner sphere as well. certainly we have no other attestation for what Eudoxus thought moved the spheres. I suppose the reason it does not occur to people to ascribe the MA c3 view to Eudoxus is that they think he was just a mathematician, took an instrumentalist attitude to his spheres, and did not get involved in the physical/philosophical question of the causes of their motion. but Eudoxus' explanation of participation in the Forms, whatever it comes to (Metaphysics A9 991a12-19; maybe note the 1936 Oskar Becker article for a dissident interpretation [dependent on emending μεμιγμένον to μεμιγμένω]), as well as his argument that pleasure is the good, show that he was not shy about getting into philosophical debates; and there is no ground at all for supposing that he was anything but a realist about his spheres

philosopher first argues that the heaven (or any given heavenly sphere) must be moved, either directly or indirectly, by a mover that is not itself moved. He then infers that this mover cannot be a part of the sphere, since when a sphere rotates as a continuous whole no part of it can remain at rest. So far Aristotle approves (699a12-20); but he disapproves when this philosopher "thinks that the poles have some power, having no magnitude but being limits and points" (699a20-22). In other words, this philosopher identifies the unmoved mover of the sphere with its poles, which are somehow in the sphere but which, unlike the parts of the sphere (and unlike every other point on the sphere), are not moved with the sphere's motion.⁷ While we may say that the poles too "spin" about the axis, this "spinning" is not a motion of the poles, since they remain in the same state at all times; rather, the spinning of the poles is an activity by which, remaining themselves unmoved, they move the sphere around them, moving the parts close to them more slowly and the parts around the equator more quickly.⁸ As we will see below, Aristotle's own account of the movers of the spheres has much in common with this account, and may be partly inspired by it. What is important for now is that both Aristotle and his interlocutor recognize that, although all parts of the sphere are moved, not all of its parts are moved equally, and, in the limiting case, the poles (which are not strictly parts of it) are not moved at all. We thus need some explanation of why, when the sphere rotates, these points are not moved and the parts around them are moved very slowly. The most elegant explanation is that the poles themselves are moving the spheres around them, but in any case the natural disposition of the aether to be moved in circles does not explain the phenomenon, and some other mover is needed.

The argument that the moving ἀρχή is an ἐνέργεια

Given that there is a single continuous eternal motion, and given that this motion must have a mover (and, because it is a single continuous motion, it must have a single mover, not a series of movers in relay), Aristotle argues about the nature of this mover:

If there is something capable of moving or producing [κινητικόν, ποιητικόν], but not actually doing anything [ἐνεργοῦν τι], there will not be motion: for it is possible for what has a δύναμις not to act [ἐνδέχεται τὸ δύναμιν ἔχον μὴ ἐνεργεῖν]. So there is no benefit even if we posit eternal οὐσίαι, like those who posit the Forms, if there is not in them some ἀρχή capable of causing change [δυναμένη μεταβάλλειν]; but then neither is this sufficient, nor another οὐσία beyond [παρά] the Forms: for if it does not act [εἰ μὴ ἐνεργήσῃ], there will not be motion. Further, neither [will it be sufficient] if it acts [ἐνεργήσῃ], but its οὐσία is δύναμις: for [in that case] motion will not be eternal, since it is possible

⁷Aristotle elsewhere says in his own voice that the poles are not moved, DC II,2 285b11. of course, on the Eudoxian scheme, the poles of an inner sphere are moved with the motion of the next sphere outwards, but they are not moved with the distinctive motion of their own sphere, and the poles of the outermost sphere are not moved at all. Aristotle's objection to making the poles the movers of the spheres is, first, that points are not οὐσίαι--but are, presumably, abstractions which cannot have the power to move anything--and, second, that two poles cannot jointly produce one rotation, MA c3 699a22-4. the conclusion Aristotle draws, building on his interlocutor's arguments and adding his own arguments that the poles cannot be the movers of the spheres, is that the movers of the spheres are neither parts of the spheres nor in the spheres, MA c3 699a10-12

⁸as, in quantum mechanics, many particles have a "spin angular momentum," but there is no such thing as an "angular position" which this would be derived from (or whatever the right term is in quantum mechanics for the relation between x and p)

for what is δυνάμει not to be [ἐνδέχεται τὸ δυνάμει ὄν μὴ εἶναι]. So there must be such an ἀρχή whose οὐσία is ἐνέργεια. Then, further, these οὐσίαι must be without matter, for they must be eternal, if anything else is to be eternal. So they are ἐνέργεια. (Λ6 1071b12-22)⁹

Here Aristotle is taking up the program announced in the first paragraph of Λ6 of inferring "an eternal unmoved οὐσία" (1071b4-5) from an eternal motion. The implicit inference is that, since "οὐσίαι are the first of beings, and if they are corruptible, all things are corruptible" (b5-6), an eternal accident implies an eternal substance; and here κίνησις is being treated not as an accident in the category of passion, so that we would infer to an eternal underlying moved substance (beyond the recollection in the first line that "there were three substances, two physical and one unmoved," Λ6 says nothing at all about a heavenly substance), but as an accident in the category of action, so that we infer to an eternal underlying mover-substance, something κινητικόν and ποιητικόν.¹⁰ This is not immediately an argument that the mover must be unmoved, but perhaps there is an implicit infinite regress argument that the first eternal mover is unmoved. But even so, Aristotle is not satisfied with proving that there is some eternal unmoved substance or other; he wants to determine its nature and its causality. Clearly his main question here is the question from B#14: given that the ἀρχή is an efficient cause, is it a potential or an actual efficient cause? And Aristotle ties this question about the causality of the ἀρχή to a question about its nature, asking whether the ἀρχή itself (or the οὐσία of the ἀρχή) is an ἐνέργεια or a δύναμις. As we have seen in IIIα1 above, Λ6 a few lines further down clearly cites B#14 (with the words καίτοι ἀπορία, 1071b22-3) and repeats B's arguments for both sides of the aporia. Aristotle thinks that the argument that the ἀρχή is an ἐνεργοῦν and not merely a δυνάμενον cause is decisive, and that the only problem is to resolve the argument on the other side (and he refers back to Θ8 for the resolution). But even before the clear verbal flagging of the reference to B#14, Aristotle is referring to its question and using its argument, further elaborated in Θ, that a merely δυνάμενον cause is insufficient. If the cause is merely δυνάμενον, then its effect, here the motion (and thus the sublunar world it regulates and sustains), will be merely δυνάμει ὄν; if the cause happens to be ἐνεργοῦν but its οὐσία is δύναμις, then the motion it causes will be actual, but there is no reason for it to be eternally actual.¹¹ So the only adequate cause for an eternal motion is "an ἀρχή whose οὐσία is ἐνέργεια", not merely in the sense that its essence includes no potentiality for generation or corruption, but also in the sense that its essence includes no potentiality for not

⁹note text and construal problems: (1) on τοίνυν twice ("but neither is this sufficient" and "these οὐσίαι must be without matter") cp. van Ophuijsen (the force is something like "note well!"--it calls the audience's attention to something, asks them to accept something which may be contrary to their expectations [but which may--not always--be claimed to follow from something said just before; it may be a controversial commitment of the speaker], it often goes with an imperative or hortatory subjunctive); (2) ἔστι/ἔσται issues b12, b13, b17, Ross/Jaeger seem right on all three; + d follow out Ross' ref to Bonitz's index on the sense of ἔσται, Index Aristotelicus 754b5-12; (3) final word ἐνέργεια or ἐνεργεία or ἐνέργεια.

¹⁰footnote to Oehler if not sufficiently handled in IIIβ2a

¹¹note issue of interpretation in B#14 (is the question whether the ἀρχή is a δύναμις/δυνάμενον cause vs. an ἐνέργεια/ἐνεργοῦν cause, or whether it is potentially vs. actually existent, or potentially vs. actually has some other predicate). see discussions above and in the Lille paper. the present passage favors the interpretation that the question is whether the ἀρχή is a δύναμις/δυνάμενον cause, with the implication that the the correlative effect is merely δυνάμει ὄν; however, some things from Θ8 (discussed IIIα3?) may favor the view that the question is whether the ἀρχή is potentially anything (has potentially any attributes) other than what it is actually. perhaps, however, these can be reconciled: assuming that it is actually causing at the moment, then it can be potentially not-causing only if it is potentially otherwise than it is

acting so as to produce motion. And, as Aristotle argued in $\Theta 8$ (1050b6-28, see III α 3 above), a substance which is essentially $\acute{\epsilon}\nu\acute{\epsilon}\rho\gamma\epsilon\iota\alpha$ has no matter, at least not insofar as it is essentially $\acute{\epsilon}\nu\acute{\epsilon}\rho\gamma\epsilon\iota\alpha$: if it is potentially F or not-F, then it can have a matter for that change, but certainly it can have no substantial matter-form composition, since it has no potentiality for corruption.¹²

Although Aristotle in $\Lambda 6$ contrasts his thesis of an essentially acting $\acute{\alpha}\rho\chi\acute{\eta}$ with the views of many different earlier philosophers, it is clear that in the passage so far cited his main concern is with Plato. Plato is right in positing eternal immaterial substances, but the ones he posits are not adequate to explain the fact of eternal motion. "So is there no benefit even if we posit eternal $\omicron\upsilon\sigma\acute{\iota}\alpha\iota$, like those who posit the Forms, if there is not in them some $\acute{\alpha}\rho\chi\acute{\eta}$ capable of causing change; but then neither is this sufficient, nor another $\omicron\upsilon\sigma\acute{\iota}\alpha$ beyond the Forms: for if it does not act, there will not be motion." Aristotle is here repeating a standard criticism of the Platonic Forms (which he has also made in Metaphysics A9 and GC II,9), that the Form of F contains no cause of coming-to-be, no explanation for why something should come to participate in F. As Aristotle puts it in $\Lambda 10$, in summing up the argument he has begun in $\Lambda 6$ and showing the failure of other philosophers' accounts of the $\acute{\alpha}\rho\chi\acute{\alpha}\iota$, "why there will always be coming-to-be, and what is the cause of coming-to-be, no one tells. And for those who posit two $\acute{\alpha}\rho\chi\acute{\alpha}\iota$ there must be another more principal [$\kappa\upsilon\rho\iota\omega\tau\acute{\epsilon}\rho\alpha$] $\acute{\alpha}\rho\chi\acute{\eta}$. And for those who [posit] the Forms [it is also necessary] that there be another more principal $\acute{\alpha}\rho\chi\acute{\eta}$: for why did [something] come to participate [$\mu\epsilon\tau\acute{\epsilon}\sigma\chi\epsilon\nu$ ingressive], or why does it participate?" (1075b16-20). Clearly something more than another formal cause is needed--positing a Form of Participation will not help. Plato is well aware of the need for a further cause of participation, and this is why he posits "another $\omicron\upsilon\sigma\acute{\iota}\alpha$ beyond the Forms," namely the $\nu\omicron\upsilon\varsigma$ which is the "cause of the mixture" of limit and the unlimited in the Philebus, or the demiurge who imposes images of the Forms on matter according to an orderly pattern in the Timaeus; and it is this cause which Aristotle is developing and purifying in $\Lambda 6$. Astonishingly, there seems to be no recognition in the existing literature on Λ that Aristotle is responding in this way to the Timaeus and Philebus. Thus Bonitz conjecturally, and Ross and Berti (in FC p.189) confidently, identify the "other $\omicron\upsilon\sigma\acute{\iota}\alpha$ beyond the Forms" with numbers or mathematical.¹³ Numbers or mathematical would be totally irrelevant to causing motion or participation, but Bonitz or Ross or Berti would reply that that is precisely Aristotle's point, that the kind of entities the Platonists posit cannot play the necessary causal role. But it seems clear that the "other $\omicron\upsilon\sigma\acute{\iota}\alpha$ beyond the Forms" of $\Lambda 6$ is the same as the "other higher $\acute{\alpha}\rho\chi\acute{\eta}$ " of $\Lambda 10$, in which case it must be a cause of participation, the efficient cause where the Forms are the formal cause; and it was $\nu\omicron\upsilon\varsigma$, not numbers or mathematical, that the Platonists posited as such a cause of participation.

