Aristotle's Theory of Powers

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Philosophy)
in the University of Michigan
2019

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ABSTRACT

This dissertation explores how causal powers connect in Aristotle's system to Aristotelian causation, hylomorphism and the composition and nature of material objects, and possibility and necessity.

I argue that active causal powers are efficient causes, explain what their causal activity consists in, and show how this is consistent with Aristotle's alternating identification of powers with form and with matter. I argue that the "way of being" that corresponds to powers, "being in potentiality," should not be understood as being possible or as a restriction of being possible; and I offer an alternative non-modal interpretation of the way of being. Nonetheless, I argue, Aristotle thinks of powers as the foundation and explanation of modality. This naturally gives rise to a conception of possibility where possibility is tied intimately to time. I finish by explaining how this conception of modality relates to some of Aristotle's notorious commitments with respect to that tie, especially his claim that every possibility is eventually realized and what is always true must be true.

CHAPTER 1

Introduction

1.1 The Question

The central characteristic of the sublunary physical world, the mundane and non-divine, according to Aristotle, is that its inhabitants perish and come to be.[1] That is, they change. And they change in a particularly philosophically puzzling way, for not only the qualities or location of this thing can change, but its very being. This is not just flux of the properties of some underlying eternal substrate. So the physical world is one of material objects which are composite and yet substantial, real and novel unities rather than just a passing mode of the real substrate. And change, substantial and not, is ordered and systematic, not random flux or churning chaos.

These are the two main large scale features of the physical world that need explaining: it is filled with material substances, and it is filled with change. This dissertation is focused on the second fact and the explanation Aristotle gives for it, though it turns out on my reading that Aristotle thinks the accounts for both facts have an important commonality. In both cases Aristotle leans heavily on the concept of a power. Indeed Aristotle *defines* power as a source for change and rest, as ἀρχὴ κινήσεως ἢ μεταβολῆς.

The central question that unites this work is: what does it mean to say that a power is a source of change? The answer is: powers order the physical world insofar as it is a world of changing things subject to causation. In particular, as efficient causes, they explain the character and existence of actual changes and of which changes could happen.

[1]See, e.g., *Meta.*Θ.8.1050b7–33; Λ.6–10, esp. 171b3–5, 1073a4–13, 23–1073b10. I will have very little to say about Aristotle's divine.

1.2 Powers and Dispositions

A central concern of this whole work is to say what a power really is. But it is good to have a brief sketch up front.

We see, both by looking at examples and the way Aristotle characterizes powers, that they are similar to dispositions, abilities, or tendencies. That is, they are modal rather than (merely) categorical properties: saying someone is able to speak or that some wire is conductive says something about what they could or would do in non-actual circumstances. By contrast saying someone is 5'6" seems to say something about the way they are that is, as it were, wholly contained in the actual world.[2]

But we will see that powers and dispositions have important dissimilarities. Primarily there are two. First, powers are teleologically directed toward some single end that their activation produces.[3] It is at least reasonable to think that a disposition, by contrast, may manifest in multiple different ways depending on the triggering circumstances without one of those ways being privileged above the others.

Second, powers connect triggering circumstances to a manifestation with the force of necessity. If someone is irritable, we might think it follows that if someone annoys them, they will snap at them. But we won't think that if someone annoys them, *no matter what*, they will snap back. For if the irritable person learns the error of their ways and *then* someone annoys them, they may restrain themselves.

Therefore I think it is better to say that powers are a subset of the dispositional properties. They are dispositional properties where the manifestation is a teleologically structured process, a process that aims at an end, and where that process necessarily takes place if the triggering conditions obtain.

[2]Powers are modal properties on the assumption that the distinction between modal and categorical properties is one that makes sense; that idea has been challenged by Mellor (1974). (For whatever it's worth, I am skeptical the distinction will bear much weight, but it is useful to fix the reader's mind on the right group of properties.) But of course if there is not a clean distinction, then we also will not have a reduction of the modal to the categorical, which seems to be what we need to deny that the fundamental properties do not "say anything" about non-actual circumstances.

[3]Aristotle explains the priority of a power's activation over the power in *Metaphysics* Θ.8. Charles (2010) argues, to my mind convincingly, that this priority includes at least teleological directedness.

Strictly speaking I am not sure if this is true about all powers. It seems right for powers in the central sense, that is, active powers to cause a change in another or insofar as the thing is other, (*Meta*.Δ.12.1019a15–18, Θ.1.1046a10–12) and passive powers to be affected by an active power. But Aristotle tells us that there are also senses of power which we use to say things *resist* being changed (*Meta*.Δ.12.1019a26–32); compare how we call something durable.

1.3 Remark on Translation and Texts

I use the English words 'power,' 'potency,' 'potentiality,' 'capacity,' and 'ability' to translate the Greek δύναμις. I use both 'actuality' and 'activity' to translate both the Greek ἐνέργεια and ἐντελέχεια. All these translations are present in the literature. As we will see, I regard 'power' and 'activity' as slightly less deceptive than the others, but I've made no special effort to stick to only those.[4]

1.4 Preliminary Answers

Here, in the form of brief summaries of each of the chapters, is some indication of how I will answer the question 'what is it for powers to be a source for change.'

[4]On translations and editions:

Translations are my own, though I have consulted plenty of existing translations along the way.

I have looked at multiple editions for several of these texts. But in quoting I tried to draw from standard editions and mark any deliberate divergences. Central texts used, with their editions, are

- Clarendon:
- *Metaphysics*: Ross, 1958
- *Physics*: Ross, 1960
- *De anima*: Ross, 1961/1967
- *Categories* and *De Interpretatione*: Minio-Paluello 1949/1966
- *Generation of Animals*: Lulofs: 1965/1972
- *Nicomachean Ethics*: Bywater 1894/1962
- HUP:
- *Meteorology*: Fobes 1919
- Les Belles Lettres:
- *Generation and Corruption*: Mugler 1966
- *On the Heavens*: Moraux, 1965
- Loeb:
- *Parts of Animals*: Peck 1961
- Princeton:
- *On the Motion of Animals*: Nussbaum 1986

Some secondary sources also contain Greek or Latin (i.e., pre-modern commentaries). These are cited in the bibliography at the end.

1.4.1 Powers are Efficient Causes

Active causal powers are the sorts of things to be efficient causes. The most capacious sense of 'power' includes passive powers and natures. But the central, authoritative sense of power is an active power which is a source of change in another thing. And paradigmatic examples of powers are skills or arts, which are exercised by an agent to produce a product. These are efficient causes of the process and the made artifact. It is this central sort of power, active power that is an efficient cause, that is the focus of this chapter.

Skills and arts are forms in the soul of the artisan. So some powers are efficient causes *and* forms. This can be taken to suggest that when Aristotle says that powers are efficient causes, it may not have much to do with what he means when he says an object is an efficient cause.

In the first chapter I give some texts that show Aristotle thinks at least some powers are efficient causes. He does not think, say, that they are merely relevant features when an material object, the *real* cause, affects something.

Then I explain what he means by this. Unlike others in the secondary literature,[5] I do not think we should conclude either that powers are only efficient causes in some secondary sense (by way, perhaps, of having some relation to the concrete object which is efficient cause in the primary sense) or that causation by form means we must conclude Aristotelian efficient causation is not anything like our own notion of causation.

Instead, I suggest, the intuitive problem with a causally acting form disappears once we adjust our views on forms and on efficient causation. First, Aristotle sometimes seems to be thinking of forms instead as concrete objects—the sphere that comes about, not sphericality. On this way of talking they are concrete objects insofar as they are unified by some function, role, or sort, and ignoring the features of their matter that do not make a difference for that. Second, Aristotle sometimes seems to be thinking of the form as a feature immanent in the object, but the sort of thing that can be, for example, seen and touched. I take this to be a non-orthodox view of Aristotelian form, but one that has had some prominent defenders.

When we think of them this way the puzzle as to how forms can be efficient causes falls away. The doctrine is not the insistence that causal *relata* include *abstracta*—that's positively Platonic, and Aristotle spends a lot of words rejecting the Platonic line on forms and causation. It's rather that it is accurate to say that things like Umer's beliefs and ability with material, such as it is, produced this dissertaton. (Not that it's wrong

[5]See the chapters themselves for citations to and more discussion of the secondary literature mentioned in these summaries.

to say that Umer-the-carpenter did, but he did only, as it were, by being along for the ride.) Previous defenders of this interpretation of Aristotelian forms have focused on making sense of the doctrine of composite and yet unified hylomorphic material substances; these considerations show that there are other reasons, based in Aristotelian causation, that support the interpretation.

I also suspect that much of the puzzlement over forms as efficient causes disappears when we see how concrete objects are efficient causes. Aristotle's primary mental models of efficient causation are not billiard balls hitting one another, and he does not seem to think of cause as in the first place a mover. Rather his paradigms are craftsmen making, parents reproducing, and skills being exercised. I suggest that for Aristotle the crucial element is that the efficient cause provides the *order* for the resulting process or product. This sense has its match in English: we're happy to say the architect was the cause of the building being so-and-so without thinking that the architect ever put their hands on it.

This kind of propagation of order does not require the cause to be moving, or shoving things—it's order can be "read off" of its structure by moving intermediaries. This, I think, goes some way to showing how material objects and forms in them could both be reasonably enough thought to enter into efficient causal relations.

1.4.2 Powers and Change

In the second chapter I focus on the connection between powers and matter. Aristotle systematically connects form and actuality on the one hand and matter and power on the other.[6] We would like to know what that connection consists in, if it is sensible at all, in the context of substantial change.

I look at *Physics* A.7 and A.8. I defend the standard view (recently under fire from Sean Kelsey) that these chapters are Aristotle's mooting of the form-matter distinction and of hylomorphism. In *Physics* A.8, Aristotle presents a puzzle, attributed to philosophers from the Eleatic tradition, which is designed to show that genuine generation is impossible. At the end of the chapter, Aristotle mentions another way of proceeding, which "is dealt with in more detail elsewhere": we might use instead the machinery of potentiality and actuality (*Phys*.A.8.191b29–30).

I try to show how the other solution is more another way of viewing the solution in new terms than an entirely novel solution. (Say Aristotle means here that another entirely distinct solution exists. Then there is a conflict with Aristotle's apparent claim

[6]A handful of relevant passages: *De Anima* B.1.412a9–11, B.2.414a15–18, *Metaphysics* Z.1032a20–25, H.2.1042b9–10, 1043a12–13, 25–28, 3.1043a32–b2, 6.1045a23–30, b18–19, Θ.8.1050b2–3.

that the puzzle is evidence for the Aristotelian principles of A.7, since those are the only way to solve the puzzle (*Phys*.A.8.191a23–27).)

On the other hand this threatens to make the language of power and actuality uninterestingly redundant with the language of form and matter. I argue that this is not so: these are two ways of characterizing a generative change that usefully highlight different aspects of it. 'Matter' makes us think of what underlies and what is worked on; 'potentiality' makes us think of what is able to do something or be some way.

The second way of viewing the generative change allows us to see more readily the teleological nature of the generative change and thus of how the matter, the material cause, for a change need not be unified by anything other than its ability to result in the generated object. Apparently Aristotle thinks that the matter out of which we come persists into the generated object. What seems intuitive when thinking of making a statue out of bronze—that is, when shaping some material stuff into a new spatial configuration—seems likely to be outright false when we look to other cases of substantial generation. As Code (1976b, p. 365) memorably puts it, "The end product—the man—is made of not semen or embryos, but of flesh and bone."

When we see that the matter for man is whatever is worked on successively to arrive at the adult human, the puzzle disappears. Allowing such "gerrymandered" objects to serve as matter may seem to make the Aristotelian claim that something persists through every generation trivial or empty. The matter for a human seems gerrymandered when we think of it as first menses, then blood, then bone …and compare it to simple bronze. But it is genuinely unified as what has the passive power to be informed by the human form—there is no guarantee that the matter for a human will have any other neat and intuitive characterization, but that is because its being is to be what is able to participate in a certain sort of change. This is just to come back to the Aristotelian idea that matter is posterior in being and account to form.

This is surely a less obvious way of thinking of hylomorphism than shaping bronze into a statue, but it is just what is stressed by moving from the terminology of matter to that of potentiality. None of this requires new terminology to be said, but it is a reasonable way to stress the innovation.

1.4.3 Being in Potentiality and Possibility

Many commentators have noted some kind of connection between power and possibility. In particular Aristotle writes of things "being in potentiality," which commentators sometimes more or less explicitly take to be close to 'being possible.' Since Aristotle in-

troduces this new notion, with some fanfare, as a new way of being, it is tempting to see here the distinction between actual objects and merely possible objects.

In this chapter I examine, debunk, and try to improve on the simplest relation one could propose. That is: for all objects x and properties Y, x is Y in potentiality iff x is possibly and not actually Y. There are, I think, a number of counterexamples to such a proposal, and seeing just where the proposal falls short helps us see how to improve on it.

First, consider the right-to-left direction of the biconditional. According to Aristotle, a substance can possibly be destroyed, but is not in potential (e.g.) its corpse. Something can possibly be what would result if several successive changes happened, but is not potentially so until it is "close" to the result: e.g., it's possible I be speaking French, but I'm not potentially speaking French until I've actually learned it. Events are possible by luck, but nothing is potentially such as to be in that state. Therefore possibility is not sufficient for potentiality; one direction of the PIP biconditional cannot be right.

We might propose as a simple emendation to the right side of the biconditional that both (i) x possibly and not actually be Y and (ii) x have a power that is teleologically directed toward Y. But now it becomes unclear why clause (i) is needed at all to get the correct extension.