Aristotle does not, of course, think that the Platonists have cited an adequate cause: "neither is this sufficient, nor another $\omicron\upsilon\sigma\acute{\iota}\alpha$ beyond the Forms: for if it does not act, there will not be

¹²the logic of the final $\acute{\epsilon}\nu\acute{\epsilon}\rho\gamma\epsilon\iota\alpha$ $\acute{\alpha}\rho\alpha$ (or whatever we read, see note above) seems strange: it looks as if he is arguing in a circle from $\acute{\epsilon}\nu\acute{\epsilon}\rho\gamma\epsilon\iota\alpha$ to immateriality back to $\acute{\epsilon}\nu\acute{\epsilon}\rho\gamma\epsilon\iota\alpha$. (we can avoid this if the immateriality does not turn on the assumption that the $\acute{\alpha}\rho\chi\acute{\eta}$ is $\acute{\epsilon}\nu\acute{\epsilon}\rho\gamma\epsilon\iota\alpha$, but I think it probably does.) my best guess is that he thinks of the final "so they are $\acute{\epsilon}\nu\acute{\epsilon}\rho\gamma\epsilon\iota\alpha$ " as simply restating the thesis "these $\omicron\upsilon\sigma\acute{\iota}\alpha\iota$ must be without matter," now that it has been argued for (as mathematical texts restate the proposition at the end of the proof). note the shift to the plural $\omicron\upsilon\sigma\acute{\iota}\alpha\iota$ here--he has not argued that there are more than one, but he is leaving the number indefinite, and if every eternal motion requires an eternal unmoved mover, and if (as we know from e.g. the De Caelo or On Generation and Corruption, and note the reference to $\acute{\omicron}$ $\lambda\acute{\omicron}\zeta\omicron\varsigma$ $\kappa\acute{\upsilon}\kappa\lambda\omicron\varsigma$ in which the sun moves at $\Lambda 5$ 1071a15-16) there are many such motions, then there will be many such movers. what he says here is proleptic for what he will develop in $\Lambda 8$

¹³Berti cites the pseudo-Alexander 688,30ff as making the same identification, but I am not sure the pseudo-Alexander is really saying this. d note on Robin on the world-soul, cited by Ross and Berti, which is slightly better but still not right (or bring this up to the main text)

motion." Aristotle's point is not (as Berti thinks) that Plato does not cite his cause as acting: obviously the demiurge acts in producing the cosmos (rather more obviously than Aristotle's version of νοῦς does). But simply positing νοῦς as a further ἀρχή is not enough: if it is not posited as acting from the beginning, it will not produce participation or motion from the beginning, and indeed, in the Timaeus, it does not, but initially leaves the chaos to itself, and begins to act only later. "Neither [will it be sufficient] if it acts, but its οὐσία is δύναμις: for [in that case] motion will not be eternal": since we have shown, against the Timaeus, that the resulting motion is eternal, the cause must be something that is adequate to explain an eternal motion. And Aristotle concludes that the only adequate cause is "an ἀρχή whose οὐσία is ἐνέργεια". It may seem that he is making, with very little notice, a logical leap from saying that the ἀρχή is eternally acting to saying that it is essentially acting. He may be relying on the conclusion drawn in Θ8 (1050b7-8, discussed in IIIα3 above) that "nothing δυνάμει is eternal"; but that does not help us much, since it was equally obscure how he reached this conclusion in Θ8. As we noted in discussing that passage, it is possible that he is relying on some form of a "principle of plenitude," perhaps asserting that every δύναμις that persists for infinite time will at some time be exercised.¹⁴ But it seems more likely that he is simply relying on a principle of sufficient reason: if the οὐσία of the ἀρχή is δύναμις, then while it might always be acting, there is no sufficient reason why it should always be acting, and so no sufficient reason why the motion it produces should be eternal. And we can supplement the argument by saying that the only sufficient reason for a cause whose οὐσία is δύναμις to be eternally acting would be a prior eternally acting cause to actualize it; so either we would have an infinite regress of eternally acting causes (and thus an actual infinity, self-contradictory in Aristotle's view), or we will reach a first cause which is essentially acting.

Before going on to describe the structure of the remaining argument of Λ6, we should pause to ask how much Aristotle thinks he has shown up to this point. The text seems undecided between a weak, a medium and a strong form of the thesis: (1) there is an ἀρχή which always exists and is always acting; (2) there is an ἀρχή which always exists and is always acting in the same way; (3) there is an ἀρχή which always exists and is always in the same state and (therefore in particular) is always acting in the same way. The argument of Λ6 1071b12-22, considered by itself, seems to be just an argument for (1). On the other hand, the opening of Λ6 had announced "that there must be some eternal unmoved οὐσία" (1071b4-5), and by the beginning of Λ7 Aristotle seems to take this as proved, which means that Λ6 should contain an argument for (3). And we can see roughly how this would work. Λ6 1071b5-11 had argued, not just that there is always some motion, but that there is a single continuous motion that always exists. Furthermore, at least the motion of the outermost heaven is not merely continuous but constant--it cannot speed up or slow down, since it is itself the fixed standard for measuring all motions. (More precisely: the fixed standard for measuring all times is the sidereal day, and its multiples and fractions. The objective way to determine how long some process takes is that it takes the time it takes the fixed stars to rotate through an arc of angle θ . So I cannot say that it takes now more time, now less time, for the fixed stars to rotate through an arc of angle θ .) And, as we have seen, Aristotle's

¹⁴this is weaker than some forms of the principle that have been proposed for Aristotle, e.g. that every possible proposition either is true or will be true at some point in the future. I think Aristotle cannot possibly have held this view on mature reflection--Socrates has the power to learn Persian, but he will live only a finite time, and it may well happen that he will never exercise this power. Aristotle does at least hold that if it is something's nature to do X, and if the thing endures forever with that nature, then its nature will not be frustrated forever (arguments in the De Caelo use this principle), but that is weaker than the principle I suggested. I regard the whole issue of the principle of plenitude in Aristotle as a very miry slough, and I will try not to get involved

program (following Eudoxus) is to explain even the apparently non-constant motions of the sun and the other planets as the result of the combination of several eternally constant motions. So in inferring from an eternal motion to an eternal mover, Aristotle is also inferring from an eternally constant motion to a mover that always acts in the same way, i.e. always acts to produce the same motion--that is, he is inferring not just to claim (1) but to claim (2). However, Aristotle acts as if he had also argued for (3). Presumably he thinks that his argument for (2) also yields an argument for (3), since if the ἀρχή were itself changing, it would produce different effects at different times, whereas in fact it produces the same effect for all time. However, there are at least prima facie several ways that this argument could fail. It will be worth distinguishing some of them and reflecting on how Aristotle might respond to them.

First, it may be objected that not all of the heavenly motions are absolutely constant, and therefore that not all of their movers are absolutely unmoved. For instance, the second-to-outermost sphere rotates with uniform angular velocity around an axis whose poles are embedded somewhere in the outermost sphere (not in the poles of the outermost sphere); these poles therefore move with the rotation of the outermost sphere, which means that the second-to-outermost sphere is rotating at one time around an axis inclined in one direction, and at another time around an axis inclined in another direction. So the motion of the second-to-outermost sphere is not absolutely constant in the way that the motion of the outermost sphere is, since its direction is changing, although its angular velocity is constant; so the mover of the second-to-outermost sphere must not be absolutely unmoved, since otherwise it would produce a motion in the same direction at every time. However, this is not an objection against Aristotle, since he agrees with the conclusion. He is careful to say in Λ8 only of "the ἀρχή and the first of beings" that it "is unmoved both per se and per accidens, producing the first eternal and single motion" (1073a23-5), while he says of the motions proper to the planets only that they "must be moved by an οὐσία that is unmoved per se and eternal" (1073a32-4, cp. a26-7), conspicuously failing to say that these movers are not moved even per accidens.¹⁵ And in Physics VIII,6 he says explicitly that "some of the ἀρχαί of the things in the heavens, [i.e. the movers of those heavenly things] which are moved with several motions" (259b30-31) are moved per accidens. He compares these with the case of souls, which are movers of their bodies, unmoved per se, but moved per accidens when their bodies are moved (since my soul is per accidens in the kitchen or in the living room when my body is there per se). The difference is that souls are moved per accidens by themselves, since the soul moves its own body and thus incidentally itself, whereas the movers of the heavens are moved per accidens only by other things (so 259b28-31). That is: the mover of sphere A, by causing sphere A to rotate around its axis, does not cause even a per accidens change in itself, and so, unless affected by something else, it will continue to produce absolutely the same motion in sphere A. However, if the poles of sphere A are embedded in sphere B (and not in its poles), then sphere B (or its mover) causes a per accidens change in the mover of sphere A, bringing it about that this mover will produce different motions (rotations around different axes) in sphere A at different times, although the mover will still be eternal and eternally moving its sphere. (Compare the theory, discussed above, on which each sphere is

¹⁵G.E.R. Lloyd, carelessly: "Λ8 1073a24f. further specifies that the unmoved mover(s) in question is/are unmoved per se and per accidens (kata sumbebêkos)--a text which has been urged, e.g. by Judson, against those who would have it that the unmoved movers are, in some sense, moved accidentally (as they would be if they were immanent souls, for example)" (FC p.253). {the reference to Judson is probably to p.162 of his article in the Gill and Lennox Self-Motion collection, but Judson is speaking here only of the mover of the outermost sphere. but neither Judson, nor anyone else I can recall having read, gives a clear statement of the correct position about the movers of the subordinate spheres.} I will probably come back to the issue in discussing Λ8

moved by its two poles: here too, the mover [or the two movers] of the outermost sphere will be unmoved and will therefore always produce absolutely the same motion, while the movers of other spheres will be moved by the spheres that contain them, and will therefore produce different motions at different times.)

Setting aside the cases of the inferior heavenly movers, it might also be objected that even the mover of the daily motion may not be absolutely unmoved, if, as Plato thinks, this mover is a self-moving soul that moves the body of the heavens along with it. Aristotle gives a brief refutation of this possibility at $\Lambda 6$ 1071b37-1072a3 (which I will discuss below), but that refutation turns essentially on finding a contradiction with other Platonic premisses, and it is worth asking whether Aristotle has independent grounds for rejecting this possibility. A first response is that the same objections we raised above against self-moving heavenly spheres should also apply against self-moving souls. If the soul is coextended with the sphere (so as to be moved by the same motion), then it too will have an equator that moves most quickly, and poles that are at rest; and while the soul's essence might explain why it moves itself, it cannot plausibly explain why the soul of each sphere moves itself at a particular angular velocity and around a particular axis.¹⁶ A deeper response, however, is to say that on this theory the soul would in some respects remain unchanged by its own activity, and that the respects in which it is changed are irrelevant to how it causes motion in its body. The soul would change only in that its different indiscernible parts would change places with each other--perhaps the parts at the poles are discernible from the parts at the equator, but insofar as the soul is moved by itself rather than by something else, it is only indiscernible parts of it which are interchanged, and the interchange of these parts has no effect on how the soul moves its body. Aristotle can thus reasonably say that on this theory the soul moves itself only per accidens--and moves itself per accidens in a weaker way than we considered in the previous paragraph, since the kind of change per accidens we are now considering has no effect on how the soul acts on its body. And this means that, contrary to Plato's thesis that it is only by being self-moving that the soul can be an unfailing and eternal source of motion to the body (so Phaedrus 245c7-8), in fact the soul is enabled to be an unfailing and eternal source of motion to the body to the extent that the soul remains unmoved, and not to the extent that it moves itself. When Plato represents the world-soul as being moved only by the interchange of its indiscernible parts, he is coming as close as he can to representing it as moving its body without itself being moved; and if he were given the concept of a $\kappaινεῖν$ and $\acute{\epsilon}νεργεῖν$ that is not a $\kappaινεῖσθαι$, he could give up even this incidental kind of motion in the soul.¹⁷

It remains that Aristotle has not proved his thesis (3) as stated above, if he has no argument to rule out the possibility that the mover of even the outermost heaven might be moved per accidens (i.e., without this motion being a necessary condition or consequence of its moving its sphere), in a way that has no effect on how it moves its sphere--thus the mover might, say, change color, or

¹⁶as noted above, this may be why Plato in the Timaeus has circles of soul rather than spheres of soul, so as not to admit soul-poles at rest (but elsewhere in the Timaeus it is clear that the world-soul is coextended with every part of the cosmos). but, as also noted above, Plato still needs to invoke the demiurge, who divides and arranges the different circles of soul, to explain the angular velocities and directions of the circles

¹⁷souls would, of course, still be moved per accidens inasmuch as their bodies are moved (although this will not happen to the soul of the outermost sphere), but that is different from the kind of self-motion we have been considering. for discussion of the Aristotelian arguments against self-moving souls as sources of motion to bodies, see my "Aristotle's Definition of Soul and the Program of the De Anima" on the arguments in DA I,3; there are also relevant arguments in Physics VIII,5, but the texts are frustrating. often Aristotle seems to be arguing merely for the possibility of his analysis (every self-mover decomposes into an unmoved mover and the thing it moves) as an alternative to Plato's (irreducible self-movers), rather than showing that Plato cannot be right

interchange its indiscernible parts as just described, while continuing to produce a constant motion in the sphere.¹⁸ And, as far as I can see, Aristotle has no argument to rule this out. (I do not see how to construct an infinite regress argument that would exclude the possibility of a mover moving itself in such a way, or of two movers moving each other in such ways.) But once we have come to the concept of an κινεῖν and ἐνεργεῖν that is not a κινεῖσθαι, we have no reason at all to believe that the movers of the heavens are moved in any such way. And perhaps Aristotle is satisfied with this as an argument for thesis (3).¹⁹

The aporia against Aristotle's thesis and the elimination of his opponents' views

Having thus made at least a plausible case for his thesis that the ἀρχή of heavenly motion is a pure ἐνέργεια, Aristotle next raises a difficulty against this thesis. What he does, of course, is to say "but there is an aporia" (1071b22-3), and repeat the fourteenth aporia of B: Λ6 1071b23-6 closely paraphrase the arguments on both sides from B 1002b34-1003a5. However, strictly speaking the aporia now is different from what it was in B. In B, before Aristotle had set out any positive thesis about the ἀρχαί, the aporia was simply the pair of arguments for opposed conclusions, which needed to be resolved somehow. In Λ6, coming after Aristotle has declared that the ἀρχή is a pure ἐνέργεια, the aporia is strictly speaking just the argument that δύναμις is prior to ἐνέργεια (Λ6 1071b23-4, cp. B 1002b34-1003a2), which is the difficulty against Aristotle's thesis. This is the argument which Aristotle will have to resolve, and he resolves it in a quick sentence toward the end of Λ6, by referring back to the distinctions and conclusions of Θ8 in a notorious parenthesis: "but as for taking δύναμις to be prior to ἐνέργεια, this is right in one way but not in another (we have said how [εἴρηται δὲ πῶς])" (1072a3-4).

However, in the fifteen lines between the statement of the difficulty at 1071b22-4 and its resolution at 1072a3-4, Aristotle leaves the reader in suspense while he develops an argument that the difficulty against the ἀρχή being pure ἐνέργεια must be resolvable somehow, since all other views of the ἀρχαί are untenable. He starts by repeating the argument for the other side of B#14, that the ἀρχαί are not merely δυνάμενα causes, since, if they were, there would be no sufficient reason for their effects to exist in actuality (Λ6 1071b25-6, cp. B 1003a2-5).²⁰ But then he goes beyond this to survey a broad range of views of earlier philosophers (and non-philosophers, the poets) about the ἀρχαί, quickly explaining why each view is untenable, so as to leave only his own view and some closely related ones. The views seem to be listed in order from the ones Aristotle regards as worst to the ones he regards as closest to the truth. That is, he starts from views which in the crudest and most obvious ways make the world come-to-be out of δυνάμεις or out of things which are δυνάμει, and so which most obviously fail to give a sufficient reason for the actual existence of the world, and then he turns to more sophisticated views which might claim to avoid the difficulties against the earlier views, but which ultimately (Aristotle claims) all fail for the same reason.

¹⁸note (here or elsewhere) on different senses of being moved per accidens. Aristotle seems willing to speak of something as an "unmoved mover moved per accidens," even if it is moved per se (e.g. it may be changing color), as long as it does not move the object by being moved (as e.g. the bat moves the ball by being moved by the hand), and as long as it is not moved in moving the object (as e.g. a hot object is cooled in heating a colder object)

¹⁹note on the mover's being superior to locomotion, which is the first of all motions. this is plausible but not demonstrative (e.g. it could be moving itself locally by interchanging its parts in the way we have described)

²⁰again, if there isn't an adequate treatment somewhere else, make sure you say enough about the issues of interpretation in B#14 (are the ἀρχαί merely potentially existent? are they merely potentially thus-and-such? are they merely potential causes?)

He says:

But there is an aporia [καίτοι ἀπορία]: it seems that everything that is acting is capable [of acting], but not everything that is capable [of acting] is acting [τὸ μὲν ἐνεργοῦν πᾶν δύνασθαι, τὸ δὲ δυνάμενον οὐ πᾶν ἐνεργεῖν], so that δύναμις would be prior. But if this is so, then none of the things-that-are will be: for it is possible [for something] to be able to be but not yet to be [ἐνδέχεται γὰρ δύνασθαι μὲν εἶναι μήπω δ' εἶναι]. But if it is as the theologians [= mythologists] say, who generate [all things] out of night,²¹ or the physicists who say all things were together,²² the same impossibility [will arise]. For how will it be moved, if there is [sc. in the original pre-cosmic state] no cause in ἐνέργεια? The wood [ῥύλη] will not move itself, rather [the art of] carpentry moves it, nor will the katamenia or the earth move themselves, rather the [male or plant] seed moves them. This is why some people posit eternal ἐνέργεια, like Leucippus and Plato: for they say there is always motion.²³ But they do not say what motion or on account of what, nor the cause of [its moving] in this way or that.²⁴ For nothing is moved at random [ὡς ἔτυχε]; rather, there must always be some [sc. cause: δεῖ τι ἀεὶ ὑπάρχειν],²⁵ just as now too [something is moved] in one way by nature, in another by violence or by νοῦς or by something else. So which of these is first?--it makes an enormous difference. But it is also not possible for Plato to name [as the ἀρχή of motion] what he sometimes²⁶ takes as the ἀρχή, what moves itself [i.e. soul]: for the soul is posterior, and simultaneous with the heaven, as he says.²⁷ But as for taking δύναμις to be prior to ἐνέργεια, this is right in one way but not in another (we have said how [εἴρηται δὲ πῶς]). And that ἐνέργεια is prior is witnessed by Anaxagoras (for νοῦς is ἐνέργεια)²⁸ and Empedocles [in

²¹Orpheus, of course; apparently the so-called "Eudemian Theogony," i.e. the Orphic theogony reported by Aristotle's student Eudemus according to Damascius (*De Principiis* v.1 p.319 Ruelle), of which Damascius tells us directly only that "[Orpheus] made his beginning from Night"; see West, *The Orphic Poems* p.116ff for what can be reconstructed here. it is depressing that some scholars continue to repeat the blind guess of the pseudo-Alexander, who lays hold of the only text he can find and says that the reference is to Hesiod. Ross does mention Orpheus, but his references to Hesiod, Musaeus, Epimenides and Acusilaus (and Aristophanes) refer at best to Night as one among several equiprimordial principles; often Night is not placed in the beginning at all. on the other hand, Aristotle assimilates "night" and "chaos" below, so the differences between Orpheus and Hesiod do not strike him as important

²²see IIIα1 for the textual situation (keep the original reading of EJ but adding οἱ after φυσικοῖ)

²³the Plato reference is to the *Timaeus* (not to *Laws* X). Ross says this, rightly, ad 1071b32, but seems to have forgotten it in his defense of Plato ad 1071b33 (perhaps worth discussing in the main text)

²⁴the transmitted οὐδὲ ὡδὶ οὐδὲ τὴν αἰτίαν seems unintelligible; various emendations have been tried, but the sense will be pretty much the same on all of them. I am translating Jaeger's οὐδὲ τοῦ ὡδὶ ἢ ὡδὶ τὴν αἰτίαν; Ross prints instead Diels' οὐδ' εἰ ὡδὶ ἢ ὡδὶ τὴν αἰτίαν, "nor, if [the motion is] in this way or that, [do they say] the cause"

²⁵perhaps discuss the sense of ὑπάρχειν ("be there beforehand" or the like); also note Ross' suggestion δεῖ τιν' ἀεὶ ὑπάρχειν.

²⁶in *Laws* X; see discussion below

²⁷in the *Timaeus*, see discussion below; "posterior" to the disorderly motion, which exists before the heaven (whether this means the heaven proper, or, more likely, the ordered cosmos)

²⁸I take this to be a view Aristotle thinks is true, not one he attributes to Anaxagoras (against the apparent implication of Ross' translation); the critique at A6 1071b12-19 is directed against, among others, Anaxagoras' νοῦς and the demiurge of the *Timaeus*, which were inactive for infinite time and then began to act in producing the ordered world. also: note textual issue: ἐνέργεια or ἐνεργεία? E, Ab, and the original reading of J have the dative; a later hand in J, the Latin translations, and some recentiores have the nominative. Bonitz prints the dative, Ross and

positing as ἀρχαί] love and strife, and by those who say that there is always motion, like Leucippus: so that there was not for an infinite time chaos or night, but the same things [have always existed], either cyclically or in some other way, if ἐνέργεια is prior to δύναμις. (Λ6 1071b22-1072a9)²⁹

To understand Aristotle's strategy in going through this sequence of false views, it will help to recall a point from the previous subsection, about Aristotle's use of arguments from Leucippus and Democritus in Physics VIII,1 and in Λ6.³⁰ Both the Physics and the Metaphysics chapters argue that motion is eternal because time is eternal, and the Physics chapter explicitly credits Democritus with the strategy of arguing "that it is impossible for all things to have come-to-be, since time is ingenerable" (251b15-17). The Physics chapter also argues, on the basis of a principle of sufficient reason, against Anaxagoras' thesis that there was rest for an infinite time and then a beginning of motion. I argued above that this strategy of arguing against Anaxagoras is also likely to be derived from the Abderites, since we are told that Democritus "tears apart [Anaxagoras' doctrines] about the διακόσμησις and about νοῦς" (Diogenes Laertius IX,34), and since Leucippus B2, cited "from the περὶ νοῦ" (which probably means, from a section of the Μέγας διάκοσμος directed against Anaxagoras' cosmogony), says "nothing comes-to-be at random [μάτην], but everything for a reason [ἐκ λόγου] and by necessity." Both the Physics and the Metaphysics chapters seem to be taking up a Democritean strategy for arguing against Anaxagoras, but then turning to argue that other philosophers have not solved the difficulty, and in particular that Democritus, although right in positing the eternity of motion, has not posited a sufficient cause for the eternity of motion: "it is not right to suppose that this is a sufficient ἀρχή [i.e. a stopping-point of explanation], that something always is or always happens in this way; this is what Democritus traces back the causes of natural [phenomena] to, that it happened in this way before also; but he would not see fit to seek a [further] ἀρχή of what always is." (Physics VIII,1 252a32-b1, cited in the previous subsection).