Indeed counterexamples to the other direction of the biconditional suggest that the (i) should simply be dropped, as it is not an implication of being in potentiality that x is possibly and not actually Y. According to Aristotle my organic parts are in potentiality but not in actuality as such.

In the first place it beggars belief that Aristotle believes my organic parts are merely possible and non-actual existents. It is uncommon-sensical in an un-Aristotelian way—-at the least we'd expect him to be far more explicit and cautious about such a claim. It threatens to make nonsense of explaining the behavior and character of whole organisms by appeal to the characteristics and interactions of their parts.[7]

Furthermore, according to Aristotle organic parts cease to be as such when they are removed from the whole. Say my eye is plucked out; it will then be an eye only "by courtesy," like an eye in a painting. For once it is removed from my body it no longer has the ability to see,[8] and that is essential to its being an eye. So the point cannot be that my organic parts could be actual entities once they are removed from the whole

[7]I take that to be an appeal clearly and pervasively made by Aristotle in the biological works. Obviously the use of such an appeal does not suggest that the behavior of the whole can be entirely reduced to the character of the parts.

[8]Or, perhaps, the ability to contribute to its host the ability to see.

that now comprises them.

We might try to drop the 'merely' part of the condition: my parts are both actual and possible. I'll show that this is exegetically dubious: on the assumption that Aristotle means 'possible' by 'being in potentiality' and 'actual' by 'being in activity,' it's very hard to construe *Metaphysics* Z.16 as a reasonable thing to have written.

I conclude that there is no reasonable way to make it Aristotle's point in saying that organic parts are in potentiality that they are possible or merely possible, even if we add some other conjunction about teleology into the mix. My alternate proposal is that the contrast between ἐνέργεια and δύναμις is not really about possibility, but about the content of an inert power and its activity. To say that something is in potentiality (or merely in potentiality) is not at all to say that it doesn't really exist or only merely possibly exists, but rather that it exists as what is encoded in a power or in virtue of the power of something else.

Compare saying (correctly) that there is a man in the painting. One way to approach this is to give a revisionary semantics: in a case like this the meaning is, despite surface grammar, that the picture represents a man rather than that a man is in some way. [9] approach this is to claim that. But another approach—one that fits well with deflationary or lightweight views of existence—is to instead take the surface grammar seriously as long as doing semantics, and to insist instead that the difference between the man in the picture and the man on the street is metaphysical. They both *are*, they both have being, but one is in a representation and one is a living material thing. If we want to inflect this with a certain amount of fanfare we might say that they both are, but have different ways of being. So too I think Aristotle's point is that some houses are, but only inasmuch as they are in the beliefs, plans, and intentions of makers of houses, while other houses are in their own right.

The first-blush plausibility of the idea that being in potentiality is about possibility is due to the fact that the actual existence of an inert power with a certain end is good grounds to think that end possible. That secures a certain amount of extensional overlap between what is possible and what is in potentiality. But the extensions are not the same and the intensions are very different.

1.4.4 The Foundation of Modality

There *is* still a close link between powers and possibility, though it is not the case that being in potentiality just *is* being in possibility. The link has just been hinted at above.

[9] Perhaps making some distinction between speaker meaning and utterance meaning, perhaps not; since this branch is not likely to be Aristotelian we won't bother with the options.

I claimed the existence of an actual power for something is good reason to think that something is possible: after all, that means that should the power be activated, that thing will happen. But I claim that Aristotle has more in mind: this is what explains or grounds why that state of affairs is possible. Furthermore, what is possible is what can be brought about as the end result of one or more powers acting (or what is actual, i.e., what has already been brought about as such a result). Those powers can be either actual or possible, i.e., they could themselves be the result of other powers' activity.

There are three claims here. First, I claim the extension of possible states for Aristotle is more limited than other conceptions of the possible have it. For example, no actual powers can activate to make it that there isn't and never was anything at all, though we may well think the "empty world" is a possibility.

Second, there is a claim about direction of explanation: I say the powers make (non-actual) things possible, not the other way around. Note how this reverses a common project in contemporary metaphysics of attempting to take possible worlds as a fundamental or relatively fundamental thing and explain metaphysical phenomena broadly in their terms. In particular, a lot of effort has gone into attempting to reduce disposition ascriptions to the truth of certain counterfactuals.

Third, there is a claim about the intension that fixes what is possible. Possibility is part of a cluster of related phenomena, tied to change, causation, and power. It is "about" what situations can be produced by processes caused by existing things. Contrast this with approaches that root possibility in combinatorics, linguistic consistency, essences, brute laws of nature, or brute existence of possible worlds.

I cannot show that Aristotle grounds possibility in powers by pointing to passages where Aristotle explicitly endorses that doctrine against other candidate views. I don't think this is surprising: the other candidates had at this point not been formulated and mooted as possibilities. For Aristotle this is simply what possibility is—the contender he feels the need to confront is not that possibility might work differently, but that there might be no non-trivial possibilities. In any case I proceed by showing that these three claims are implicit background assumptions present in the arguments and assertions Aristotle does make about possibility.

1.4.5 Possibilities from Powers

In the final chapter I attempt to spell out more precisely how it is that powers can be thought of as grounding or explaining what is possible. In the course of doing so I discuss some of the consequences of the view. Some of these are counter-intuitive for

us, and I try to defuse those intuitions, both as obstacles for the exegetical project and as prompting concerns about the philosophical worth of the view. Some of these cohere well with other Aristotelian commitments that others have noticed; this both gives confirmation that the claims of this work are on the right track and offers explanation of why Aristotle might have been ready to accept this view of possibility and the other commitments.

This is the picture I claim is in Aristotle's texts, if not on the surface. There exist some powers. If, by some series of activations, those powers may bring us into a situation, then that situation is possible. If there is no such series of activations that get us to that situation, then it is not possible.

Picturesquely, we can imagine possible situations laid out on a tree with the root at the current moment, and subtrees branching off as time progresses.[10] To say a situation is possible is quantificational in a similar way as the conventional account—but what is checked is not possible worlds disconnected from this one, but states of affairs on the tree. These states of affairs are potential evolutions of the current actual moment.

If I am right, then Aristotle should not consider possible some of the things we do take as possible. I've already mentioned the "empty possibility," but consider also that Aristotle should not think that laws of nature or fundamental physical invariants could have been different.[11] I think we find independent textual confirmation of this.

[10] I'll consider reasons one might want to allow branching before the current moment in the chapter itself.

[11] Tad Schmaltz has pressed me on the question of whether Aristotle has our notion of a law of nature. Surely he does not share all our central ideas about law: our notion is heavily mathematized, even in the special sciences, and arguably tied to the notions of conservation and symmetry and mathematical machinery for expressing those that Aristotle lacked.

However, it is not necessary for the points in the body above to make the claim that Aristotle shares exactly our conception of a law of nature. In any case he does have the idea of fundamental invariant regular features of the physical world, and gives his own candidates for such features across his physical works. If desired my suggestion can be rephrased without the terminology of 'laws' to say that Aristotle thinks these regularities are necessary (with what we'd call metaphysical necessity), still a claim most common contemporary metaphysicians disagree with.

Furthermore, I think Aristotle *does* have something which answers at least approximately to our use of 'law of nature.' These are the theorems of the physical sciences which make up the body of a science in the *Posterior Analytics*. These are necessary (with at least some decent modal strength, on anyone's reading) and sweeping statements about the subject matter of the science. Probably Aristotle does not think that these laws "govern" their instances, and arguably that is an accretion to the laws concept that postdates the classical period. But then neither do all contemporary philosophers or scientists share that idea.

Is this "close enough" to the way we talk about laws of nature to count as his having the same notion? Frankly I don't think this is a productive question: I doubt it has a determinate answer shorn from a particular context of communication and purpose to that communication. What I think I can say is that Aristotle's conception of a statable physical invariant seems close enough to a law in our sense for the purposes of the current context.

I also consider Aristotle's notorious commitment to a principle of plenitude, whereby what is possible must happen at some point in time. I claim that this is a reasonable way to extend the conception of modality explained here, and so we get some insight into what the principle could mean and why Aristotle might not have found it as apparently absurd as modern commentators have.

1.4.6 Conclusion

These chapters canvas various distinct aspects of Aristotle's use of δυνάμεις, but they are not wholly scattered or disparate. Powers are the actual properties which explain actual and possible causal processes, and in doing so explain what situations and objects are possible. Thus they are the source of physical order.

It is instructive to compare the roles that powers play with the role that projectible predicates played in much more recent literature. These are the predicates that figure in the generalizations that we take to be "real" generalizations in the sense that they are candidates for inductive establishment, support counterfactuals, and (in a broad sense of the term) are potentially nomic generalizations rather than mere accidents. In particularly rationalist and realist manifestations these are taken to be natural properties or to be what is "structural."[12]

If I am right, Aristotle's powers fill some of the same roles. They underwrite counterfactuals and separate the genuine causal processes from mere accidents and flux. In this sense they are meant to give the physical world its order and explain why it is not heaving chaos. An Aristotelian approach is therefore an interesting alternative to these other ways of proceeding.

In the conclusion of the dissertation I include some more brief remarks evaluating the whole Aristotelian approach sketched here and comparing it with these other approaches.

[12]The terminology of 'naturalness' of course comes from Lewis' system, though many have incorporated it into their own thought. 'Structure' is the generalization of naturalness in Sider's system, which is not limited to marking out the fundamentality of predicates.

1.5 Remarks About Scope of Discussion and About the Development of the δύναμις Concept

1.5.1 Scope

I constrained my attention to the work of late Aristotle, primarily the *Metaphysics*. There is a lot to do in untangling how the concept is used in Aristotle's late metaphysics, even without worrying about how that use evolves or breaks from Aristotle's early metaphysics. Pursuing the question of development in depth makes relevant very difficult questions about how the ontological picture of the *Metaphysics* relates to that of the *Organon*, questions I cannot hope to deal with adequately here. Therefore, I have for the most part put aside power, causation, and possibility in the *Organon*.

Similarly I have largely put aside questions about how δυνάμεις and the δυνάμει/ἐνεργείᾳ distinction is applied in non-metaphysical contexts such as Aristotle's ethics, politics, rhetoric, etc. And, another restriction: I've had very little to say about Aristotle's theology, his claims about eternal and divine substances, or his claims about actuality and potency in that realm. This is not because I regard this as an unimportant part of Aristotle's system. Indeed I suspect that Aristotle thought just the opposite. It is rather a practical concession: this text is already too long.

That said, I hope the reader will find it useful instead of indulgent if I try to contextualize the focus of this work with some brief remarks about δύναμις across Aristotle's corpus.

In particular it may be useful to notice how the concept gets progressively more prominent use. Since we're primarily interested in metaphysics and the particularly Aristotelian use of the word, I put aside cases where the word means things like political power (a standard, not especially Aristotelian use) or the meaning of words (philosophy of language is out of scope).

1.5.2 Δύναμις in Various Texts

Aristotle's earliest use of δύναμις certainly seems to indicate that the concept is much more restricted than in the *Metaphysics*. In the *Protrepticus*, as Menn (1994, p. 78) notes, the word usually indicates a power of the soul or of a living thing.[13] Examples include powers that continue to play a prominent role in Aristotle's biology and psychology

[13]Exceptions: δυνατὸν is used to mean 'possible' at B31, 41, 57, and 71 (again following Menn (1994, p. 78)); also δύναμις once means 'political power,' at B98. The other nine times it is used it is a power of the soul or the ensouled thing.

like the power to see and think, but also the virtues and arts.

In the *Categories* δύναμις is a much less interesting subcategory than we might expect: it occupies a niche in the category of quality and is given relatively little attention (*Cat.*8.9a14–27, see also 8.10a34–10b5). The primary example of a δύναμις appears to be an ability, but a natural inclination or aptitude as opposed to a learned ability. It is frequently paired with the adjective φυσική (natural), but as far as I can see no contrasting case of δύναμις is being imagined; Ackrill (1963, p. 25) translates the phrase with 'natural capacity.' Aristotle's example is that we may call someone a runner or a boxer because they are naturally suited for those activities (9a14–21), and he explicitly contrasts this with calling someone a wrestler or a boxer because they have gained some branch of knowledge, i.e., learned a skill (10a34–10b5). Someone who has learned a skill has not gained a power, but is in a condition (a διάθεσις, 9a20, 10b5). Presumably if this condition were made stable and well-grounded enough, they would be in a state (a ἕξις); conditions and states are really of the same type except for that difference (8b26–29).

The other examples of a δύναμις are being healthy or sick and being hard or soft. As Ackrill (1963, p. 105) points out, Aristotle characterizes health and sickness as dispositions to be easily affected or not, so we can understand them together with natural aptitudes as inclinations or dispositions to take on another quality of a different sort. But it is more difficult to see how hardness and softness can be unified with the others: perhaps softness can be thought of as a tendency to be scratched or bent or the like, but (especially as softness need not be natural or necessary to the object) this threatens to make it far too easy for qualities to count as capacities. (Note that being a quality that tends to produce other qualities is not sufficient in this text to be a δύναμις, 8.9b9–18.)

By contrast, dispositional properties in general appear to be states, conditions, or affections (affections are things like sweetness, bitterness, etc.). I see no indication that Aristotle sees these as united in any interesting way as opposed to the rest of the motley crew that is quality.

In *De Interpretatione* 12–13, Aristotle repeatedly infers casually from the obtaining of various contingencies—possibilities that are not also necessary—that the object is capable of doing that thing. And at the end of 13 he makes it clear that capable objects have corresponding capacities. (These relations are of course remote from his focus in those chapters.) As C. Freeland (1986, pp. 84–86) reasonably enough points out, despite the ease with which Aristotle makes these inferences, he does not clearly state that *all* contingencies will have such explanations, and the example contingencies he mentions are relatively simple.

Examples of powers or capable objects in *De Interpretatione* 12–13 include being able to walk or be cut (repeatedly, but e.g. see 12.21b11–14) and a fire's capacity to heat (13.22b38–23a4).

Before moving on it's a good idea to pause and take stock. These three texts all contain themes that will run through Aristotle's lifetime treatment. The *Protrepticus*'s central examples, the abilities of living things, remain central to Aristotle's thought. The apparent close explanatory connection between powers and possibility in *De Interpretatione* is not a one-off or misleading (I will argue), but if anything becomes more systematic and explicit in the *Metaphysics*. The general typology of the *Categories* seems to be quickly dropped. But the distinction between states and powers persists.

However, there is a striking lack of unity in the way the concept is deployed. The extension of the concept in *Categories* is more limited than that of *De Interpretatione* and is largely or entirely disjoint from the examples in the *Protrepticus*. I speculate that we are not seeing the evolution of a concept as Aristotle works through some problem so much the *ad hoc* application of a semi-technical term in ways that are useful in the immediate contexts.

Moving past early works, we see that the state/power distinction is preserved in the *Nicomachean Ethics*. At B.5 we are told that virtues are not feelings or powers, but states. Virtues are described as what makes us naturally capable of feel certain ways (1105b23–25, 1106a9–10; see also B.1.1103a18–32).[14] The virtuous state of the soul is compared to the excellence of the eye, which allows us to see well (B.6.1106a14–19).

Both powers and being in potentiality move to greater importance in the later works. Powers play a pervasive role in the biology. Throughout *De Anima* the types and nature of souls are apparently explained in terms of their faculties, i.e., in terms of what they can do. In this text the potentiality/actuality distinction is explored in the hopes that it can be used to define soul (see esp. *De Anima* B.1 and B.5). The distinction is related to form and matter in the hopes that the essence of a human can be understood in terms of what a person can do without the unseemly result that people temporarily stop existing when they fall asleep.

Similarly powers are used in non-biological physical contexts throughout *De Caelo*, *De Generatione et Corruptione*, and *Meteorologica*; and the potentiality/actuality distinction is used enthusiastically in *Physics* Γ.1–3 and in *De Generatione et Corruptione* A.3–4 to give an account of change.

In *De Anima* I believe we see the state/power distinction again, this time wheeled out as part of the larger machinery of first and second potentialities and actualities. However

[14]Or possibly apt to feel certain ways, as Sachs (2002, p. 27) translates.

this time state and power are instead described as two sorts of powers (*DA*.B.5.417a22–417b2, 417b28–418a6). A change (μεταβολὴ) properly speaking is a change to an opposite or toward an opposite into an intermediate state (*DA*.B.4.416a34–35); that is, in the *De Anima* we have the doctrine familiar from the *Physics* that change is an exchange of contraries. One sort of power is an alteration that may result in an exchange of qualities and of states (417a30–33, 417b15–16). For example, an ignorant man may exchange lack of knowledge for possession of knowledge, because he is the sort of animal that is able to learn (417a22–28), or a boy may become a general (417b29–32), presumably by gaining the art of warmaking or something like. This corresponds to a capacity as the *Categories* had it, that in virtue of which something is naturally in a position to take on some further state.

But there exists also a power by which one exercises the gained knowledge or ability (417a33–417b7, 417b18–19), and this is not an exchange of one contrary for another, but the activation or "preservation" of the state itself (417b2–7) or a change "into" the state and nature itself (μεταβολὴν καὶ τὴν ἐπὶ τὰς ἕξεις καὶ τὴν φύσιν, 417b16–17). It is not quite clear whether this deserves to be called a change, really (417b5–8). This corresponds to the *Categories*'s state, a dispositional property which can be activated and does not destroy itself in being activated (for the property is not *exchanged* for a contrary), examples of which included the virtues and knowledge (*Categories* 8.8b26–9a9).

While old distinctions are preserved, the terminological decisions are not. Also, there is a tendency as the texts go on in Aristotle's career to make the δύναμις concept more encompassing, and to draw distinctions within that concept instead of contrasting power and other types of properties.

This tendency increases in *Metaphysics* Θ: there we see that the class of δυνάμεις is a quite broad but loosely connected group of properties, united by being either sources of change or closely related to sources of change (*Meta*.Θ.1.1046a1–18). The sorts of examples Aristotle uses vary widely: his most common examples are of arts and of abilities of the body or soul (power to stand or sit, to see or contemplate), but he also includes natures, physical powers broadly, and capacities to exist.[15]

[15]Skills/arts: 1.1046a22–28, 2.1046b6–7, 3.1046b30–36, 5.1048b32–33, 8.1049b30–33, 8.1050a12–13, 8.1050a26–33, 9.1051a8–9. Physical powers 1.1046a22–28, 2.1046b6–7, 3.1047a4–6, 9.1051a9–10. Powers of the soul and/or the body: perception/sensation at 3.1047a7–10, 5.1048b32, 8.1049b20–23, 8.1050a10–11, 8.1050a25–26, 8.1050a36; power to stand at 3.1047a14–18, 28–29; to walk at 3.22–23; to sit at 3.1047a26–27; to contemplate at 8.1050a12–14, 8.1050a36–1050b2; to be healthy or sick at 9.1051a7–8, 9.1051a13. Power to move around in space at 8.1050b15–22. Nature at 8.1049b8–10.

I believe that Θ.6 is meant to introduce a new sort of power, a power to be some substance (i.e., to go beyond a power to cause something to be qualified in a certain way and those types of powers closely

Given the acceptance of learned arts as powers, as well as skills that are acquired by practice (5.1047b32–36), I cannot see why Aristotle would deny that virtues are powers in the scheme of *Metaphysics* Θ, in its encompassing or broad sense of 'power.' The old reasons of *Nicomachean Ethics* are no longer available now that powers are not restricted to abilities that are had naturally. Virtues do seem to be, in some broad sense, sources of certain kinds of changes.

However I suggest that the old state/power distinction is in a way preserved: now it is taken over into the distinction between two sorts of process that a power might be for. Aristotle distinguishes what we might call an activity from a change at Θ.6.1048b18–34. A change is incomplete and has a limit that is outside of itself, a limit that it has not reached while it exists. By contrast an activity is complete and has no such external limit; therefore once you have begun the activity, you have done it (even if you continue to do it). If I go for a stroll, as soon as I do, I have strolled; but if I paint a picture, it is only correct that I have painted a picture after I am done and the process has become a finished event wholly in the past. Another way to put the point is that an activity, unlike a change, has no success condition beyond what it takes to engage in the activity at all (or perhaps to engage in the activity well).

Here, a power in the sense meant to be contrasted with a state corresponds to a δύναμις for a change. The activation of the power results in the exchange of one contrary for another: the change is completed successfully when the other contrary is reached. On the other hand, the activation of a power which corresponds to a state in the old scheme does not result in a lack being replaced by a novel positive property, but is the use or exercise of a power without the production of some product or reaching some external end: and such a power is already completely exercised as soon as it is used at all.

Therefore if we rest by dividing up powers into powers for a change and for an activity, we have the old state/power distinction. Not only does this new idea preserve a modified version of the old scheme, but it is an improvement, precisely because it is compatible with our making the division not in the powers but in their activations.

Take the action of walking to the store. Although walking to the store is a change and incomplete, to be walking with that purpose is an activity and has happened as soon as it is underway. That is to say, as soon as you start walking with the purpose of getting to the store, you have so walked; but it is not true that as soon as you start

related to that). But this is controversial. However the power to be *simpliciter*, i.e., to exist, is clearly endorsed at *Meta*.Θ.8.1050b7–22. This is not a new development from the perspective of the whole corpus: see *De Caelo* A.12 (e.g., 281a27–281b2, 281b19–282a1).

walking to the store, you have walked to the store.[16]

Walking to the store is nothing other than what happens if the activation of the capacity to walk with the purpose of getting to the store goes as planned and without interruption. The exercise of a capacity for a change is itself an activity.[17] That, I think, must be also the meaning of Aristotle's definition of change discussed throughout *Physics* Γ.1–3, hard as it is to explain how the exact words he writes result in this (or in any reasonable meaning).

This is an improvement because these is one underlying substrate, your muscles and your central nervous system and so on, that is responsible for your being able to walk with the purpose of getting to the store and for your being able to walk to the store. It is better to say that there is one power whose activation can be spoken of in two ways, than to say that there is both a power and a state which overlap in substrate and have other systematic connections.[18]

In any case, in *Metaphysics* Θ we see that the term has definitely become a bit of technical jargon: though its roots in the ability of a living organism are still visible, its meaning has been stretched beyond what it might mean in ordinary ancient Greek.[19]

[16]In English at least, we often mark this by making the verb into a participle and adding a form of the verb 'be' as an auxiliary verb. That is, 'He is painting' indicates that he is now activating the power that, should it run to completion, will later have resulted in a completed change. Note that 'He paints' is a somewhat strange or unusual construction, the historical present; while 'He is painting' is mundane (cf. Curthoys and V. Dudman 2012, pp. 98–102). Further if we consider a verb which in its base form already denotes a state or activity instead of a change ('He detests her') it seems at best strange to use the participle construction: *'He is detesting her.'

But while the distinctions in English does seem to have some relation to the change-activity distinction, the match isn't exact: 'He strolls' can only be heard in the historical present, though it is an activity on Aristotle's classification it functions like 'paint,' not 'detest.'

[17]Cf. Code (2003, p. 254):

> Penner suggests that when engaged in a change (such as housebuilding) there are two 'action-like entities involved, an actualization (Ψ-ing) and a movement …an inside and an outside, so to speak ….' (1970, 439). If so, then when the second-level potential builder actually builds there are two actualizations, a change and an exercise of skill, where the latter is a complete actuality.

[18]How then to deal with Aristotle's idea that powers are individuated according to what their activations are (throughout *Meta.*Θ, but see esp. 2.1046b4–15, 8.1049b13–18; cf. *De Anima* 413b30–31)? I see two options: we can take seriously the idea that there is one activation here, although we can speak of it in different ways. (Perhaps by making an intentional distinction as Aristotle does in his definition of change.) Or, we can think of that as an instruction about the logic of ascriptions of capabilities, but not necessarily to be taken seriously as a statement about how many distinct objects exist. This is not the only case like this: as Beere (2010, pp. 47–49) points out, Aristotle distinguishes as separate uses of δύναμις saying that something is able to do something and that something is able to do something well; but it is not so tempting to think that he means to endorse their being two distinct types of objects or properties here, as opposed to that the latter locution marks the excellence of the power spoken of in the former locution.

[19]See Beere (2010, pp. 50–53) for a contrasting view. It's fine to point to uses in Homer or whoever

The term is also now more encompassing than ever before (whether we understand 'before' to follow the order of composition or the order of intended consumption of texts).[20] This, I suggest, isn't an accident: it's the result of Aristotle progressively finding a more and more important role for δυνάμεις in his system. The feature that unifies the class is a relation to a power as a source of change in another thing or insofar as a thing is other. Either a power is defined in terms of such an active power or; in the case of the power to be a certain thing, it is related by analogy.[21]

1.5.3 Previous Attempts to Find Consistency

At least two scholars have identified sub-classes of powers across the development I have laid out.

1.5.3.1 Kenny

Kenny (1976, pp. 52–53) suggests that the rational, "two-way" powers of *Meta*.Θ.5 are identical to voluntarily exercised powers, to cases where (as Aristotle puts it in the *Nicomachean Ethics*) the action is "up to us."[22]

C. Freeland (1986, pp. 81–84) adequately explains why this suggestion is not a good idea, but I will briefly recapitulate her observations.

First, Kenny writes as if the relevant two ways are exercising or not exercising the power. Then he criticizes Aristotle: surely a dog, say, can choose to come or not when

of power words that fit into the way late Aristotle would use δύναμις, but what's needed for the claim that Aristotle's use is at its core the same as the ordinary Greek one is for the extension of the concept in Aristotle to not outstrip the extension of the word in ordinary Greek; and I don't think Beere's discussion establishes that.

[20] I refer to the fact that the corpus seems to have an order in which it was meant to be read by the student. For example, certain texts assume material covered in others, and we notice that Aristotle systematically refers forward or backward, to what will be covered or has already been explained, depending on the texts. For more detailed treatment of this, see Burnyeat (2004).

[21] What this being related by analogy amounts to is out of scope for us, but see Beere (2010, pp. 178–188) for some useful discussion.

[22]

> This two-way ability also was something which interested Aristotle, who drew a sharp distinction between rational powers, such as the ability to speak Greek, and natural powers like the power of fire to burn. If all the necessary conditions for the exercise of a natural power were present, then, he maintained, the power was necessarily exercised; put the wood, appropriately dry, on the fire, and the fire will burn it; there are no two ways about it. Rational powers, however, are essentially, he argued, two-way powers, powers which can be exercised at will: a rational agent, presented with all the necessary external conditions for exercising a power, may choose not to do so. (Kenny 1976, pp. 52–53)

called (in *some* reasonable sense of the word 'choose'!). But the dog's choice is not rational.[23]

In *Metaphysics* Θ.5, Aristotle's goal is to show that the two-way nature of some powers does not result in absurdity (it is not the case that the same power, being activated, causes contraries to actually obtain). He solves the problem by saying that choice breaks the symmetry in such cases: when various triggering conditions obtain *and* the agent chooses to act in one way or another, then only one contrary is produced.