Very likely Aristotle's assimilation of "the physicists" (that is, Anaxagoras) who say "all things were together" to "the theologians ... who generate [all things] out of night" is already Democritean. Anaxagoras and the other physicists of his time reject coming-to-be out of not-being, or out of Orphic night or Hesiodic chaos, which seem much like not-being (Aristotle assimilates them here: "if it is not thus, [the world] will be out-of night ... and out-of not-being," Λ7 1072a19-20). One of the physicists' reasons for rejecting coming-to-be out of not-being turns on a principle of sufficient reason: "what need would have stirred it up to arise afterwards rather than before, beginning from the nothing?" (Parmenides B8, lines 9-10). But, Democritus can say, Anaxagoras is no better: he will deny that his world comes-to-be out of not-being, it has a material cause and even an efficient cause, but there is still no sufficient reason why it should emerge from its quiescent state now rather than sooner or later. Aristotle entirely agrees with this turning of the tables against Anaxagoras, and indeed the passage I quoted in part a few lines above says in full "if it is not thus, [the world] will be out-of night and all-things-together and out-of not-being" (Λ7 1072a19-20).

Jaeger the nominative. it doesn't make too much difference, but the nominative seems better from the point of view of the content

²⁹this whole passage was cited before in IIIα1; d update that citation with your current textual etc. footnotes. some of this was also cited in IIIβ2a

³⁰cross-ref

Aristotle thus agrees with those philosophers who "posit eternal ἐνέργεια, like Leucippus and Plato: for they say there is always motion."³¹ Indeed, while Aristotle himself thinks that not all activity is motion, and that the activity of the ἀρχή is not a motion (that is, not a κινεῖσθαι), he nonetheless agrees with Leucippus and Plato, not just that there has always been activity, but also that there has always been motion, since there would be no sufficient reason for motion to begin at one moment rather than another if there had previously been no motion (even if there had previously been activity not involving change of state). Aristotle then criticizes Democritus, as in the Physics chapter, for citing no cause for this eternal motion, and in particular for citing no cause why things should be moved in one way rather than in another. Closely connected with this, Aristotle criticizes Democritus for not citing any one motion as the first--so that the cause of this motion (nature? violence? νοῦς?) would be the first cause of motion as such. And indeed, while Democritus assigns a cause to each individual motion (this motion of this atom arose because it collided with that other atom), he refuses to trace them back to any first motion, and he refuses to explain why there is motion at all--there is motion now because there was motion previously, and so on back ad infinitum. It is also reasonable for Aristotle to say that Democritus explains only motion ὡς ἔτυχεν, motion as an accidental byproduct of previous accidental byproducts, which cannot be expected to happen in any particular way (for instance, there is no reason why atoms should move in some one preferred direction, "down" rather than "up"). Aristotle would presumably say that each Democritean motion is violent (as resulting from a collision), and that all violent motions are derivative: so the first motion must arise instead from nature or (Aristotle's own view) from νοῦς, and all other motions should be explained as derivative from this.³²

This criticism of Democritus seems to be in a Platonic spirit. The Philebus protests that the world cannot be governed "by the power of irrationality and randomness and by however-it-chances [τὸ ὅπη ἔτυχεν]," but by νοῦς and φρόνησις (Philebus 28d5-9). The Timaeus urges "the lover of νοῦς and knowledge" to pursue "causes belonging to the intelligent nature," by contrast with derivative causes of motion, "which arise when things are moved by others and [therefore] move others by necessity" (46d7-e2). Laws X uses the principle that only soul is self-moved, and that bodies merely transmit motion when they are moved, to argue that soul and its modes of causality, νοῦς and art and law, are prior to body and its modes of causality, nature and chance and violence (cp. 889a4-e1 with 892a7-b8, 896c5-d3);³³ Plato even argues that the name "nature" should be taken away from the bodily elements and awarded instead to soul, if soul is naturally prior to body (892b5-c7). So it is surprising that, Metaphysics Λ6 directs his criticism equally against "Leucippus and Plato," who both equally "say there is always motion, but ... do not say what motion or on account of what, nor the cause of [its moving] in this way or that." Aristotle's criticisms of Democritus (or Leucippus) may be fair, but what has Plato done to deserve the same criticisms?

To see what Aristotle is doing, we have to consider separately Plato's accounts of the origin of motion in the Timaeus and in Laws X. Laws X says that the motion of soul is primary (and eternal), and that the motions of bodies are derivative from it. But the Timaeus says that bodies

³¹this may be intended to be chronological as well as in order of improvement; Anaximander, who believed in eternal motion before Anaxagoras, is dropped

³²with all this cp. treatment in IIIβ2a, think about how to eliminate duplication

³³these texts do not explicitly mention violence (βίαια), although the second cited text speaks of strength (ρόμη) as an attribute of body (896d2). but Plato describes the physicists' doctrine of the priority of bodily causality as entailing the naturalness of violence at 890a4-5 (in context), and he describes motion caused by being pushed by a body from without, rather than moved by a soul from within [or entirely non-spatially], as taking place βίαια at 898e5-899a4

were in disorderly motion even before the demiurge intervened to produce the soul and the ordered cosmos. When Aristotle lumps together "Leucippus and Plato," he means that for both philosophers, before the ordered cosmos came-to-be, there were bodies moved and violently moving each other, without any first motion or first cause of motion specified, and without any reason why they should move in one way rather than in another.³⁴ And indeed it is likely that Plato deliberately intended his description of the pre-cosmic state to resemble Democritus' in these ways. Plato's point would have been to show that an ordered cosmos could never arise from such causes, and that it requires instead the intervention of νοῦς. Still, Plato has taken over his opponents' assumption of motion ὡς ἔτυχεν, prior to any motions due to soul or νοῦς, and not derived from any other first motion or first cause of motion; and Aristotle can reasonably challenge Plato to explain where this motion came from. Aristotle goes on to consider one possible Platonic answer. As Aristotle says, Plato "sometimes"--namely, in Laws X (and the Phaedrus)--takes self-moving soul as the ἀρχὴ κινήσεως (Plato's own wording, Laws X 895a1-2, 896b2-3, Phaedrus 245c7-9, d6-7). Here Aristotle points out simply that this is incompatible with the Timaeus: "for the soul is posterior [to the disorderly motion], and simultaneous with the heaven [= the ordered cosmos], as he says."³⁵ Of course, someone might simply jettison the Timaeus and defend the position of the Laws alone. Presumably Aristotle would object to this position along the lines of the objections against self-moving souls that I have suggested above (and of his objections in Physics VIII,5 and De Anima I,3). Nonetheless, despite these objections, and despite the fact that Λ devotes much less attention to the Laws than to the Timaeus, the Laws is much closer to Aristotle's own position than any of the other views that he has considered. Aristotle has deliberately, by eliminating the most objectionable views first, brought the reader to the threshold of the truth. The Laws, like Aristotle, maintains not only that there has always been some motion in the universe, but that this ordered world is eternal and has been sustained from eternity by one or more eternally continuous motions, motions due to νοῦς, and that all motions due to violence or to what is ordinarily called "nature" are derivative from these primary motions; the Laws, like Aristotle, apparently draws the conclusion that we must give up on the περὶ φύσεως project of a narrative deriving the world from its ἀρχαί. All that remains is to eliminate self-moving heavenly souls as an intermediary between νοῦς and the heavenly bodies (heavenly souls need not be eliminated, but they will no longer be self-moving: they will act, but the heavenly bodies will be--causally, not chronologically--the first things that are moved).

Having eliminated all available views which deny that ἐνέργεια is eternal, or which admit that ἐνέργεια is eternal but deny any one first eternal ἐνέργεια, Aristotle hopes to have persuaded the reader that there must be some solution to the aporia against the priority of ἐνέργεια; he notes prior witnesses who at least implicitly agree that ἐνέργεια is prior, and he refers back to Θ8 for details on in what senses δύναμις is or is not prior to ἐνέργεια. How

³⁴or, more precisely (quote from Anaxagoras paper), the receptacle is moved by its contents and moves them in turn, rather than the bodies moving each other

³⁵it is worth noting that both Plutarch and Cherniss try to read this solution into the Timaeus, Plutarch by tracing the disorderly motion to a disordered irrational world-soul (so that the demiurge intervenes, not to create a soul, but to harmonize and rationalize an independently existing irrational soul), Cherniss by saying that the precosmic state of the Timaeus is a mythical representation of the irrational aspect of what happens now in the (more-or-less) ordered cosmos, and that the disordered motions are byproducts of motions originating in the soul and losing any rational pattern as they are transmitted from body to body (Plato would not say so in the Timaeus, because the mythical narrative structure forbids him to mention a soul in the pre-cosmos). Ross' notes in Λ6 ad locum seem inclined in the same general direction, but he admits it is difficult to make Plato consistent on the question

exactly does Θ8 yield a solution to the aporia, which had argued that δύναμις must be prior to ἐνέργεια by Plato's test, since "everything that is acting [ἐνεργοῦν] is capable [of acting] [δύνασθαι], but not everything that is capable [of acting] is acting"? As I have argued in IIIα3 above, Aristotle shows that Plato's test is not sufficient to prove the priority of δύναμις over ἐνέργεια, because, while δυνάμεις (or their bearers) cannot exist without ἐνέργεια (or their bearers--I will skip this parenthesis in what follows), it is also true that ἐνέργεια cannot exist without δυνάμεις. Plato's test is thus indecisive, and so, following the rule of Categories c12 (14b11-13), the tie is broken by whether δύναμις is the cause of being to ἐνέργεια or vice versa, which Θ8 settles in favor of ἐνέργεια. Furthermore, Aristotle argues (in Θ8 and De Interpretatione c13) that there is a sense in which eternal things, or things that are essentially ἐνέργεια, do not have δύναμις--certainly they do not have δύναμις as something distinct from and underlying the ἐνέργεια. And it is reasonable to say that δύναμις in the broad sense in which it is implied by ἐνέργεια is always an attribute consequent either on "proper" δύναμις or on essential ἐνέργεια: so that, although it is implied by essential ἐνέργεια and does not imply essential ἐνέργεια, it is not prior to essential ἐνέργεια κατ' οὐσίαν, any more than animal is prior to horse κατ' οὐσίαν--or, to give the proper comparison, any more than animal is prior to god κατ' οὐσίαν.³⁶

Cycles and their causes

Aristotle thus rejects the idea that "there was for an infinite time chaos or night," or that the ἀρχή of the world was something unformed and quiescent, like a world-seed (the seed model for the ἀρχαί explicitly rejected Λ7 1072b30-1073a3, following Θ8). It is perhaps surprising that he mentions as still possible the hypothesis of cyclical alternations of the world, as in Empedocles or the Statesman; even more surprising that, in the remaining lines of Λ6 (1072a9-18), he argues from this hypothesis as if it were his own view. But the arguments against the priority of δύναμις have not eliminated the possibility of cyclical alternations, and indeed Θ8, in arguing that the seed which precedes a mature individual must itself be preceded by another mature individual, would tend to support this possibility. In progressively eliminating false doctrines of the ἀρχαί, Aristotle leaves for last the doctrines that are closest to the truth, and, as we saw in discussing Physics VIII,1 (in IIIβ2a above), Aristotle thinks that Empedoclean cyclical alternation is far better than an Anaxagoran beginning of motion after infinite quiescence. But, as we also saw in discussing Physics VIII,1, Aristotle also thinks that Empedoclean cyclical alternation would require a higher cause, beyond Love and Strife, to keep them eternally alternating their periods of dominance in equal times. So too in Λ10: "why there will always be coming-to-be, and what is the cause of coming-to-be, no one tells. And for those who posit two ἀρχαί there must necessarily be another higher [κυριωτέρα] ἀρχή" (1075b16-18). Here at the end of Λ6 his strategy is first to argue that a cyclical alternation of periods of coming-to-be and periods of passing-away requires a higher eternally acting ἀρχή, and then to try to determine how many such ἀρχαί are needed to yield the phenomenon of alternating periods of coming-to-be and passing-away.

This strategy of argument is all the more reasonable, as Aristotle himself in a sense accepts alternating periods of coming-to-be and passing-away: Empedocles and the Statesman are exaggerating, but they are exaggerating a real phenomenon. It is not just that each sublunar individual matures and then perishes: there is a natural period of life for each species, and even

³⁶cross-ref to treatment in IIIα3 (and elsewhere?)

(Aristotle says) a period of generation and maturation for the species as a whole, followed by a period of decay and perishing: "the times and lives of each [species] have a number by which they are determined. For there is order in all things, and every time and life is measured by a period [of some heavenly body], but not all by the same period, but some by a lesser and some by a greater: for the period and the measure is for some of them a year, for some of them more, for some of them less. And by sensation too it is evident that things are in agreement with our arguments: for we see that when the sun is approaching [i.e. when it is moving north, from winter solstice to summer solstice] there is coming-to-be, and when it is receding [i.e. when it is moving south, from summer solstice to winter solstice] there is decay, and each take place in an equal time: for the time of passing-away and the time of coming-to-be according to nature are the same" (GC II,10 336b10-19). These are not periods of coming-to-be and of passing-away for the cosmos as a whole, since they apply only to the sublunar realm and since the period of coming-to-be for the northern hemisphere would be the period of passing-away for the southern hemisphere; and of course not everything is dead or dying even at the worst of times. But Empedocles and the Statesman are generalizing this alternation to the cosmos as a whole; and the Statesman, by speaking of the reversals of the daily motion as "the greatest and most complete τροπή [literally 'turning,' but commonly 'solstice'] of all the τροπαί which take place in the heaven" (270b10-c2), is imagining the cosmic alternation as a "great year" modelled on the yearly alternation of the seasons.³⁷

We have already discussed, at the end of the previous subsection, Aristotle's argument (here and in Physics VIII,1) that any such regular alternation, whether of ordinary summer and winter or of the phases of the cosmos in Empedocles and the Statesman, would require a higher eternally acting ἀρχή. But here at the end of Λ6 Aristotle is also trying to determine how many such ἀρχαί are required. Here, as elsewhere in Λ6, Aristotle is critically adapting the Timaeus. The Timaeus, rather than having νοῦς act directly on sublunar bodies, has νοῦς produce and act on a number of sempiternal mediators which in turn act on sublunar bodies: these mediators include the heavenly bodies, the world-soul and souls of particular heavenly and sublunar bodies, and specifically the "circles of the same and the different" within the world-soul. As we have seen (at the beginning of the present subsection) the Timaeus does this, not just to save the astronomical phenomena, but to account for the phenomenon of coming-to-be and passing-away: νοῦς cannot explain this phenomenon directly, since it always acts in the same way and so would produce equally at all times whatever effect it produces; and so Plato posits however many further beings, existing eternally (or eternally once they have been created) but acting in different ways at different times, are needed to explain the effect. Aristotle of course agrees with Plato in positing the heavenly bodies as mediators between νοῦς and sublunar bodies, and specifically as the causes of (alternating periods of) coming-to-be and passing-away. He rejects self-moving souls, and so in particular must reject the "circles of the same and the different." But he agrees that at least two motions in the heavens are needed to account for sublunar cycles of coming-to-be, and he agrees that these two motions in the heavens require two incorporeal causes; and what he says about them clearly echoes the "circles of the same and the different," while also deliberately modifying them.

Aristotle's argument is difficult, in part because it is extremely compressed, in part because, while he is certainly thinking about the actual motions of the heavens, he tries until the last lines to formulate everything in the abstract, so that it would apply to the hypotheses of Empedocles and the Statesman as well as to the real world. The passage cannot be translated without some

³⁷with all this compare the discussion in IIIβ2a above

controversial interpretation, but I will try to keep the controversial material to a minimum and segregate it within brackets, and to describe the two textual disputes in footnotes:

So if the same things always [recur] in a cycle, there must be something which always persists acting in the same way [ἀεὶ μένειν ὡσαυτῶς ἐνεργοῦν]. But if there is going to be coming-to-be and passing-away, there must be something else which³⁸ acts in different ways [at different times] [ἐνεργοῦν ἄλλως καὶ ἄλλως]. Therefore this necessarily acts in one way through itself [καθ' αὐτό] and in another way through something else [κατ' ἄλλο]--therefore either through [some third thing] or through the first. But it must be through [the first]: for [the first] is the cause to itself and to [the second].³⁹ So it is better [to say that the second thing acts through] the first: for [the first] was the cause of [things being] always in the same way [τοῦ ἀεὶ ὡσαυτῶς], and the second [is the cause] of [things being] in different ways [τοῦ ἄλλως], and clearly both of them together [are the cause] of [things being] always in different ways [τοῦ ἀεὶ ἄλλως]. And the motions really are like this--so why seek other ἀρχαί? (1072a9-18)

There is, I think, an unavoidable tension in this passage between the general way that Aristotle introduces the need for causes of sameness and difference and the concrete astronomical identifications he makes at the end. If there is to be always coming-to-be and passing-away--or always anything else--then there must be something which always persists acting in the same way. Presumably this thing's uniform action would be responsible for the regular alternation of equal periods of coming-to-be and of passing-away. If, say, Love causes coming-to-be and Strife causes passing-away, then perhaps this principle keeps a giant circle in uniform rotary motion: Love and Strife would be fixed at diametrically opposite points on the circle, and its rotation would bring Love to perigee (say) once in every 6000-year period, and would bring Strife to perigee 3000 years after. Or, in a simpler model, if God causes coming-to-be and his absence causes passing-away, the rotation of the circle would bring God to perigee every 6000 years, and bring him to apogee 3000 years later. On the other hand, if there is going to alternating coming-to-be and passing-away, rather than the same effect always, there must be something else that acts in different ways, sometimes producing coming-to-be and sometimes producing passing-away--namely, on these hypotheses, Love (and Strife) or God. If it seems strange to say that Love or God would produce passing-away when they are at apogee, we can just say that at apogee they "act differently" in that they act on the world less intensely than they do at perigee, so that they fail to produce the same effect of coming-to-be. But in fact there is good Aristotelian justification for saying that they would, per accidens, produce passing-away: "what is cold heats

³⁸Ab Bonitz Ross Jaeger add ἀεὶ; EJ, the Latin translations, pseudo-Alexander and Averroes omit (note also the inversion εἶναι/ἐνεργοῦν). the text without ἀεὶ seems clearly better: as he says below, the first is responsible τοῦ ἀεὶ ὡσαυτῶς, the second τοῦ ἄλλως, and the first and second together τοῦ ἀεὶ ἄλλως. here, having mentioned ἀεὶ ὡσαυτῶς for the first, he now quite properly mentions ἄλλως καὶ ἄλλως (no ἀεὶ) for the second.

³⁹Ross and Jaeger, reading αὐτῷ with pseudo-Alexander and the Latin translations instead of the αὐτῷ of EJAb Averroes Bonitz, translate the phrase instead as the apodosis of a contrary-to-fact conditional, with the sense "if the second thing acted through a third thing, then the first thing would be a cause to the third and thus also to the second" (but I have no idea why the first thing would have to be a cause to the third). it does seem slightly odd to say "[the first] is the cause to itself and to [the second]," since Aristotle seems to have no use for the notion of causa sui; but I take the sense to be "the first is the cause, not only of its own activity, but also of one aspect of the activity of the second"

[sc. per accidens] when it has turned [away] and is receding" (Physics VIII,1 251a31-2). Love or God would "act in different ways" at different times because it "acts in one way through itself" to produce coming-to-be, "and in another way through something else," through the mover which has taken it far from us, to produce passing-away. So God or Love and Strife are responsible for things down here being in different ways at different times; the first moving principle is responsible for them being always in the same way; and the first moving principle together with God or Love and Strife are responsible for them being "always in different ways," that is, in constant cyclic alternation. Or, as GC II,10 puts it, "the locomotion perpetually produces coming-to-be by making the generator approach and recede" (336a16-18).

It seems straightforward to apply this to the real case of the alternation of summer and winter, where the single circular motion around the pole of the ecliptic brings the sun closer to us (not closer to the earth but further north) at summer solstice and further from us (further south) at winter solstice, so that near summer solstice it is above the horizon for longer and gets higher in the sky, and performs its per se actions of heating and generating, while near winter solstice it per accidens cools and corrupts. Unfortunately, the astronomical identifications that Aristotle intends, while not entirely clear, are clear enough to rule out identifying the "second thing" with the sun and the "first thing" with what makes it approach and recede.

It is clear that the thing that "always persists acting in the same way" must be either the mover of the daily motion or the sphere of the fixed stars, which is moved only by that motion; likewise, the thing that is responsible for coming-to-be and passing-away must either be the sun, or its sphere, or the mover which moves it around the pole of the ecliptic--"it is not the first locomotion which is the cause of coming-to-be and passing-away, but the one along the inclined circle" (GC II,10 336a31-2).⁴⁰ The "first thing" which "always persists acting in the same way" and is "the cause of [things being] always in the same way" is clearly supposed to pick up on Plato's "circle of the same" which "proceeds around in the same way [κατὰ ταὐτά] in the same place [ἐν ταὐτῷ]" (Timaeus 36c2-3) and is responsible for the daily motion, and the "second thing" which "acts in different ways" and is the cause "of [things being] in different ways" is supposed to pick up on the "circle of the different" whose "sideways locomotion ... goes through and is dominated by the locomotion of the same" (Timaeus 38e6-39a2) and which is responsible for the motions of the sun and other planets around the ecliptic. (Aristotle's ἀρχαί will not be self-moving portions of soul, but they will be whatever causes the motions that Plato thinks are caused by the circles of the same and the different,⁴¹ and they inherit the connections with sameness and difference.) But in what sense does Aristotle's "second thing" "act in different ways," acting both καθ' αὐτό and κατ' ἄλλο, and in what sense is it the cause τοῦ ἄλλως? (And in what sense is Plato's "circle of the different" a circle of the different?) The most obvious answer would be that while the other stars preserve the same positions relative to each other, the planets and especially the sun, under the influence of what Plato calls the "circle of the

⁴⁰Aristotle is surely assuming here (for purposes of argument) a model of the sun on which it has only the daily motion and a uniform motion along the ecliptic, as opposed to the Eudoxan three-sphere model on which the sun, like the moon, moves on a variable circle with a small fixed inclination to the ecliptic, and as opposed to corrections of either the two-sphere or the three-sphere model to take account of the inequality of the seasons

⁴¹an oversimplification, since Plato's circle of the different apparently causes the ecliptic motions, of different speeds, of all seven planets, whereas Aristotle is talking only about the yearly motion of the sun around the ecliptic. but only the various motions of the sun are relevant here. also, Aristotle accepts a model in which each planet--apparently even the sun--is moved with more than two simple motions, whereas if Plato is describing more than two motions, what he says about the others is obscure. again, this difference is irrelevant for Aristotle's present purposes, and he speaks as if the sun has only the two simple motions

different," are at different times in different places relative to the fixed stars, and therefore act in different ways on sublunar things. But this cannot be what Aristotle means here, since he says that when the "second thing" acts *κατ' ἄλλο*, it does so "through the first," i.e. through the mover of the daily motion or the sphere of the fixed stars; whereas it is not the daily motion but the ecliptic motion which makes the sun "recede" to the south and so cool us per accidens in winter.