However, the two ways of two-way powers in *Meta*.Θ.5 are not exercising and not exercising, but exercising for contrary results (C. Freeland 1986, p. 81). We are to imagine that the knowledge of doctoring, being the knowledge of what it takes to be healthy and how it comes about, is sufficient to grant the ability to make someone healthy and the ability to make someone sick. So it is simply left open that even non-rational powers may be up to the agent to exercise or not: as C. Freeland (1986, p. 83) points out, nothing rules out that choice or desire enters into the triggering conditions of the power in such cases.

Additionally: in *De Interpretatione* 13.23a1–7 Aristotle tells us that even some irrational powers are for opposite results. That provides room for non-rational two-way powers.[24]

However, if he still thought this by the time he was putting together *Metaphysics* Θ.5, it would be a curious omission that he did not mention it. For, depending on which non-rational powers he thinks have opposite results, invoking choice may not be a plausible explanation for why such powers do not simultaneously realize opposite states when triggered. (If he was thinking of animals' non-rational powers for actions, fine; but if he was thinking of powers of inanimate objects, not so fine.) If that *is* the way out he pictures, one would expect him to state what such two-way non-rational powers are, so it's clear that the solution applies.[25]

[23]Aristotle seems to agree that choice need not be made through the rational faculty.

[24]Perhaps this conflicts with the claim that non-rational powers are one-way at *Meta*.Θ.2.1046b5–6? In that case it is tempting to think Aristotle simply changed his mind about that claim. But see the next footnote for a path to reconciliation.

[25]There are some examples of non-rational two-way powers at *Meta*.Θ.8.1051a8–10: one power is for being built and for being destroyed, for being healthy and being sick, for moving and resting. It's hard to know what to do with this passage in the light of *Meta*.Θ.5. C. Freeland (1986, pp. 76–77) suggests that it is a bit of loose talk and what is really meant is that the same subject will have both capacities and be a subject for both contraries (at different times); but this makes nonsense out of the argument of the passage, which is indeed about powers. Ross (1958, p. 267) claims that this chapter is only about potentiality, and not power; in his commentary St. Thomas claims that the doctrine is about passive power and not active (1868); but I agree with Freeland that neither claim seems plausibly to fit the examples and language of the chapter (76).

Better is the suggestion of Makin (2006, p. 225) that the examples are meant to specifically avoid powers

We might wonder why Aristotle is not clearer in this chapter about Kenny's concerns. As C. Freeland (1986, p. 83) puts it:

> Although I have argued above that Aristotle's concern in ix 2 and 5 is not with the issue of voluntariness, I confess to sharing some of the puzzlement which must have prompted Kenny to read these chapters as he did. Why does Aristotle's treatment of powers fail to deal with the apparently voluntary powers of animals or of non-rational agents?

I think we can answer Freeland's question if we not only accept her contention that Aristotle's aim in *Meta*.Θ.5 is not to explain how voluntary action is possible, but see what his aim *is*. Much of the chapter is occupied with explaining how powers are related to a conditional: given agent and patient with corresponding active and passive powers, if they approach each other and appropriate conditions are met, then necessarily they act to produce what those powers are for.[26] But when it comes to rational powers, the very same substrate grants the ability for opposite results.[27] Aristotle's primary concern is that the two-way nature of rational powers is going to produce a paradox given the conditional that describes how powers behave. His goal is not to explain how the necessity of powers' activation doesn't get in the way of choice, or something like that: it is to explain how the two-way nature of power doesn't get in the way of their necessary activation (given their triggering conditions obtaining).[28] Similarly, a subgoal of this chapter is to show that his account of power does not fall afoul of a paradox of learning (we cannot ever acquire an ability since acquiring requires practicing it). The point of this chapter is to outline that conditional and then defend and explain it in the face of these difficulties. Talking about how choice enters into the activation

that are active *and* non-rational. Then we can say that the two-way character of the non-rational passive power to be built or destroyed is explained by the two-way character of the corresponding rational active power: the same matter is for opposites since it is what is worked on by the active power which is for opposites. (It is a little hard to think of the powers for being healthy and sick as passive powers, but it helps if we think about it as the correlative to the active power that is the doctoring skill.) On this line, I guess we would want to say that when Aristotle contrasts two-way rational powers and one-way non-rational powers in Θ.2 and Θ.5, he is talking only of active powers (which seems to fit the examples given). This seems to me to work, but it is reading in a fair bit of implicit sophistication.

[26] I discuss why we should read the text as asserting such a conditional in chapter 6.

[27] Note that the text suggests that opposite here means opposite in the way that healing and hurting are opposites, not acting and refraining from acting, since Aristotle is imagining that exercises of rational powers *produce* (ποιητική, ποιήσει) opposites (*Meta.* Θ.5.1048a5–10). When I choose not to heal or hurt I don't produce anything, but refrain from production.

[28] The two-way nature of rational powers is not an Aristotelian innovation, but goes back at least to Plato (*Republic* 333e–334a). I.e., Aristotle may well be trying to show that his own new doctrine does not come into conflict with some doctrine effectively already established for him and his peers.

conditions for powers *in general* wouldn't be totally irrelevant, but it would be at least a digression.

In short, I doubt it is wise to identify powers for voluntary actions or for what is up to us in the *Nicomachean Ethics* with two-way powers in *Metaphysics* Θ.5; and anyway the concerns of *Metaphysics* Θ.5 are quite different from those of the *Ethics*.

1.5.3.2 Hintikka

Hintikka (1973c) suggests that the contingencies of *De Interpretatione* 12–13 *are* the powers of *Meta*.Θ.1.

Again, C. Freeland (1986) protests. Contingencies are double-edged: they describe something that may obtain and may fail to obtain. But some powers, she says, are always and only activated.[29] Fire always and necessarily heats. So they cannot be the same.

But here Hintikka (1973c, p. 58) seems to have anticipated and answered Freeland: he claims that this doctrine of *De Interpretatione* is only tentatively held there, and abandoned in *Metaphysics* Θ.8:

> For in *Met.*Θ8.1050b31–4, precisely the opposite view is emphatically put forward by Aristotle by reference 'to our previous discussion': 'But the other potencies …are all potencies for opposites …' Hence everything can be understood in terms of my interpretation precisely in the way already indicated …. (Hintikka 1973c, p. 58)

Actually Aristotle does not abandon his doctrine that fire always heats, though; he repeats it at *Meta*.Θ.8.1050b29–30. The desired clarification comes next: αἱ δ' ἄλογοι τῷ παρεῖναι καὶ μὴ τῆς ἀντιφάσεως ἔσονται αἱ αὐταί, "And irrational potencies will also be potencies for opposite determinations by being absent or not" (33–34). That is, Aristotle is imagining that fire can heat or not heat by not being in that place anymore (or perishing). It is correct after all that the power fire has, though it is always and necessarily activated *when the fire is around*, explains a contingency; and Hintikka is right in the end that contingencies are meant to be connected with change and perishable objects.[30]

[29]At C. Freeland (1986, p. 72); I suppose she is relying on *De Interpretatione* 23a3 and *Meta*.Θ.8.1050b29–30.

[30]Note that 'opposites' here is ἀντιφάσεως, opposites in the sense of contradictories not contraries. That is expected based on the context, for earlier in the chapter Aristotle explains that everything is capable of opposites and this is because, for any capable thing, it is possible for it not to exercise that capacity (Θ.8.1050b8–12). The point is therefore not that every capacity is like the capacity for healing, which also enables its holder to hurt, but that every capacity can fail to be actualized.

Still, it is not right to *identify* contingencies and powers. Contingencies in *De Interpretatione* appear to be propositions or sentences or something like that—things that can be true or false, that enter into inferences and relations of logical equivalence, etc.—while powers are properties or qualities.

In general I don't find Aristotle to be especially careful about keeping types straight, but in this case there are knock-on effects that we would expect him to notice.

In *De Interpretatione* powers are properties that, at least in some cases, explain the truth of contingencies, which means they ought not be identified with each other.

Contingencies have certain logical relations to other modal claims. If something is true but not necessarily true, then it is a contingency. But it is not right that if I do something but it's possible I failed to do it, then I am capable of doing that thing or have the ability to do it.[31] Neither in English nor in Greek do we say that someone is able to do something just because they have done it: it must be possible for them to do it whenever they want (or close to it), somewhat reliably, at a not too improbably distant possibility, without extreme external help, and so on. The sheer possibility that I spontaneously speak flawless French does not mean I have the ability to do it.

Hintikka (1973c, pp. 57–58) makes a reasonable case that contingencies should be read as closely connected to powers in *Meta*.Θ. But his claim that they are *identical* overshoots the mark. Instead, Aristotle merely has in mind in *De Interpretatione* 12–13 that contingencies hold in the realm of changeable and perishable objects *because of* the powers of changeable objects.

1.5.4 Drawing Some Morals

What can we conclude from all this?

On the one hand, there is little consistency across all the texts in the extension of the δύναμις concept. Previous attempts by Kenny and Hintikka to identify certain uses across different texts are unlikely to be correct.

We can impose some doctrinal consistency by distinguishing a wide sense of δύναμις, perhaps the sense described in *Meta*.Θ.1, and a narrower sense where power is contrasted with other dispositional properties like state and condition.

But we should not value doctrinal and terminological consistency so highly that we obscure why the concept developed in the way it did. I would prefer to find unity for the concept by trying to fit these observations together into a coherent narrative, despite that it must needs remain speculative. Anyway here is my speculation.

[31] This difference will recur a few times throughout this dissertation, since it provides a systematic way to tell when Aristotle is talking about possibilities versus capabilities; see Makin (2006, pp. xxiv–xxv).

Over the course of Aristotle's philosophical career, he became increasingly impressed by the idea of a property which is in some sense dispositional or modal and which is explanatorily important for change, both actual particular instances and the structure of types of change in general. As the static world of the *Organon* gives way to the dynamic world of the *Physics*, the theoretical importance of such a property for explaining the systematicity and order of the physical world becomes clearer. As δυνάμεις and the δυνάμει/ἐνεργείᾳ distinction are used more frequently in analysis of other philosophical topics, and in the course of this the concepts are explored further and related to form and matter, it becomes clearer that the theoretically important kind is δύναμις in the wide sense of *Metaphysics* Θ.

At some point it occurs to Aristotle that the activation of a power that is a state, or the activity of a power if we prefer that distinction, has something in common with substantial being: as my strolling consists in the active and cooperative working of certain parts, so the *being* of a material object can be thought of as its matter cooperating to produce a novel thing. Now the form of a compound object can be thought of as the joint and mutually reinforcing activity of the parts, insofar as they have a power to be this thing, instead of as a quasi-mathematical structure that is laid onto the parts or into which the parts are slotted.

This thought is probably then back-propagated into already written texts. Because of the references forward and backward in the texts we can be confident that the texts as we have them must have been edited at least once after writing and probably repeatedly, either by Aristotle or by a later Aristotelian editor (or both).[32] In general I suspect this is part of the explanation for the difficulty commentators have had in tracing a developmental story through Aristotle's writings: commitments and approaches from different periods are not cleanly broken out into different texts. In our particular case this may account or in part account for the apparently ambiguous use of 'form' as an object under a description or together with a property on the one hand and the property itself on the other.

Thus the development of the δύναμις concept is a crucial part of the development of mature Aristotelian metaphysics.

[32] I.e., text A cites text B and text B cites text A; obviously then their compositions must have overlapped in time.

It's a (reasonable) commonplace that the Aristotelian texts we have were not intended as polished publications like a book in contemporary academia, but something more like lecture notes. These revisions may be as unmysterious as periodic updates to classroom materials.

CHAPTER 2

Powers and Efficient Causation

2.1 Introduction

Active causal powers[1] are efficient causes. The very terminology Aristotle uses is a strong indication of this. Powers in general are "sources of change and rest"; different powers are defined as different sorts of sources. Active powers in particular, which we are primarily concerned with, are defined as sources of change in another.[2]

Aristotle also tells us that the causes are sources for changes. The characterization applies to all or almost all of the four causes, but certainly to the efficient cause. Efficient cause indeed seems to be defined as the primary source of change and rest (*Phys*.B.3.194b30).[3]

This makes it very plausible that active causal powers are causes of some sort or another. If causes in general are *defined* as the sources for change, then active powers,

[1]That is, powers in the narrow sense, the sense called primary in *Metaphysics* Θ.1, powers to produce a change in another thing.

[2]For the claim that powers are sources of change and rest, particularly striking passages are *Meta*.Δ.12.1019a15–16 and *Meta*.Θ.1.1046a6–13. Δ.1.1013a13–14 does not show it directly, but shows that some active powers are sources when put together with a claim I will belabor, that skills are powers. *Ph*.B.1.192b20–23 similarly makes a restricted claim, that natures in particular are sources; natures are in the wide class of powers at *Meta*.Θ.8.1049a8–10.

[3]Since I have claimed that the same characterization as source of change and rest is used for causes, here are some sources for that. See for example *Ph*.B.3.194b16–23 (esp. 20-22), *Ph*.Γ.1.200b12–14, *Meta*.Δ.1.1013a16–17, and Δ.4.1015a17–19; again it is a frequent claim.

However, intriguingly, the source of change is identified with the efficient cause and in these terms *contrasted* with the final cause at *Meta*.Δ.2.1013b11 and (perhaps) 24–25 (doubled at *Phys*.B.3.195a10–11 and 22-23). That final causes are not sources of change strikes me as an idiosyncratic claim. Since I wish to use these terminological points to identify active powers with a subset of efficient causes, it is no great harm to the main claims of this chapter if 'sources of change' turn out to be restricted to exclude final causes. In fact it may help: then there is not a danger that Aristotle means that powers are a source of change in the sense of being a final cause.