The only way to make sense of Aristotle's astronomical identifications is to say that the *καθ' αὐτό* action of the "second thing" is the motion of the sun or its sphere around the poles of the ecliptic, and its *κατ' ἄλλο* action "through the first" is the daily motion of the sun or its sphere (or, if the "second thing" is the mover of the sun's ecliptic motion, then the daily motion of the poles of the ecliptic themselves) around the celestial north pole. If so, the "second thing" will act "in different ways," not because the sun acts in one way in summer and in another way in winter, but that its motion around the poles of the ecliptic is motion around different poles at different times, because the poles of the ecliptic themselves rotate each day around the celestial north pole. Indeed, this is probably also what the Timaeus means in speaking of the "circle of the different": when Plato says that the circle of the same "proceeds around in the same way [*κατὰ ταῦτά*] in the same place [*ἐν ταὐτῷ*]" (Timaeus 36c2-3, cited above), he must intend a contrast with the circle of the different, which does not always rotate "in the same way," since it rotates around different poles.⁴² However, while this contrast between the daily and the ecliptic motions is astronomically correct, it means losing the connection with the intuitive idea which justified connecting the ecliptic motion with "the different," namely that it is responsible for the sun's being in different parts of the sky at different times of year and so acting differently on the sublunar world, and thus for the sublunar world's being in different ways at different times of year: for now, according to Aristotle, the sense in which the sun or its sphere or its mover would act "in different ways" is that it acts differently at different times of the sidereal day, which has no direct connection with why sublunar things are in different ways at different times of the year.

Thus, as I have said, Aristotle's abstract positing of an *ἀρχή* that always acts the same way and is responsible for constancy, and an *ἀρχή* that acts in different ways at different times and is responsible for change, seems to be in unavoidable tension with the astronomical realization he proposes. Nonetheless, Aristotle's proposal gives a sufficient, and with its limits correct, explanation of the cycle of the seasons and thus (in principle) of cycles of coming-to-be and passing-away. And it also leads to the plurality of *ἀρχαί* that he thinks are genuinely responsible for sublunar phenomena, namely the movers of the different simple heavenly motions.

As I said above, it is clear that the "first thing" is either the mover of the daily motion or the sphere of the fixed stars, and that the "second thing" is either the sun or its sphere or the mover of its ecliptic motion, but it was not obvious which. For some reason, Ross (following the pseudo-Alexander, and followed in turn by Berti) find it obvious that the "first thing" is the sphere of the fixed stars and the "second thing" is the sun; Bonitz says that the "second thing" is rather the sphere of the sun.⁴³ But Aristotle says only that these things *ἐνεργεῖ* in the same or

⁴²perhaps it does not even rotate "in the same place," even though it always rotating around its constant center, because it is not a whole sphere but only a circle in the zodiac belt, which will be in different places when the poles of the ecliptic are in different places. also, when Plato says that the motion of the different is "dominated by the locomotion of the same," this seems to mean, not just that the motion of the same is faster, but that the circle of the different is itself carried along by the motion of the same, with the consequence that its poles rotate around the celestial north pole

⁴³Ross claims this is all clear from the GC II,10 passage, despite the fact that this text speaks only of "motions" and never mentions either spheres or fixed stars (and neither does Λ6). the GC text does of course speak of the sun, but of its approach and recession, which are not the same as the actions *καθ' αὐτό* and *κατ' ἄλλο* mentioned here. GC

different ways, not that they κινεῖται. He also calls them ἀρχαί (in the last line of the chapter, "so why seek other ἀρχαί?").⁴⁴ And, in the larger argument of the chapter, he has been trying to show that ἐνέργεια is prior to δύναμις, and thus that the ἀρχαί are pure ἐνέργεια without δύναμις (and are therefore unmoved, unlike the sun or the spheres); and here he is trying to determine how many such ἀρχαί we must posit to explain the phenomenon of cycles of coming-to-be and passing-away. Perhaps one reason for the resistance to identifying the "first thing" and "second thing" with the movers of the daily motion and of the yearly ecliptic motion is a reluctance to give up the idea that the "second thing" acts differently in summer and in winter. Perhaps another reason is that commentators have not seen any sense in which the movers of the non-equatorial motions act ἄλλως καὶ ἄλλως, or in which they act κατ' ἄλλο as well as καθ' αὐτό. But, as we have seen, Aristotle thinks that the subordinate movers are moved per accidens by the higher movers, in that the higher mover changes the axis around which the subordinate mover is causing rotation. This seems to give a sufficient sense in which the subordinate mover causes motion κατ' ἄλλο, in ways determined by something else, and certainly it causes motion ἄλλως καὶ ἄλλως, around a constantly changing axis.

How many ἀρχαί?⁴⁵

Strictly speaking there is only one "ἀρχή and first of beings" (Λ8 1073a23-4), only one thing to which nothing else is prior, namely the "mover of the first eternal and single motion" (1073a25); "the rule of many is not good; one ruler let there be" (so the last line of Λ, Λ10 1076a4 = *Iliad* II,204). The mover of the daily motion is prior to the movers of the other heavenly motions, not by a temporal priority or by somehow atemporally producing them, but because the poles of the other motions are themselves carried by the daily motion, so that the activities of the other movers in moving their spheres are determined by the mover of the daily motion.⁴⁶ However, in a broader sense, all of the movers of the heavenly motions can be called

II,10 does say (336b2-4, cp. 336a31-2) that the motion in the inclined circle is responsible for the approach and recession of the sun, and that the "locomotion of the universe" (not specifically of the fixed stars) is responsible for continuity, but this is not enough to support Ross' identifications--certainly the GC does not say that the sun moves καθ' αὐτό along the ecliptic and κατ' ἄλλο around the celestial poles, and I doubt that this is Aristotle's view. Ross could be right, but the texts are not as close as a reading of his note would lead you to think: and, of course, a fundamental difference is that the GC says nothing about unmoved movers of the heavens. also: Ross seems to think that the sense in which the sun acts ἄλλως καὶ ἄλλως is that it is simultaneously moved by two different motions; the phrase seems to me to very strongly suggest that the "second thing" acts in different ways at different times.

⁴⁴Aristotle says "And the motions really are like this--so why seek other ἀρχαί?", but this does not imply (as Berti FC p.198 seems to think) that the "first" and "second" things are moved by these motions: they are more naturally taken as the moving ἀρχαί of these motions. also, a technical point: it seems unlikely that Aristotle would describe the sphere of the fixed stars as the cause of constancy in the world--he does not generally give this sphere, or its stars, any special causal status. the daily motion does have a special status, but as far as I know Aristotle never says that the daily motion affects only the outermost sphere, or affects only it directly and the other heavens only by means of it; it seems to affect all the spheres immediately (he never e.g. speaks of "the mover of the outermost sphere," as medieval philosophers commonly do). also: the language δεῖ τι ἀεὶ μένειν at 1072a10 echoes δεῖ τι ἀεὶ ὑπάρχειν at 1071b35, where it was used for the cause of a motion; so probably here as well (and μένειν might be a funny verb for a sphere in rapid motion)

⁴⁵with everything in this subsection compare my unpublished "The Subject, the Date, and the Spirit of Metaphysics Λ8" (from 1990-91)

⁴⁶objection: but maybe their activities in moving their spheres are incidental, and they have intrinsic activities of thinking which are independent of the first mover. well, maybe; we don't know much about their intrinsic activities, but I'll have a suggestion on this below. anyway, Aristotle is convinced that the others are subordinate to the first, the only one not moved even per accidens.

ἀρχαί, and they are all collectively prior to everything else. And it belongs to Λ to speak about them. There were three kinds of substance, sensible corruptible, sensible eternal, and separate unchangeable, of which the first two belong to physics and the last to first philosophy (Λ1 1069a30-b2, Λ6 1071b3-5, with E1 1026a10-22 on first philosophy). First philosophy is thus broader than wisdom strictly speaking, since first philosophy deals with some immaterial substances other than the ἀρχή, and perhaps these are a distraction from the main goal of the Metaphysics. But if Λ does not address such basic questions as how many immaterial substances there are, these questions will not be dealt with anywhere else, and Λ will have failed to deliver on its promise to investigate this third kind of substance. So, after the conclusion of Λ7--"it is clear from what has been said that there is some substance which is eternal and unmoved and separated from the sensibles, and it has also been shown that this substance can have no magnitude, but is partless and indivisible ...;⁴⁷ but also that it is unaffected and unaltered, for the other motions are posterior to motion in place" (1073a3-12)--Aristotle next raises the question "whether there is one such substance or more than one, and how many" (Λ8 1073a14-15), and devotes the rest of Λ8 to that question. Λ8 is in a sense a digression from the main argument of Λ, and I will not spend much time on its details (whether the number is 55 or 47 does not make much difference for the aims of the Metaphysics), but I will say something briefly about the role Λ8 plays in Λ, especially because it is continuing the investigation we have seen in the last lines of Λ6, into how many immaterial ἀρχαί (in a broad sense) we must posit to explain the phenomena of the sensible world.

Jaeger thought that Λ8 was a later addition to Λ, and this view has been widely accepted (even by Jaeger's opponent von Arnim, who gave a radically different reconstruction of the development of Aristotle's theology).⁴⁸ I think that this is wrong, and that, for the reasons I have given, there could never have been a version of Λ without something like Λ8. Still, Jaeger and those following him have raised important issues. Two kinds of reasons have been given for suspecting that Λ8 is not of a piece with the rest of Λ. First, much although not all of Λ8 seems stylistically different from the rest of Λ: it is much fuller, in properly written out sentences rather than the jottings typical of Λ, it avoids hiatus, and it avoids many of Aristotle's usual technical terms (εἶδος, ὕλη, ἐνέργεια or ἐνέργειν, ἐντελέχεια, τί ἦν εἶναι, etc.). Second, Λ8's "polytheism" seems to be in tension (even if there is no logical contradiction) with the "monotheism" expressed in the last line of Λ10, which Jaeger and others think is more typical of Λ as a whole: Jaeger speaks of Λ8's "grotesque multiplication of the prime mover" and assigns this development to the last years of Aristotle's life, when he had lost any real interest in immaterial substances and was willing to hand over the decision on them to the non-philosophical (and merely probable rather than certain) discipline of mathematical astronomy.⁴⁹ I

⁴⁷the ellipsed passage summarizes the argument from Physics VIII: the mover of an eternal motion must have an infinite power, which cannot reside either in an infinite magnitude (since there are no infinite magnitudes) nor in a finite magnitude (since paradoxes would arise when the power is divided into the parts present in the different parts of the magnitude)

⁴⁸give brief history: Jaeger, von Arnim, Guthrie etc. maybe the Judson anecdote. but note now Burnyeat

⁴⁹Λ8 "loses itself entirely in subsidiary matters, and shows far more interest in ascertaining the exact number of the spheres than it does understanding of the fact that this grotesque multiplication of the prime mover, this army of 47 or 55 movents, inevitably damages the divine position of the prime mover and makes the whole theology a matter of mere celestial mechanics" (Jaeger p.347); "Aristotle himself asks to be excused, in Λ8, for entering a sphere that is beyond the bounds not merely of philosophy proper but even of demonstrative necessity. He will not speak of 'necessity' at all, but merely of the 'probable' [cf. 1074a14-17]. This merely probable character contradicts, however, the original conception of metaphysics as a study far surpassing physics in exactitude, and Aristotle only makes the

think that the stylistic objection does indeed show that (much of) Λ8 is not of a piece with the rest of Λ, but I think it would be a mistake to conclude that it is a later insertion; I will come back to this issue below. I think the perception of a tension in content between Λ8 and the rest of Λ, and the suggestion that the "multiplication of the prime mover" happens only toward the end of Aristotle's life, are mistaken, but they raise issues which deserve discussion.

In fact, Aristotle seems to have maintained a plurality of immaterial substances, and specifically of movers of the heavens, in texts from all parts of his career. The Epicurean in Cicero *De Natura Deorum* reports that *De Philosophia* Book III "now ascribes all divinity to mens [i.e. νοῦς], now says that the world itself is a god, now sets another god over the world and ascribes to him the part of ruling and preserving the movement of the world by a sort of backward rotation [replicatione quadam]" (Fr.26 Ross); this preserver of motion, probably the mover of the sun's motion around the ecliptic, seems to be an immaterial substance distinct from the νοῦς that produces the forward daily motion. Other texts refer, without any special emphasis, to immaterial substances in the plural. *De Caelo* I,9, speaking not of movers as such, but of what is "outside" the outermost heaven, says that "the things which are there are not in any place, nor does any time make them grow old, nor is there any change in any one of the things which are arrayed beyond the outermost locomotion, but unaltered and unaffected, possessing the best and most self-sufficient life, they live out all eternity" (279a18-22). We have seen that Λ6, after arguing that "there must be such an ἀρχή whose οὐσία is ἐνέργεια" (1071b19-20), adds in the plural "these substances must be without matter, for they must be eternal, if anything else is to be eternal" (1071b20-22). More emphatically, the end of Λ6 refers to two celestial motions, and, if I have interpreted it rightly, to two movers. *Physics* VIII,6, which in some passages seems to suggest that there is only one eternal unmoved mover, in fact implies that there are several. Aristotle starts by noting that there may be either one or many eternal movers (258b10-11), and then adds that it is better to posit finitely many than infinitely many, better to posit one than many, and that "also, one is sufficient, which, first of the unmoved things, being eternal, will be the principle of motion to the others" (259a12-13). This might sound as if there were just one eternal unmoved mover (though there are many non-eternal unmoved movers which are moved per accidens, namely souls), but it is saying instead that there is a unique first mover which is the source of motion to the others--the phrase "first of the unmoved things" shows that "to the others" means "to the other unmoved movers"--as a source of their motion per accidens. And further down in the chapter (in a passage discussed above), Aristotle says that while the mover of the first absolutely uniform motion is unmoved even per accidens (259b22-23), "some of the ἀρχαί of the things in the heavens, [i.e. the movers of those heavenly things] which are moved with several motions," are moved per accidens, not by themselves (as the souls of corruptible are) but by other things, i.e. by the higher heavens or their movers (so 259b28-31). Indeed, Aristotle has no choice but to admit such a plurality of eternal unmoved movers, since it is a manifest fact, and one crucial to Aristotle's physics, that there are a plurality of motions in the heavens, and a single mover cannot produce all these motions: the sun is being moved with two uniform motions, around two different axes and with two different angular velocities, and there must be two ἀρχαί acting on it simultaneously to produce these two effects; and since the poles of the yearly motion themselves rotate with the daily motion, he cannot avoid the consequence that the mover of the yearly motion is moved per accidens by the mover of the daily motion.

contrast more sensible when he excuses himself by remarking that anyhow astronomy is the closest related to philosophy of the mathematical disciplines" (p.350)

In a larger perspective, it is unsurprising that Aristotle posited a plurality of immaterial substances subordinated to a single ἀρχαί, since most of his Academic contemporaries did so as well: there is no attestation of anyone believing in only a single immaterial substance.⁵⁰ "The rule of many is not good; one ruler let there be" is a criticism of Speusippus, not for positing a plurality of numbers, but for positing an unconnected series of ἀρχαί, the one and plurality as ἀρχαί of numbers, the point and extension as ἀρχαί of geometricals, and so on. As long as there is a common ἀρχή, Aristotle does not object to a multiplicity of immaterial substances, but instead puts forth his own proposal for what these substances will be, and for how to determine how many of them there are. Some of Aristotle's competitors believe, on insufficient grounds, that there are ten: "the supposition [ὑπόληψις] of ideas contains no particular [ἰδίᾳ] investigation [of the number of separate substances] (for those who say that there are ideas say that the ideas are numbers, and they speak about the numbers sometimes as if about infinitely many things, sometimes as if about things bounded by the decad [i.e. as if the 'numbers' which the ideas are are only the numbers from 1 to 10]; but for what reason there are just so many numbers, nothing is said with demonstrative care); but as for us [as opposed to the idea-theorists], we must speak from things which are laid down and determined [ἐκ ὑποκειμένων καὶ διωρισμένων]" (Λ8 1073a17-23). Aristotle's strategy of inferring from a uniform motion in the heavens to an immaterial substance as its mover gives him a more precise way to answer the question of the number of such substances: "it is manifest that there are substances, and of these one first and another second according to the same order as the locomotions of the stars; but the number of the locomotions must be investigated out of the mathematical science which is most akin to philosophy, astronomy [ἐκ τῆς οἰκειοτάτης φιλοσοφίας⁵¹ τῶν μαθηματικῶν ἐπιστημῶν δεῖ σκοπεῖν, ἐκ τῆς ἀστρολογίας]" (1073b1-5). Here Aristotle is ostentatiously substituting astronomy for arithmetic, the discipline preferred by some of his competitors. Astronomy is the most οἰκεῖον discipline here because "it considers a substance which is sensible but eternal, but the other [mathematical sciences], like that which is concerned with numbers and with geometry, do not consider any substance" (b5-8). Because astronomy considers one genus of substance, it is more closely related to philosophy than are the other branches of mathematics; because it considers a substance which, though sensible, is eternal, it is akin specifically to first philosophy, which considers eternal non-sensible substance. And the only hope of deciding questions in first philosophy is to give οἰκεῖα reasons, which must be based on οἰκεῖα things--things, like the heavenly bodies, which are naturally akin, and causally connected, to the immaterial substances in question. Even so, Aristotle makes no claim of certainty, speaking only of what it is "reasonable to suppose" [εὐλογον ὑπολαβεῖν] and deferring the judgment of necessity to "those who are more capable to say" (1074a13-16, cp. a24-5), mathematicians like Eudoxus. In proposing an astronomical solution to the number of immaterial substances, Aristotle is probably following the example of the theory reported in *De Motu Animalium* c3, on which the heavenly spheres are moved by the points which are their poles.⁵² Indeed, it is striking that of the claims made at the end of Λ7--"that there is some substance which is eternal and unmoved and separated from the sensibles ... that this substance can have no magnitude, but is partless and indivisible ... that it is unaffected and unaltered" (1073a3-13)--all except possibly "separated

⁵⁰they might, however, posit two first ἀρχαί, perhaps contraries, one a formal and one a material cause to the many immaterial substances

⁵¹so Bonitz Ross Jaeger, following Themistius and the pseudo-Alexander; the manuscripts have φιλοσοφίας.

⁵²as I've noted before, that theory may in fact have been Eudoxus' own

from the sensibles" (depending on how we interpret this) would apply to point-movers just as well as to Aristotle's substitutes.

While most of the Academic discussion to which Aristotle is responding is lost to us, we can form some picture of the non-οἰκεῖον reasoning, from arithmetic rather than astronomy, from a fragment of Speusippus' On Pythagorean Numbers (Fr.28 Tarán).⁵³ When Aristotle complains about people who say nothing "with demonstrative care" about why "there are just so many numbers," he is thinking not primarily of Speusippus but of idea-theorists. But Speusippus too wants to say what model the demiurge looks to in making the sensible world; and since Speusippus rejects the Forms, and makes mathematical numbers the highest objects of contemplation, he must provide an arithmetical substitute for what the demiurge contemplates. Plato had argued that the demiurge, since he is good and wishes to produce the best possible (Timaeus 29e1ff), would take as his model something eternal (29a2ff), and more particularly "the most beautiful and in all respects τέλειον of the intelligibles" (30d2); and since the world, being an animal, must be modelled on some intelligible animal, this most beautiful and τέλειον model must be the "παντελής animal" (31b1), i.e. that animal which "contains all the other intelligible animals comprehended within itself" (30c7-8), since "nothing beautiful would come to be in the likeness of something ἀτελής" (30c5). Plato here identifies the beautiful with the τέλειον, not just in the vague sense of "perfect," but in the more concrete sense of παντελής, "complete" or "all-embracing." Speusippus follows these identifications and, substituting numbers for intelligible animals, asserts that the decad is "the most παντελής model lying before the god who is maker of the universe" (Fr.28 ll.13-14). He argues that it is a τέλειος number by being all-embracing in each of several different ways, each of which gives the demiurge reason to choose it as a model for the world: the decad contains an equal number of even and odd numbers (ll.18-21), it contains an equal number of prime and composite numbers (ll.21-27, counting 1 as a prime), it contains an equal number of multiples and submultiples (ll.27-31), it contains all the different kinds of ratios (ll.32-33), and, finally, it contains the numbers corresponding to figures of all possible dimensionalities (l.33ff), chiefly because one is the point, two the line, three the triangle and four the pyramid and these together are ten, but also for more abstruse reasons. While Speusippus is admirably thorough in coming up with new properties of the decad, Aristotle is obviously right to say that this sort of reasoning lacks "demonstrative care." Furthermore, Aristotle has a plausible diagnosis of what would lead intelligent philosophers to such intellectual laxity: in trying to determine what intelligible being is the model for the sensible world, they do not have the patience to begin with the sensible world as actually observed and follow each step of the upward causal path, but try instead to leap immediately to the top. Because of this haste, they do not have οἰκεῖα reasons for determining what the intelligible ἀρχαί are or what attributes they must have; so in preferring one description of the ἀρχαί over another they must cite ἀλλότρια considerations, i.e. considerations drawn from another science (here arithmetic) dealing with a genus not causally connected with the ἀρχαί under discussion, and which therefore cannot demonstrate or even indicate what is genuinely εὐλογον ὑπολαβεῖν about them.⁵⁴ Speusippus tries to determine what model the