Still, I encourage the reader not to put too much stress on such isolated cases. I tentatively suggest that Aristotle regarded the efficient cause as the cause best labeled as source of change and rest, though the others may deserve the appellation as well and are primary in other respects.

being sources for change, would have to be some sort of cause. Though this does not secure that active powers are *efficient* causes, that would seem by far to be the most reasonable candidate of the four causes, and when we examine Aristotle's examples and analysis of change and efficient causation, we will see that this is the best way to make sense of this claim.[4]

It may be objected that causes are sources for change but there are other sources for change as well—i.e., that is not intended as a defining remark but just as a assertion about causes. Then it will not follow from the fact that active powers are defined as a kind of source for change that they are among the causes. I think it is very plausible that what it is to be a cause is to be an explanatory principle of a change. But even if that is not always correct, it may still be that active powers are efficient causes; and I will show that there is plenty of textual evidence showing that it is so.

There is a difficulty with this view. In at least plenty of cases, Aristotle identifies active powers with forms. This may lead us in a couple of directions, which I will take these as foils and alternatives to my own view.

First, one might think this is a good reason to deny that powers, or at least the powers that are forms, are causes. There are a couple of ways to develop this idea.

[4]The focus in this chapter is on active causal powers; in general when I say 'power' in this chapter without any qualification, I mean active power. Aristotle clearly believes that active powers are prior to, e.g., passive powers, let alone powers to resist a change, to do something well, etc. (This is discussed by him in *Metaphysics* Θ.1, and we will go over this more slowly below.) Thus it is reasonable for us to start with active causal powers, too.

Caston complains that, against the claims here, passive powers are not efficient causes. For, he says, only active powers are sources for motion. To the first I say fine and good: I mean that powers in the narrow and strict sense, active powers, are efficient causes. But Caston's proffered justification is wrong: Aristotle is quite explicit that the whole wide class of powers defined in terms of active powers are sources, and that passive powers are sources for a change:

> ὅτι μὲν οὖν λέγεται πολλαχῶς ἡ δύναμις καὶ τὸ δύνασθαι, διώρισται ἡμῖν ἐν ἄλλοις· τούτων δ' ὅσαι μὲν ὁμωνύμως λέγονται δυνάμεις ἀφείσθωσαν …ὅσαι δὲ πρὸς τὸ αὐτὸ εἶδος, πᾶσαι ἀρχαί τινές εἰσι, καὶ πρὸς πρώτην μίαν λέγονται, ἥ ἐστιν ἀρχὴ μεταβολῆς ἐν ἄλλῳ ἢ ᾗ ἄλλο. ἡ μὲν γὰρ τοῦ παθεῖν ἐστὶ δύναμις, ἡ ἐν αὐτῷ τῷ πάσχοντι ἀρχὴ μεταβολῆς παθητικῆς ὑπ' ἄλλου ἢ ᾗ ἄλλο· (*Metaphysics* Θ.1.1046a6–13)
>
> That power and being capable are said in many ways, we have gone through in other places. We may put aside those powers among these that are said homonomously …but however many are in relation to one primary kind, these are all sources, and said in relation to the primary power, which is a source of change in another or insofar as it is other. For one is a power of being affected, a source of change in the thing affected and of a passive change by another or insofar as it is other.

Caston also complains that not all efficient causes are powers, and cites two interesting examples, the absent helmsmen as efficient cause and God. But I said that powers are efficient causes, not that efficient causes are powers. Another reason I would not endorse the claim that efficient causes are powers is discussed at footnote 52.

Perhaps it is only the case that objects are in the first place causes; forms and powers are only "causally relevant." This is dubious; Aristotle says many times of forms and active powers that they are causes, and, we will see, there is frequently nothing in the text corresponding to 'causal relevance.' And of course such a view cries out for an explanation for what causal relevance actually amounts to such that abstract forms can be causally relevant without having any actual causal abilities.

Here is another attempt, which seems to be what Everson (1999, pp. 46–55) develops. According to him it is the material object which is in the strict or primary sense a cause. The form or power is a cause in a secondary way, *in virtue of the* role it plays in the material object's activity. Since on this view the form gets its causal role parasitically on the causal activity of the material object, I will call this the *causation by courtesy* view.[5]

Everson is objecting to another commentator on this topic, Frede. Frede, like me, takes it that Aristotle is committed both to forms literally being causes and their being causes not in a derivative or secondary sense. Of course I am going to defend that Fredean commitment.

But there are two disagreements I have with Frede. He is committed to something stronger than that forms are non-derivatively causes: he flips Everson's prioritization and insists that forms, and *not* material objects, are primarily or strictly speaking efficient causes. Toward the end of this chapter I will argue that Frede is not correct that material objects are *not* first-class causes. Both forms and material objects are first-class, non-derivative, literal causes.

Second, on Frede's view the fact that forms are first-class causes means the label 'efficient cause' is highly misleading. For forms are abstract and inert; this shows that it

[5]At first it seems Everson will defend the first variant, that powers are not causes at all. For he says "we need to show that Aristotle does not in fact treat abstract items as efficient causes" (48). In context "abstract items" clearly refers to forms, with the art of sculpture as the example at hand.

But he then backs off to the claim that "if, however, one looks at the places where Aristotle provides some elucidation of the way in which arts are *aitia*, then it is reasonably clear that, strictly speaking, it is the artist and not his art which is the efficient cause" (49). This second quotation seems more amenable to the idea that Aristotle says that arts are causes, for it generates the implicature that forms are causes, though only loosely speaking—otherwise why use the phrase "strictly speaking" at all.

That impression is confirmed when Everson, in summarizing the discussion, says that "…Aristotle takes efficient causes not to be events but the capacities or dispositions possessed by substances …" (54). That seems to explicitly walk back the first claim. (Note that he says that "the form instantiated in a particular substance, such as the art of healing possessed by a particular doctor" (50), is the causally relevant form.)

So it seems Everson is a bit sloppy about variations on the idea: sometimes arts are not causes, sometimes they are causes but not "strictly speaking," sometimes they are causes. In my view the most charitable way to take him overall is as saying that forms are literally causes but only secondarily or by courtesy. I'll continue to consider the alternatives—indeed we will spend several pages looking at texts where Aristotle does call various forms causes, to refute the view that forms are not efficient causes at all—but I'll use him as a representative of that strongest variant.

is a mistake to think of Aristotelian efficient causation as closely related to causation (as we speak of it) at all. This view is expounded in Frede (1980), Frede (1992), and Falcon (2015).

Here we have Frede suggesting both that forms are more strictly efficient causes and that this is deceptive if it suggests they are like our causes:

> However muddled our notion of a cause may be it is clear that we would have difficulties in using the term 'cause' for the kinds of things Aristotle calls 'causes' .... For an end, a form, or matter do not seem to be the right kinds of items to cause anything, let alone to be causes. ...Quite generally our use of causal terms seems to be strongly colored by the notion that in causation there is something which in some sense does something or other ...there is a strong tendency to conceive of causes as somehow active. And it seems that our difficulty with the Aristotelian causes is that they cannot even be conceived of in this way. ...It is only with Aristotle's moving cause [i.e., with efficient cause] that we think that we readily understand why it should be called a cause. But it would be a mistake to think that Aristotle with his notion of a moving cause tries to capture our notion of cause .... For Aristotle in more theoretical contexts will tell that it is not the sculptor working on his sculpture who is the moving cause, but the art of sculpture. And with the art of sculpture we have the same problems as with ends, forms, and matter. (Frede 1980, pp. 217–8)

Similarly

> ...Aristotle explains that strictly speaking, it is not the sculptor who is the efficient cause of the sculpture, the builder who is the efficient cause of the house, but the art of building and the art of sculpting. ...Nobody assumes that the art of building is an agent or has any causal efficacy .... To refer to the art here is not to refer to the thoughts, beliefs, and intentions of the builder. (Frede 1992, p. 95)

6

[6]Compare, Frede's student Falcon:

> However, an adequate explanation of the production of a statue requires also a reference to the efficient cause or the principle that produces the statue. For Aristotle, this principle is the art of bronze-casting the statue (*Phys.* 195 a 6-8. Cf. *Metaph.* 1013 b 6–9). This is mildly surprising and requires a few words of elaboration. There is no doubt that the

I will have little to say about Frede's insistence that Aristotelian efficient causation is deeply different from our own, or that the terminology is misleading, mostly because I want to avoid discussion of the contemporary concept causation in itself. But I will argue at some length against the justification he uses for that claim. According to Frede it is a mistake to think of Aristotelian efficient causes as "somehow active." But the very fact that efficient causes are simultaneously powers and forms casts doubt on this. For the change that the active power causes (and that the passive power undergoes) *is* an activation of the powers.

Therefore Aristotle *does* think of his efficient causes as actors doing something. Much of what I have to say will be taken up explaining how this could be the case without abandoning the claims that forms and material objects can both be efficient causes.

I will argue that an active power acts as an efficient cause by organizing and ordering the change that is its activation. The resulting change (and product, if it exists) gets its character as that sort of change from interacting with the power.

This is genuine activity of the active power: it governs and steers the unfolding process. But it isn't (though it doesn't rule out) activity in the sense of pushing and pulling: the fundamental metaphor is of transmission of order and structure, not transmission of momentum, energy, "biff" or "vim."

One billiard ball striking another is not an efficient cause in this sense. (As we will see Aristotle tends to describe the one ball not as a cause, but as a mover—of course that does not rule out that in come cases the mover is also a cause.) But we too understand what is meant when the civil engineer is held responsible for the placement of some feature, and not the construction worker who actually placed it. For it is the character of the engineer's beliefs and decisions that determined where the feature would go, and the construction worker implemented the decision. The construction worker moved the materials, but the source of the process was the engineer.

These are the two claims I mean to primarily defend here: that powers are efficient

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> art of bronze-casting resides in an individual artisan who is responsible for the production of the statue. But, according to Aristotle, all the artisan does in the production of the statue is the manifestation of specific knowledge. This knowledge, not the artisan who has mastered it, is the salient explanatory factor that one should pick as the most accurate specification of the efficient cause (*Phys*. 195 b 21–25). By picking the art, not the artisan, Aristotle is not just trying to provide an explanation of the production of the statue that is not dependent upon the desires, beliefs and intentions of the individual artisan; he is trying to offer an entirely different type of explanation; an explanation that does not make a reference, implicit or explicit, to these desires, beliefs and intentions. (Falcon 2015, sec. 2)

Cf. also Williams (1982, p. 122).

causes, and that they effect their changes by directing how the process unfolds by governing a physical process. They transmit and enforce the structure of the process and the product.

As mentioned, forms and compound material objects are on an equal footing as efficient causes. I finish the chapter by looking at *Physics* B.3, where some commentators have seen evidence that forms, in the most proper sense, are efficient causes, and try to show that text need not be read that way.

2.2 Examples of Forms Functioning as Efficient Causes

2.2.1 Skills and Arts

In *Physics* B.3, Aristotle introduces his machinery of the four causes. Judging by the examples given, the causes are apparently meant to explain both things and changes. Our focus is on the efficient cause. If we wish to keep track of Aristotle's claims about this type of cause, we must keep in mind that "efficient cause" is not Aristotle's term. He has a different terminology for for this category. Aristotle introduces this type of cause as ὅθεν ἡ ἀρχὴ τῆς μεταβολῆς ἡ πρώτη ἢ τῆς ἠρεμήσεως, οἷον ὁ βουλεύσας αἴτιος, καὶ ὁ πατὴρ τοῦ τέκνου, καὶ ὅλως τὸ ποιοῦν τοῦ ποιουμένου καὶ τὸ μεταβάλλον τοῦ μεταβαλλουμένου (194b29–32). It is "the primary source whence comes the transition and rest: for example, the man who has deliberated, and the father of the child; and, in general, the maker of what is made and the changer of what is changed." After Aristotle first glosses the four sorts of causes, he mentions that the same event can have multiple causes, causes of different sorts. He says

> τὰ μὲν οὖν αἴτια σχεδὸν τοσαυταχῶς λέγεται, συμβαίνει δὲ πολλαχῶς λεγομένων τῶν αἰτίων καὶ πολλὰ τοῦ αὐτοῦ αἴτια εἶναι, οὐ κατὰ συμβεβηκός, οἷον τοῦ ἀνδριάντος καὶ ἡ ἀνδριαντοποιικὴ[7] καὶ ὁ χαλκός, οὐ καθ' ἕτερόν τι ἀλλ' ᾗ ἀνδριάς, ἀλλ' οὐ τὸν αὐτὸν τρόπον, ἀλλὰ τὸ μὲν ὡς ὕλη τὸ δ' ὡς ὅθεν ἡ κίνησις. (195a3–8)
>
> Then perhaps the causes are said in so many ways. It follows that, since the causes are said in many ways, there are many causes of the same thing, and not coincidentally. For example, the art of statue-making and the bronze

[7]So manuscripts EJ[1]; the less reliable FI have ἀνδριαντοποιητικὴ.

The word is important for the following discussion, for I wish to insist on taking literally the claim that the art of statue-making is an efficient cause. But I detect no difference in meaning between the two readings that is relevant for our purposes. I proceed following Ross' decision to print ἀνδριαντοποιικὴ.

> are causes of the statue, not in virtue of some other thing but insofar as it is a statue, but not in the same way. Rather, the one is cause as matter and the other as whence the change comes.[8]

The art of statue-making is a cause. What sort of cause is it? Aristotle says that one of these is the matter and the other is the efficient cause, the cause "as whence the change comes." The bronze is the other cause given, and it is surely the matter for the statue and not the efficient cause, so the art is the efficient cause.

Let's pause here for a moment and appreciate this passage.

First, here we have the bald statement that the art of the statue is a cause. Note that there no hesitation here: it is not that it is "causally relevant" or parasitic on anything futher. It simply is a cause of the statue.

Second, this is not an indirect statement. We are not drawing out implications that Aristotle may have not seen or meant, for example. He says outright that the art and the bronze are causes, and one is the efficient cause and one the matter. I cannot see how to read this passage as saying anything other than that. If the interpreter takes it that Aristotle does not think the art is a cause, they must take it that Aristotle blundered, for here he says it is.

If they take it that Aristotle thinks the art is a cause but only in a secondary or derivative way, at least the text doesn't contradict the interpretation. But it is quite a deceptive presentation for it mentions nothing of the sort.

It is worth emphasizing that this is the introduction of the introduction of the efficient cause concept. There are cases where one expects an introduction to gloss over details, e.g., when the details are difficult to grasp at the outset. But it is implausible that Aristotle would regard the idea that the form is only derivatively a cause as so difficult as to require such working up to. That's not an idea that needs extensive prerequisites to grasp. Nor is Aristotle especially concerned to be gentle or non-technical here: for example, here he casually slings around his relatively obscure notions of accidental and *per se* predication.[9]

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[8]Very similar remarks with the same upshot for our argument are given in *Metaphysics* Δ.2, the chapter on cause (which borrows heavily from this chapter of the *Physics*.)

[9]I was instructed to compare the reasoning here with *Mete*.4.5 382a28–29. But in the first place that passage is compatible with this one and with the reading of it given here. It contrasts the agent as efficient cause (and this does seem to be not the quality but an object, since it acts in virtue of qualities) with the *pathos* which is a form. But unlike Frede I do not deny that a material object can be an efficient cause (there are several examples of that, too, in *Phys*.B.3) nor do I deny that a form can play a role in causation that is not efficient causal, e.g., the form transmitted. This passage *does* appear to characterize the efficient cause as a material object and contrast that with the quality that is not an efficient cause, but nothing about it clearly indicates that it would be inappropriate in this or another context to call a form

I want to explicitly flag, too, that the art is not the formal cause; that's not one of the options. The phrase "as whence the change comes" refers back to the characterization we saw of the efficient cause at 194b29, ὅθεν ἡ ἀρχὴ τῆς μεταβολῆς ἡ πρώτη ἢ τῆς ἠρεμήσεως. It does not pick up on any of Aristotle's characterizations of the formal cause earlier in the chapter (194b26–29).[10]

In the above I assumed but did not try to show that the art of statue-making is a form. Now I will argue for that. The art is the form of the artifact that the art produces. Thus we already glimpse in this claim the theory of efficient causation as transmission of form.

Here are a couple of clear statements of the doctrine that concerns us, that the art is the form of the type of thing it produces, and efficient cause of the artifacts it results in.

At *Generation of Animals* B.1.735a1–5, Aristotle says

> σκληρὸν μὲν γὰρ καὶ μαλακὸν τὸν σίδηρον ποιεῖ τὸ θερμὸν καὶ τὸ ψυχρόν, ἀλλὰ ξίφος ἡ κίνησις ἡ τῶν ὀργάνων, ἔχουσα λόγον τὸν τῆς τέχνης. ἡ γὰρ τέχνη ἀρχὴ καὶ εἶδος τοῦ γινομένου, ἀλλ' ἐν ἑτέρῳ· ἡ δὲ τῆς φύσεως κίνησις ἐν αὐτῷ ἀφ' ἑτέρας οὖσα φύσεως τῆς ἐχούσης τὸ εἶδος ἐνεργείᾳ.
>
> Heat and cold make the iron hard or soft, but the motion of the instruments makes the sword, since it has the account of the art. For the art is the source

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an efficient cause.

Indeed I think the passage helps rather less than the objector hopes, for they should not hope to put a great deal of stress on the precise words that Aristotle uses. For he cites the qualities in virtue of which the agent acts in a more agential tone than the objector should hope for if the point is to make this distinction: in the next lines we see that "the quality is produced either by (ὑπό) the being present or the being absent of heat and cold" (381a32–381b1; cf. 382b16–18, and note the feminine τῆς ἐντὸς θερμότητος—heat and not a hot object is intended). If the passage intended to draw a strong contrast between the agency of the object and the principles by which it worked, it should not use ὑπο + genitive—standardly for an agential or causal relation—to point out the role of the qualities, but probably a dative (the agent acts, but does it *by means of* the qualities).

To be clear I am *not* saying that carefully marking a distinction like this is what I expect from Aristotle; on the contrary, my position is that Aristotle is often happy to be fluid and careless about the type distinction between qualified object and quality in virtue of which it is so qualified. The point is rather that my opponent who points to a passage needs to take it that Aristotle is being careful on these sorts of type issues if they are going to make hay out of the way Aristotle expresses himself, especially in the absence of any claim that alternative ways of expressing himself would not be okay; and that precision is missing.

To put a similar point in a somewhat different way: the text there suggests his concern is with heat and dryness and cold and wetness and how these interact, not with causation in itself; and it is on the former facts and not the latter where we would expect him to exert care about getting the formulations right.

[10]Those characteriztions are "the form or model, the definition of the essence, the genuses, …and the parts of the definition."

An explicit characterization of an art as efficient cause similar to the one discussed above is at *Meta*.B.996b6–7.

> and the form of what is generated, but in another. The motion of nature is in a thing from another nature which has the form in actuality.

Here we see that in a case of the generation of an artifact, a sword, heat and cold are the causes of the material changes in what will become the matter of the artifact. But what causes the sword itself to come about is not the applications of heat and cold, but their organization.

This is not organization in the abstract sense of a separated Platonic universal, but the organization "in another," i.e., in the mind of the artisan.[11] But the fact that the art is held in a person is in no tension with the observation that Aristotle plainly has it that the art is a source of another object's coming into being (ἀρχὴ …τοῦ γινομένου) and makes (ποιεῖ) it.

Again, it is worth belaboring the point. *Someone* could make this point and insist that because the art is in an artisan, the artisan is really the one doing the causal work. That is just not what this text says. In the first place there is no discussion or reference to "causal relevance" or to causation "by courtesy" or in some second-hand way. In the second the causal language is straightforwardly applied to the art: it is a source of generation in another thing, and it makes the sword.

This language is of course familiar: a source of a change in another thing is how an active causal power is defined at *Metaphysics* Θ.1.1046a9–11. If the art matches the definition, it is what is defined too; so the art is a causal power. And that is right in line with the examples of powers as skills and arts that *Metaphysics* Θ is littered with.[12]

And those skills are indeed presented in *Metaphysics* Θ as active causal powers. Aristotle says

> διὸ πᾶσαι αἱ τέχναι καὶ αἱ ποιητικαὶ ἐπιστῆμαι δυνάμεις εἰσίν· ἀρχαὶ γὰρ μεταβλητικαί εἰσιν ἐν ἄλλῳ ἢ ᾗ ἄλλο. (*Meta.*Θ.2.1046b2–4)
>
> That is why all skills and productive knowledge are powers. For they are sources for change in another or insofar as it is other.

By now we have a few examples of Aristotle calling a skill a source for change in another and plenty of good reason to conclude he means them to be active powers. We further have several instances of Aristotle straightforwardly calling a skill an efficient cause. Despite the Eversonian line, we did not see those attributions hedged or any reference to mere causal relevance.

[11]This is more explicit at *Metaphysics* Z.7, e.g., 1032b20–25: the form of health is in the physician, in the mind, etc.

[12]See footnote 15 for a breakdown of where different sorts of powers appear in *Metaphysics* Θ.

I've already noted the similarity in definitions here: a power is a source for change in another object (or in the same object insofar as it is other), while an efficient cause is the primary source whence comes a change. It is very natural to close the link and suggest that a power is a source for a change in another object by means of being the source where the change comes from.[13]

Let us see how one might try to deny it. There are two differences in the locutions. First, the power is specified with care for where the change is, viz., in another, and the efficient cause is not. Second, the power is simply a source *of the change* while the cause is a source *whence the change comes*.

But neither of these is enough to uphold some deep difference between efficient causes and active powers (that actually act).

On the first purported distinction: I note that Aristotle does appear to be committed to the idea that efficient causes are not in what they affect (as such). For in *Metaphysics* Δ.1, the chapter on sources, Aristotle discusses efficient causes as one of the examples, and says

> ἡ δὲ ὅθεν γίγνεται πρῶτον μὴ ἐνυπάρχοντος καὶ ὅθεν πρῶτον ἡ κίνησις πέφυκεν ἄρχεσθαι καὶ ἡ μεταβολή, οἷον τὸ τέκνον ἐκ τοῦ πατρὸς καὶ τῆς μητρὸς καὶ ἡ μάχη ἐκ τῆς λοιδορίας· (*Metaphysics* Δ.1.1013a7–10)
>
> [And another sort of source is] the source (which is not a constituent) whence something first comes to, whence the change or motion naturally first starts, for example a child from the father and mother and the fight from the abuse.

It's clear, between the language used, the examples given, and process of elimination with the other types of source described in that chapter, that we are here talking about the efficient cause. And it does not seem that this is allowed to be in the thing that it is

[13]Will this get us into the position where we have to say all efficient causes are active powers? I hope not: I've already mentioned some cases that seem to be problems. But I think the strategy pursued here doesn't rule out pursuing *ad hoc* strategies for defusing problem cases. For example we've mentioned the case of the absence of the helmsman as an efficient cause; but this already strikes me as an idiosyncratic example for Aristotle that may require a special explanation for how it can be an efficient cause. (All of Aristotle's formulations for efficient cause seem to require that it at least be a being in its own right, but I am not sure that a lack of a helmsman is.) Similarly matter can function as an efficient cause, I think (see footnote 52), though Aristotle mentions it rarely; but it doesn't do so *as matter*, as something configured by a further form.

Pursuing these kinds of *ad hoc* strategies interpretively doesn't make sense for philosophers who try to be rigid, exact, and encompassing with their statements, but I do not think Aristotle is a philosopher like that. He is often content, for example, to rest without trying to come up with clean and exhaustive definitions on the grounds that there may be many related senses for something (and that sort of thing may be just the thing to say for problem cases of causation).

causing the change in (μὴ ἐνυπάρχοντος). This is very similar to the prescription that an active power be in another thing than what is affected or in what is affected but not as such, enough so that I think it is not very plausible to suggest Aristotle does not have the same requirement in mind.[14]

The second is harder. But I still think it is not a plausible thing for an objector to lean on. For they would need to give an explanation for why causes but not powers should count as whence the change comes. It is tempting to try to say something like: the change comes from the thing whose activity actually kicks it off. It is tempting because the objector wants to say that this is a property that the object but not the skill or the form could have. The problem is that we have already found particular examples causally acting powers, so the objector cannot really fall back to such a distinction in types.

In other words, we have already that *some* forms, namely skills, i.e., certain active powers, *can* cause a process or a product. And in those cases there was textual reason to accept that the skill is an efficient cause. So in those cases we have to accept that the skill can be the kind of thing "whence a change comes." Once we've gone this far, it's hard to see on what grounds we can dig in and insist that this does not happen in general with active powers when they cause things.

Furthermore, in the cases we saw, the skill's causal activity was not some highly unusual fringe case. The skill of sword-making is causal when an artisan makes a sword; the skill of statue-building when the statue-maker works.[15] So it is hard to see how we can reasonably defend the claim that this is some special feature of these examples, as opposed to something that happens when active powers act.

Indeed my basic suggestion is that the activation of a power and the activity of the powerful object are not really on different levels of causal legitimacy in Aristotle's mind. When one happens, the other does too. Both Everson and Frede suggest that one type of thing has to be privileged as the more genuine cause. But as far as I can see while there is plenty of textual evidence that Aristotle is willing to treat both types of things as causes, there is little or none that he cares to rank the types by priority.[16]

[14]Ideally we would be able to say why this requirement is part of the definition in one case and brought up as a non-definitional requirement in the other.

[15]This is of course compatible with the claim that the artisan is cause, too.

[16]Here I am basically in agreement with the remarks of Kosman (1969, p. 46):

> I have spoken throughout of the actuality (and making actual) of *a potentiality*, rather than of the subject of a potentiality. In his definition of motion, Aristotle speaks only of the latter, but it is clear that he would allow the other mode of speech, which he sometimes uses. The function of "*qua* …" (ᾗ) makes clear this fact.

I think there is a reasonable way to understand the lack of the locution in the case of the power compared to that of the efficient cause, that makes it not a "deep" difference. It is basically a matter of what one is picturing. The paradigmatic efficient cause is already acting: a process is proceeding from it and under its guidance. This isn't true in the case of a power; the possibility of inert powers is much more salient. This isn't a deep distinction between the two: for example Aristotle could clearly have defined powers instead as the source of a change in another such that, when there is a change, the power is whence it comes. The point is that efficient causes, to actually be efficient causes, have to actually do some causing. Powers are not like that. Still, active powers are efficient causes in the sense that they are a type of thing that can be efficient causes.

2.2.2 Miscellaneous Other Examples

When Aristotle writes of crafts as efficient causes, it is not a special case of form as efficient cause. I wish to mention two more examples to show this.

First, Aristotle is extremely blunt that the soul is an efficient cause:

> ὁμοίως δ' ἡ ψυχὴ κατὰ τοὺς διωρισμέ νους τρόπους τρεῖς αἰτία· καὶ γὰρ ὅθεν ἡ κίνησις καὶ οὗ ἕνεκα καὶ ὡς ἡ οὐσία τῶν ἐμψύχων σωμάτων ἡ ψυχὴ αἰτία. (*De Anima* B.4.415b8–12)
>
> The soul is the cause and source of the living body. These [i.e., causes] are said in many ways. But the soul is equally the cause in three ways we have distinguished. For the soul is that whence the change comes, and that for the sake of which, and it is cause as the substance of ensouled bodies.