⁵³compare brief discussion above in my appendix to Iβ2c

⁵⁴cp. Aristotle on the Pythagoreans (much admired by Speusippus and by Aristotle's other Academic rivals): Since the other things seemed to have their whole nature as likenesses from the numbers, and numbers to be the first things in all nature, they supposed [ὑπέλαβον] that the elements of numbers were elements of all beings, and that the whole heaven was a ἄρμονία and a number: and they collected whatever they had that was agreed [ὁμολογούμενα] about numbers and ἄρμονίαι with regard to the affections and parts of the heaven and the arrangement of the universe, and they applied [ἐφήρμοστον, fitted] these [agreed-on things to their doctrine of the heaven]. And if anything were

demiurge used by reasoning a priori from the causes that would lead the demiurge to choose such a model (drawing on arithmetic for considerations about the properties of numbers in general), rather than a posteriori from the observable effects of the demiurge's choosing the model he did (drawing on astronomy for facts about the number of spheres and motions); Aristotle says that our knowledge is too weak to allow us to reason in this way, and that we can come to know immaterial ὄρχαί only by reasoning a posteriori. If this method yields an imperfect or even (as Jaeger says) a "grotesque" number of immaterial substances, if it yields a prudent assessment of the εὐλογον and not a bold claim of certainty, this is all the better for driving home the difference between genuine and specious metaphysical reasoning.⁵⁵

In the light of these comparisons with Academic theories, there is no reason to see tension between Λ8's "polytheism" and the "monotheism" of the last line of Λ10, and no reason to think that Aristotle's willingness to hand over the decision on the number of immaterial substances to mathematical astronomy represents a late, "positivistic" loss of faith in the autonomy of philosophy. So the content of Λ8 gives no reason to think that it is a later insertion in Λ. What, however, of its style? It is true that much of Λ8 is stylistically elevated and hiatus-avoiding: this style in fact begins with the last paragraph of Λ7, and is found in Λ7 1073a3-Λ8 1072b32, 1074a14-31, and 1074a38-b14, interrupted by the long passage 1073b32-1074a14 (on Callippus' improvements on Eudoxus' astronomical models, 1073b32-8, followed by Aristotle's technical and obscure reckoning of the total number of spheres required, 1073b38-1074a14), and by the short passage 1074a31-8 (an argument for the unicity of the world and of its first mover, highly elliptical and full of metaphysical terminology, generally agreed to be a later insertion in its context).⁵⁶ It is hard to believe that Aristotle wrote Λ8 at the same time as the rest of Λ--why

missing, they strove beyond this to string together the whole subject: I mean, for example, that since the decad seems to be τέλειον and to comprehend the whole nature of the numbers, they said that the things which move [τὰ φερόμενα] in the heaven were also ten; but since those which are manifest [φανερά] are only nine, on account of this they make the counter-earth a tenth" (*Metaphysics* A5 985b32-986a12). As Aristotle says in another passage where he complains about the Pythagorean positing of the counter-earth (*De Caelo* II,13), "they are not seeking accounts and causes for the phenomena, but dragging the phenomena toward certain accounts and doctrines of their own, and trying to coordinate [the phenomena with their own doctrines]" (293a25-27).

⁵⁵it is striking that Avicenna, professing to follow Aristotle throughout, winds up with the old perfect number of 10 separate substances or intelligences (plus God, who is beyond substance and intelligence), instead of the "grotesque" 47 or 55. note that for Aristotle too, the ordered series of immaterial substances is in some sense the "model," if not directly of the whole sensible world, anyway of the celestial portion of the sensible world, with the series of spheres "imitating" the series of movers (and in some looser sense the sublunar world imitates the celestial world). another very plausible target for Aristotle's criticism is Xenocrates, who also seems to have identified the decad as the model of the sensible world (for Xenocrates, unlike Speusippus, this is still an animal-itself, but interpreted in terms of numbers; his decad seems to be made up of 1-itself, 2-itself, 3-itself, and 4-itself, where Speusippus' contains all the numbers from 1 to 10 and can be carved up however you like {in the terms of *Metaphysics* M, Speusippus' units are συμβλητά, while for Xenocrates the units in e.g. the 2-itself are ἀσύμβλητα with those in the 3-itself}; see Themistius *In de Anima* 11,27-12,4, with Aristotle *De Anima* I,2 404b18-27). at least Xenocrates seems to have argued from the different things in the sensible world which must pre-exist in the intelligible model, rather than arguing a priori the perfection of the decad. a further point, to which I will return in IIIγ, is Aristotle's conclusion that the movers of the heavens and/or the heavenly bodies themselves are gods, and his pseudo-historical account of religion as deriving from an original knowledge of these divine things, so that the name of each god would originally refer to one of these (presumably Kronos was originally the planet Saturn or its mover, etc.--there's a nice comment of Burnyeat on this in his *Map of Zeta*). here too Aristotle is competing with other Academic "scientific" allegorizations of the traditional gods--Xenocrates (Fr.15 Heinze) identifies the monad and dyad with Zeus and the Mother of the Gods respectively

⁵⁶also οὔτοι at 1074b3 does not refer back to anything in the immediate context, but seems rather to refer back to the "divine bodies in the heaven" of 1074a30-31 (or perhaps to their movers, discussed previously), bypassing the

would he abruptly shift into a literary and popularly accessible mode in the middle of an esoteric technical work? But for the same reason it is hard to believe that he wrote $\Lambda 8$ afterwards as an addition to an Ur- Λ ; rather, as Blass pointed out already in 1875, the natural conclusion is that Aristotle wrote the hiatus-avoiding passages before the rest of Λ , as part of an exoteric work, and that, when he was writing Λ , and needed for the completeness of the argument to have some discussion of the number of immaterial substances, he simply excerpted these passages from his earlier work.⁵⁷ In the process, he would have added whatever new material he needed to fill out the argument, and naturally he would have had no reason to avoid hiatus in the new additions, and would have written them in the same style as the rest of Λ ; and he would have updated the astronomy, reporting Callippus' improvements on Eudoxus.⁵⁸ This assumption allows us to avoid the great difficulty of reconstructing what the original Λ would have looked like. For although Jaeger says that, with $\Lambda 8$ removed, $\Lambda 7$ would join smoothly to $\Lambda 9$, this is not true: the last paragraph of $\Lambda 7$ (1073a3-13) talks about eternal non-sensible substance in general and its indivisibility and unchangeability, with nothing specific to $\nu\omicron\upsilon\varsigma$, and the jump to $\Lambda 9$'s "τὰ δὲ περὶ τὸν νοῦν ἔχει τινὰς ἀπορίας" would be wrenching. Both in argument and in style the last paragraph of $\Lambda 7$ goes with the hiatus-avoiding parts of $\Lambda 8$; but if we excise this paragraph as well, the original Λ will have contained absolutely no discussion of non-sensible substance in general (but only of $\nu\omicron\upsilon\varsigma$ as the first ἀρχή), which seems incredible. Blass suggested that the last paragraph of $\Lambda 7$ and the hiatus-avoiding parts of $\Lambda 8$ were excerpted from the De Philosophia, and since we know that the De Philosophia discussed at least two movers of the heavens, this is quite plausible. Aristotle's "polytheism" and his willingness to rely on mathematics to solve metaphysical problems are the sign not of a late "positivism," but of early disputes in the Academy; he trumps the dogmatic Pythagorean number-speculation of Speusippus and Xenocrates by deferring to the astronomical authority of their revered colleague Eudoxus. For the purposes of the Metaphysics, Aristotle's main interest is in the first ἀρχή, but he has no

intervening lines 1074a31-38. but note that 1074a31-8 does not (as sometimes thought) maintain a "monotheism" contradicting the "polytheism" of its context, and that it contributes at this stage of the argument. how many movers are there? only as many as there are heavenly motions; and since the motions are for the sake of the stars they carry, there will be no more motions of invisible spheres than are manifested in the visible motions of the stars.

furthermore, there is only one heaven, so we need not suppose that, in addition to the 55 (or however many) motions in this heaven with their corresponding movers, there is also another analogous spherical system in the space beyond our sphere of fixed stars, with some number of motions of its own and a corresponding number of movers. the unicity of the heaven or world (οὐρανός) does not contradict the multiplicity of spheres: 1074a31 ὅτι δὲ εἰς οὐρανός immediately picks up 1074a30-31 τῶν φερομένων θείων σωμάτων κατὰ τὸν οὐρανόν.

⁵⁷reference in Blass, note Ross' reference, note recently take up by Burnyeat (I did this before Burnyeat, but in an unpublished paper, and Burnyeat came to the same conclusion independently--both of us had followed up Ross' reference and found Blass' article). Jaeger routinely uses this form of argument to show that an elevated hiatus-avoiding passage in one of Aristotle's treatises is an extract from an exoteric work, and there are indeed good grounds for thinking that Aristotle habitually did this; it is odd that he did not draw the same conclusion in the present case

⁵⁸this disposes of the only argument Ross gives for supposing that $\Lambda 8$ is of a later date than the rest of Λ (rather than simply of a different date), namely, that Callippus' astronomical work seems to date to near the end of Aristotle's life (from Ptolemy's references, the "first Callippic cycle" began in 330). but while Blass preferred to take the passage on Callippus with the preceding passage on Eudoxus as part of the original exoteric work (rather than with the following passage on calculating the total number of spheres), it is full of hiatuses (7 in 6 lines, compared to 3 in the 15 lines of the Eudoxus passages). Burnyeat tries to show the Callippus passage could be early anyway, by arguing that Callippus' astronomical models could be earlier than his calendar cycle, but the plausibility is the reverse of what Burnyeat says it is

reason to repent of what he has said about the other immaterial substances, and he incorporates it here to fill out his account.⁵⁹

⁵⁹possibly appendix on Eudoxus, how to get from the simple theory of the sun to the theory of the moon and, via hippopedes, the planets, and more complicated theories of sun and moon, with comments on Schiapparellian and anti-Schiapparellian reconstructions, and questions of Eudoxus' goals (Ptolemy-style predictions? Babylonian-style predictions? Euclid/Autolycus-style qualitative theorems?) besides Schiapparelli's reconstruction of the hippopede (of which the cleanest statement, with references to earlier literature, is in an article of Neugebauer's in his Astronomy and History, you may also want to add your own version of the calculation, which can be done very simply with trigonometry) also discuss the alternative version given by Ido Yavetz in Archive for History of Exact Sciences for 1998, in which (i) the inner sphere moves with twice the angular velocity of the outer sphere (in the "opposite" direction), (ii) the planet is not on the equator of the inner sphere, but is the same angular distance from the pole of the inner sphere as the pole of the inner sphere is from the pole of the outer sphere. Yavetz' version seems to fit better with observation, but is algebraically a much more complicated curve {I think a sextic rather than a quartic}, and seems the kind of curve that would be discovered after prolonged experimentation {though it's simpler than, and indeed implicitly involved in the construction of, Callippus' planetary curves}. the Schiapparelli hippopede is the curve that the moon would move in, against the background of the fixed stars, if the period of retrogression of the nodes were just one draconitic month. Yavetz also really has to push it to make his model consistent with the text of Simplicius (which certainly sounds as if the two spheres move with the same angular velocity), and also makes the connection with Proclus' hippopede more remote. but Yavetz is right that there is no textual evidence that the planet is on the equator of its innermost sphere, in the way that e.g. the moon is on the three-sphere model, or the way the sun (or any other planet) is on a simple two-sphere model. the equatorial case is certainly easier to discover, and it does stand to reason that they would discover the techniques of planetary theory by extrapolating from solar and lunar theory (and there's feedback, since Callippus adds a hippopede to the motions of sun and moon to account for the first anomaly); on the other hand, the non-equatorial case might have led Apollonius (or whoever) naturally to epicycles. also note Henry Mendell's article (ref? in Centaurus?) for an anti-Schiapparelli interpretation of Aristotle's/Eudoxus' lunar theory, and also for some more general points on the roles of hippopedes in this style of solar/lunar/planetary theory. also: perhaps note on what the movers are (why not souls?--or defer all this to IIIγ?)