There is nothing about causal relevance. The statement is very clear: the soul is three sorts of causes, and those include the cause whence the change comes.

There are plenty of examples in *De Anima* where Aristotle says the soul is a cause, or is (in part?) a power to act in some way, or describes it as doing something. At this point we should not be much impressed by the fact that he is not constantly repeating the formula for efficient cause in particular. He is telling us that the soul is a cause, or that it does things, and these seem to be or to crucially involve processes and changes in another, i.e., they are cases where the soul is an efficient cause.

The soul is what feeds; the agent, the soul, works on the patient, food.[17] The soul is

[17]"There are three factors, the thing fed, that by which it is fed, and the thing feeding; the thing feeding is the soul in the primary sense, the thing fed the body holding the soul, and that by which it is fed, the food" (416b21–24).

the cause of processes like growth and maturation of the organism (*DA*.B.4).[18] The soul is (in part?) the power for an animal's locomotion through space (*DA*.B.4.415b12, 23; Γ.9.432a15–18, *DM*.6.700b10 and ff.), and we might speculate that a fuller Aristotelian account of animal self-motion would also explain how the soul is the cause of animal self-motion that is not locomotion.[19]

Of course the soul is explicitly and repeatedly defined as a kind of form, the form of the living thing (e.g., *De Anima* B.1.412a20–23, B.2.414a13–15). Thus the soul is an example of a form that is an efficient cause.[20]

2.2.2.1 The Rylean Passage

However the soul is a funny case for my argument, because it is the one place I see so far where the causation by courtesy view can get some clear textual footing. That is the notorious "Rylean passage" in *De Anima*:

> εὐλογώτερον δ' ἀπορήσειεν ἄν τις περὶ αὐτῆς ὡς κινουμένης, εἰς τὰ τοιαῦτα ἀποβλέψας· φαμὲν γὰρ τὴν ψυχὴν λυπεῖσθαι χαίρειν, θαρρεῖν φοβεῖσθαι, ἔτι δὲ ὀργίζεσθαί τε καὶ αἰσθάνεσθαι καὶ διανοεῖσθαι· ταῦτα δὲ πάντα κινήσεις εἶναι δοκοῦσιν. …τὸ δὴ λέγειν ὀργίζεσθαι τὴν ψυχὴν ὅμοιον κἂν εἴ τις λέγοι τὴν ψυχὴν ὑφαίνειν ἢ οἰκοδομεῖν· βέλτιον γὰρ ἴσως μὴ λέγειν τὴν ψυχὴν ἐλεεῖν ἢ μανθάνειν ἢ διανοεῖσθαι, ἀλλὰ τὸν ἄνθρωπον τῇ ψυχῇ· (*De Anima* A.4.408a34–308b15)
>
> Someone might, speaking well, raise a puzzle about the soul's motion, looking to the following sorts of considerations. For we say the soul is in pain and rejoices, is brave and afraid, and moreover that it is angry and senses and thinks. These all seem to be changes. …Perhaps it is better not to say the soul grieves or learns or thinks, but that the man does with the soul.

Unfortunately for me, this seems quite clearly to back the a view in the Eversonian spirit. Even *if* it is okay to say that the soul grieves, etc.—and it's by no means clear that the passage is envisioning the answer 'yes' to that—still it is better to say that the whole being does so, and it does so together with (or perhaps by means of) the soul.

[18]"To some people the nature of fire seems simply to be the cause (αἰτία) of nutrition and growth. …it is in a sense a helping cause, but not simply a cause (αἴτιον), but that is more correctly the soul" (416a10–16). The question is what holds a living thing together as its parts try to spin off in different directions (6–7).

[19]Perhaps, as Lorenz (2006, 141n13) has it, Aristotle thought that with treating self-motion in general is not difficult once one has in hand an explanation for the special case of self-locomotion.

[20]A few other places where forms are efficient causes: *Meta*.E.1.1025b22–24; throughout *Meta*.Z.7–9; *Meta*.Z.17, esp. 1041a27–32; *GC*.A.7.

This passage is a real problem, and I am not sure what the right thing to say about it is. But I can make a few remarks:

First, this is a singular and strange passage. It stands against many passages where the soul or other forms are efficient causes. The bulk of passages cutting against this one do not wash it away; but if we want to interpret someone's overall thought, it will be a mistake to focus on a single passage and ignore the others that seem to paint a different picture.

Second, this passage is incompatible not just with the current view of causation, but with general deep Aristotelian commitments about the soul. For in many other places Aristotle does treat the soul as a subject, a subject to mental states in particular, and, of course, as a substance.[21] In other words, this is not special pleading: this really is a strange passage that contradicts the general current of Aristotelian thinking.

Finally, this passage presents itself confidently, hedging its bets only with the minor qualification 'perhaps' at line 13. But we should note that it belongs to a preliminary working-through of Aristotle's predecessors' views, and a typical part of that is considering the merits and demerits of views that will ultimately be discarded. This passage occurs early in the work and its commitments seem to be quickly forgotten. A possibility is that it was intended as not as a full-throated defense of the view expressed, but as mooting a possibility that is discarded relatively quickly.[22]

2.3 Alternatives

My proposal for the nature of powers will be clarified further if we work through an initially compelling objection.

Active powers are forms, at least in the case of the active powers we've examined. In the case of a craft, I claimed the power was an ability and a form of the product in the mind of the craftsman.

In the claim that forms are real, genuine, non-derivative causes, I follow Frede. But according to Frede, as we saw, forms are also not the right kind of thing to be an efficient cause in the sense of being active. That part of the view seems hard to square

[21]Shields (2016, p. 144) conveniently collects a small representative sample: soul is substance at 412a19–20, *Meta*.1037a5, subject at *Meta*.1029a1–2, subject of mental states at *Meta*.429a10–11.

Shields' hope seems to be that if the dative *te(i) psuche(i)* is handled gingerly enough, the tension can between these passages and the Rylean passage can be resolved; I am skeptical.

[22]After all we clearly have soul as substance immediately after the sifting through the opinions of the ancients at B.1.412a20–21; it's a live possibility that the soul is in the body like a sailor in a ship at B.1.413a5–10; and by B.4.415b9–15 it is the cause of the living body, as substance, efficient cause, and final cause. These conclusions are reached rapidly after this passage and they are hard to square with it.

with the evidence we saw: forms were described with productive language (recall that the art of the sword made, that the heat moved, that the statue-form was the source from which the change proceeded). And I suggested that the activation of a power and the activity of an object that uses that power are basically on a par as far as causal legitimacy goes, which of course is also anti-Fredean.

In the next several sections I will object first to Frede's views, then to Everson's. In objecting to Frede I will mostly follow the spirit of Everson's objections to him: Frede's interpretation makes Aristotle's view too Platonic in the light of Aristotle's rejection of Platonic separate, abstract forms.

That means that the next two sections reject two possible ways to construe the causal status of forms. I will then give another account: I will claim that the central point in saying that a power or form is an efficient cause is that its structure is propagated through a series of physical intermediary motions to a product. I will point to a view of forms which has fallen out of favor recently, but undeservedly so, where the form is what is worked up to by a change of the matter: that is, the form is a man (under a certain type, perhaps; insofar as its being a man is a certain activity of its body). That view can help us make sense of how this kind of propagation could start in a form.

2.4 Rejecting Alternatives

Everson already raises an important problem for Frede's view of forms as inactive causes (see esp. Everson 1999, p. 50). His objection by itself is strong enough to motivate searching for an alternative to Frede. But the same considerations are easy to extend into an objection against Everson's own causation by courtesy view.

Aristotelian efficient causes strictly speaking must be active, according to Everson. For Aristotle takes Plato to task for making inert Platonic Forms into generative causes (*Meta*.A.9.991a9–15, b3–8).[23] Platonic Forms always exist and are unchanging, and so they cannot explain of effects which only sometimes exist why they exist at those times and not others.

We would therefore expect Aristotelian forms, if efficient causes, not to fall into the same error. And as we have stated there is too much textual evidence that forms are efficient causes to simply reject that forms as well as material objects are causes.

Let us add to Everson's criticism: for Frede the Aristotelian form is the art of build-

[23]With more care on Plato's behalf, following G. Fine (1987), we might say the problem is that the only candidate for efficient cause in the Platonic framework is unsuited to the job. But Aristotle does read the *Phaedo* as saying that Forms are causes of being and becoming (991b3–4).

ing, but not in the sense of the "thoughts, beliefs, and intentions of the builder" (Frede 1992, p. 95). The art is some abstract thing and is the cause of the house by being used by the builder, by being the abstract content the builder represents and acts in accordance with.

But Aristotle rejects the version of Platonic Form where it is a kind of abstract pattern that an agent replicates in the effected object (991a20–26). For, he asks, what is it that acts with its eye on the Forms? In the case of the builder perhaps there is a forthcoming answer, but Aristotle does not want efficient causation to require an agent's intentional action in every case.

On Frede's view the art is a kind of *abstractum* that the builder uses to build, but not the structure in the builder themselves (not their thoughts or beliefs). It is a natural question how this interpretation is meant to give to Aristotle a view other than the one he rejects when discussing Plato. In particular, for better or worse, Aristotle criticizes the Platonic view on bases that seem to recur on Frede's interpretation of Aristotle: the form will be changeless and inert.

The spot where it seems plausible that Aristotle could give such a theory of forms and still regard himself as improving on the Platonic version is the criticism that talk of patterns and models amount to empty metaphor. For Aristotle does sometimes talk of forms as models; but it also seems to me that he goes some way to filling this out beyond mere metaphor. But this is not how Aristotle presents his own theory of form—as a similar take that corrects this one flaw.

Like Everson, then, I think that Frede's conception of Aristotelian efficient causation is too Platonic to be plausible in the light of Aristotle's complaints about that kind of theory of form.

Can the causation by courtesy view do better while retaining the commitment that Frede and Everson both apparently share, in form as abstract?

Here is a way one might attempt to spell this out. Perhaps Aristotelian forms are meant to be efficient causes by being related in some special way to the material objects whose contingent and temporally limited existence is an efficient cause in a more straightforward sense. Say, for example, they are that in virtue of which (or one thing in virtue of which) the material object gets to be the kind of cause it is. But if this is sufficient to count as an efficient cause, then the door is opened again for Platonic Forms to count as causes by proxy.[24]

[24]Here Caston asks why Everson cannot read this passage with Aristotle granting that forms are causally relevant while denying that they are causes. The answer is the texts we have seen where forms are examples of efficient causes. By this point I am taking it that the textual evidence has firmly shut the door on the option that it is interpretively adequate to claim that forms are only causally relevant and

Indeed it seems plausible that Forms are related to objects in a way that is a reasonable candidate for such a special relation in the *Phaedo*. And it seems plausible that Forms are related in a way that is a reasonable candidate in the *Timaeus*, namely, the Demiurge's looking to the Forms as it constructs the world. But these relations are rejected by Aristotle as adequate Platonic solutions.[25]

Now it is compatible with rejecting these relations that Aristotle should solve the problem by proposing some other relation to do the job. But this is not how he proceeds. Instead he concludes that abstract Platonic forms are otiose from the perspective of explaining being and becoming for concrete changing things (991a8–11).[26] Similarly he tells us that Forms in Plato's sense have nothing to do with "the cause in the case of the sciences," what is produced by nature, or by intentional action (992a29–31). If Aristotle thought of himself as either defending Frede's abstract pattern version of form or of solving the problem with Platonic Forms as efficient cause by proposing another relation between Forms and material objects, this would not be the right conclusion.

Metaphysics A.9 raises another reason to think forms are not abstract and inert in the Fredean style. In rejecting Plato's view Aristotle insists that forms are not separate from material substances.

There is a large debate about the meaning (and to a lesser degree, accuracy) of Aristotle's claim that Plato made the forms separate. I cannot enter into the issue in earnest here.

But I'll say at least that I find it very tempting to think that Aristotle *means* by calling them not separate that forms are spatially and physically unseparated from the material objects that instantiate them.[27] That is, they are located where their instantiators are.[28]

It is also extremely tempting to conclude that Aristotle *at least* means by calling forms unseparated that there are no uninstantiated forms, no forms not in a substance.

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not causes. No doubt I cannot convince every reader, but at this point I am going to leave the stubborn behind.

[25] *Timaeus* isn't named in A.9. I don't mean here that Aristotle is thinking of that text in particular (though I wouldn't find it surprising). Rather it seems to me plausible that Aristotle is thinking of a creator who creates while looking to eternal model at lines 991a20–25 (and perhaps also thinking of mortals who make in such a way), especially with the rhetorical question "For what is it that works, looking to the Ideas?" (23–24).

[26] This is phrased as a pregnant question one might ask—one might ask, what do forms contribute?—but in the context it is clear that Aristotle is imagining that the question constitutes a strong objection because the Platonist has no adequate answer.

[27] The first several pages of G. Fine (2003) is a guide to the recent literature on the topic of separation, and it includes presentation of several candidate views for what separation amounts to.

[28] *DA*.A.3, e.g. 406b1–7. Notice that the text does not suggest the particular form in question is exceptional in any relevant way (that is, as far as being located goes). For the idea that lack of separation means spatial coincidence see also Else (1936, p. 55).

That is because it is plausible that separation means at least the absence of ontological dependence: if X is separated from Y, then it is not the case that, if Y were to cease existing, X would stop existing.[29]

Now let us take the medical art to be an inert Fredean form. Imagine then that all the doctors die off without passing on their craft to any new students; all medical textbooks are burnt; all machines in hospitals the world over rust and break; and, in general, everything that could be thought to instantiate the medical art in one way or another perishes. Then the medical art itself, the form, ceases to exist. For we are supposing that is what it means to say it is not separate.[30]

If the medical art is not in the doctors and books, it is mysterious why it should be destroyed in this case, and it seems to me Aristotle says nothing that offers guidance. On the other hand, if forms are always in their objects that instantiate them or have them as powers, then there is a ready explanation for this. Aristotle's claim that (sublunary) forms are not separate from normal everyday objects is therefore naturally read as meant to imply that that forms are immanent in objects rather than transcendent.

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[29]See G. Fine (2003, pp. 254–264).

We must also understand to be ruled out more prosaic causal dependence. For example, if all oxygen were to cease to exist, I would soon, though not instantaneously, cease to exist as well. Aristotle tends to describe ontological dependence using the bare conditional (i.e., with no other clause ruling out such causal dependence). But I take it that the way in which I depend on oxygen to live is a different sort of thing than that intended when, for example, Aristotle claims that a quality ontologically depends on the substance it inheres in. For it is likely that both I and air are excellent candidates for substances and separable from each other.

(It is not easy to tell what must be added to the conditional to fix the problem. I am tempted to point out: there's little sense in which *what it is* to be oxygen explains *what it is* to be human; by contrast, what it is to be a red thing is to be a substance qualified in a certain way. It is a commonplace in contemporary metaphysics that these "hyperintensional" relations are at least difficult to capture with only modal dependence (e.g. K. Fine 1994, pp. 4–5).

But to argue that this is a contrast Aristotle intends when he writes of ontological dependence is a task best left for another time.)

[30]See *Meta*.Z.15.1039b20–28. Note that Aristotle there emphasizes that the form would cease to exist, but would not undergo a process of destruction. (Cf. *De Caelo* A.11.280b6–9 for the sense of 'ungenerated' and 'indestructible' as, not eternal in either temporal direction, but literally not able to undergo a process of generation or destruction.) Only substances are destroyed in that sense.

As Professor Caston pointed out to me, *Metaphysics* Z.8 makes very similar claims, but about production. E.g., at 1033b1–10 Aristotle says it cannot be that we make a sphere when we shape the bronze material, but only that we make the bronze sphere, on pain of regress (the form sphere will also have to be made up of formal and material constituents, etc.).

The point here is explicitly not that the sphere is something separate (1033b20–1034a5). And it is consistent with what is said there that the token of this form did not exist prior to the production of the bronze sphere, and does exist, in some broad sense because of the activity of the maker, after the production of the bronze sphere. It is at least compatible with the text that although the form cannot be produced, because there is no generative change that produces it in itself, it is still the case that the sphere first does not exist and then, because one made the bronze so-and-so, does. The point is then similar to insisting that one does not *make* an instance of tanness by sunning oneself; one rather makes oneself more tan.

All this is accounted for nicely if we think that the form is not some abstract inert object separate from the objects that have it and somehow related to the objects that instantiate it or have it as power; but rather that it is the thing thing in the object which does the affecting.

When you see a yellow object, the object's form of yellowness *is* what you see. Form in *this* sense is not causally otiose for Aristotle. There is no mystery in finding the motivation for saying that it must be in a material object and located where its instantiator is. And for this sort of form there is no trouble making sense of Aristotle's idea that form can be causally active—efficient causation does not suddenly need to become mysterious and intractable from our standpoint, as it does for Frede—and there is no pressure to do violence to the texts by insisting they do not say forms are causes.

So I conclude that we have good reason to reject both Frede's view of forms as inert and inactive and the causation by courtesy view. And I've started to limn an alternative to both views, and to claim that it does better meeting Aristotelian constraints than either of the other views.

2.5 Concrete Forms

I claim that the crucial assumption common between Frede and Everson's two views is incorrect: they both assume that forms are inert and abstract.[31] While the causation by courtesy view is correct that efficient causes require activity and preclude inertness, this does not rule out forms and powers as efficient causes in a first-class, genuine sense. Your ability to read English, I claim, is not an abstract object: it is a feature of you, right there in your head.

Here a short digression is in order. The words 'abstract' and 'concrete' has meant many things to many people. This makes it difficult to use it unequivocally as a tool for investigating forms. But I am going to use it stipulatively: when I say forms are not

[31]The very fact Aristotle repeatedly holds that powers have activities (or actualities) which they are posterior to in definition and being (e.g., *Meta*.Θ.8.1049b4–18, 1050a4–9, 1049a24–29, 1050b2–6) should already make us suspicious. In what sense do they have activities if they are inert and inactive?

I suppose defenders of the causation by courtesy view will claim that their activities are only held parasitically because of the genuine activities their objects can engage in, perhaps leaning heavily on the Rylean passage; for them the powers have activities but do not act (only the objects they are in do). It's a reasonable picture of the world, but I think there's plenty of text showing it's not Aristotle's, and we have trod this ground already.

Once we see that there are several texts where powers unambiguously cause other things, we lose reason to insist that the activity is *really* of the object and not the power.

I don't know what someone like Frede would say in defense of the inert causes view against the point that powers have activities. Unlike the causation by courtesy defender, he cannot even understand this as the milquetoast claim that objects have activities which those powers are somehow relevant for.

abstract, I primarily mean that they are located in space and time and enter into familiar causal (i.e., not necessarily Aristotelian-causal) relations (including, potentially, perceptual ones). I also insist that they are not mind-dependent or the product of linguistic practices or conventions. It will still often be the case that a form cannot exist by itself, but must be compresent with other forms, or matter, or a compound of the two.[32]

Surely this is not the standard view, but various commentators have argued for it already. I will quote a couple to give the flavor and then add more discussion in the footnotes.

For example, commenting on the *Physics* we have Charlton

> The general view of commentators is that an Aristotelian form is an entity the natural expression for which is an abstract noun or equivalent phrase, like 'knowledge of music', 'sphericality,' 'what it would be to be a man'. …If this is so, however, it becomes questionable whether an Aristotelian form is, after all, an entity the natural expression for which is an abstract noun. And if a concrete expression is just as natural or more so …the authentic model for the matter-form relationship is that of man to thing which knows music, or of bronze to a sphere …of constituent to thing. (Charlton 1992, pp. 70–71)

And as Charlton notes, Aristotle often enough does not use words like 'sphericality' for form, but prefers 'sphere' instead. (We already saw an example in footnote 30.)

Charlton spends several pages trying to defend this idea. I won't repeat all his comments, but I will point out that one reason to take form this way is in the first book of the *Physics*: the end form of a process of generation in A.7 seems to be not knowledge but a knowing man. We will return to this next chapter, and see how we need this to make sense of this chapter as the introduction of hylomorphism it is standardly taken as.

Another defender of the same idea is Wiggins[33] :

[32]In the classic typology of Dummett (1981) the conception of abstractness relevant for us seems the most obviously related to the "rough, everyday, distinction" that Dummett (1981, p. 480) says "draws the line according as they (sc. objects) are or are not accessible to the senses." As he points out, this has the unfortunate consequence that the distinction is contingent and relative to our biological capacities. Plausibly what cannot be a cause cannot be accessible to the senses; thus the Negative Way is one way to fix the original intuitive distinction.

[33]It seems to me that one way of reading *Metaphysics* Z.4 gives strong textual support to Wiggins' suggestion (really see the whole chapter, but, e.g., "The essence of each thing is what it is said to be in virtue of itself. For being you is not being musical; for you are not musical in virtue of yourself. What, then, you are in virtue of yourself is your essence" (1029b13–16).). But it is admittedly a difficult passage.

> …if *psuche* is the *ousia*, f, of x then it would seem that x must *be* an f. (If f is the account of what x is then it would seem that x must satisfy the sortal predicate f.) But then the living body *is* a soul. …it is clear that what we have done here is in effect to rediscover the 'is' of constitution (see 1.4). (Wiggins 1967, p. 48)

I think we can safely assume Wiggins thinks humans are concrete, so he will think souls, i.e., persons, are as well.[34]

[34]Ackrill gave a well-known set of objections to Wiggins' idea. First, he says, Aristotle accepts a triad, not a pair, of entities: body, soul, and compound animal. And there is plenty of textual evidence that Aristotle believes the body and the soul constitute the compound.

This is correct, but does not show that Wiggins is wrong (except, perhaps, to neglect the compound). We can still say that the body constitutes the soul, that is, when the body is arranged or acting in a certain way. To say the soul exists is to say that something is there acting in such a way so as to constitute something alive; the soul *is* the activity of the body (the 'is' of constitution).

This does not prevent us from saying, further, that the body and the soul both constitute a further thing, the compound. The compound is the object considered with both form and the matter—not just the matter that is making up the living thing and insofar as it is making the living thing. So features of my matter that have nothing to do with what I am as such may nonetheless be predicated of me *per se* as a compound. My table, for example, may have a certain amount of static to it; but that has little to do with its function as a table or the matter that is configured to perform that function. The less unified a thing is by its substantial form, the easier it is to find such features that are not determined by it.

(Whether you prefer to talk of considering objects in different ways or of distinct objects having constitution relations amongst themselves depends on whether you think constitution is an intensional relation holding between the object specified twice or between really distinct objects. I didn't intend to take a stance on the question for myself or Aristotle; I just picked a way to speak.)

Obviously these sorts of claims take us far afield from powers and causation, and I can't defend them in depth here. But I hope they seem plausible enough at first glance that they go some way to showing that Wiggins' game is not up just because he did not fit the compound into his scheme.

The second objection is that "it would make no more sense to say that a man *is* a *psuche* than to say that an axe *is* an ability to chop" (120–121). Indeed (especially if we emphasize that 'is' enough.) But here we take a page from Charlton's book: it is just fine to say that the axe *is* a thing-able-to-chop.

We needn't be as strident as Charlton, either; nothing prevents Aristotle from writing of form in two ways. now as the thing constituted, now as the feature of it in virtue of which it is so constituted. And we do see him using unambiguous abstract terms for forms now and then; e.g., look back at footnote 9, cf. *Physics* E.1.224b10–15. These two sorts of form have an obvious close relationship. Furthermore they always go together in a material object that has the feature or is that way.

Ackrill seems to feel that accepting such a sense of form will destroy the Wiggins argument. For then it will no longer be clear that Aristotle must say the form soul makes man a soul, on analogy with the form axe making something an axe; instead we have the form being able to chop which makes something an axe, and the some corresponding ability-form which makes someone a human.

That's fine and good: if we talk of form in the second sense, as the feature that makes something be constituted in a certain way, then indeed the feature will have a different formula than the thing constituted. But that is compatible with the thing constituted nonetheless being a form (in the first sense); it is the activity of its matter, insofar as that matter is configured in accordance with the principle.

If this makes Wiggins' argument fail, that's fine; the position survives, and does as well or as badly in understanding the texts as it ever did. Wiggins himself seemed to feel not that this was a particularly textual argument but that it was the only way to make the overall view "logically hygenic" (48).

But it seems to me unclear that the argument will definitely fail; we will have to decide, perhaps, whether Aristotle tends to write of the soul as a principle in accordance with which the body is configured

If forms are concrete, then what are they? We may flesh out this idea in two ways.

First, it has been claimed that Aristotle believed that forms were identical to the objects in which they inhere.[35] For our purposes we can put this as follows: what is worked up to by a change as the terminus is a qualified person, a substantial form (which is a substance), etc., not an abstract quality, an abstract principle or universal of a substantial kind, etc.

Now the first construal seems to me to help understand both the texts and doctrines that Charlton and Wiggins point to. But I doubt that Aristotle strictly writes of forms this way. So, second: we may take form as not quite an object, even under a description, but as a concrete feature in the object.

So on this understanding we take your power to speak English to be not you *qua* English speaker, but the structure of your central nervous system (or the imprint on the surface of your heart, in Aristotle's biology) that enables you to speak English. It is this which is put to work, in a mundane sense, when you speak; this is what it is for your power to speak to be activated.

I do not mean by structure an abstract mathematical structure, but the instantiated shape and connections themselves. This must be distinguished also from the mass of flesh that is the matter for the organ: we are talking about the arrangement that the organ has, as long as we understand by that not the abstract mathematical arrangement but what the organ is actually *doing* to be the sort of thing that fulfills its function.[36]

Either way, what's important for us is that this is the kind of thing that can be seen and touched, and which without mystery (any more than usual, anyway) enters into causal relations.[37]

(analogous to the ability to chop) or as the being configured (analogous to being able to chop/being an axe). It plausible to me that he prefers to treat the soul as the activity of the body, that is, as its acting and being configured a certain way (think of the definition of soul at *De Anima* B.1.412a20–23).

[35]The interpretation is defended in Charlton (1992, pp. 70–73), Charlton (1991, pp. 10–11), Wiggins (1967, 48ff.), and at length in A. C. Lloyd (1981). More carefully, Charlton thinks that 'Socrates' form' for Aristotle is ambiguous between "'Socrates himself, in his formal aspect'" and "'the specific characteristics Socrates has' or 'the species to which Socrates belongs'" (Charlton 1991, p. 11). A reply to Wiggins is given in the first part (119–124) of Ackrill (1972). Lloyd also defends the claim that this was the interpretation of Alexander of Aphrodisias, and Charlton mentions his belief that the view goes back to Boethius.

[36]This kind of view is perhaps at least amenable to, and perhaps even a species of, the views of Irwin (1989) and J. E. Whiting (1986). For them form is not wholly free of matter, but contains proximate though not distal matter.

[37]There is a large literature on the question of whether Aristotelian forms are better thought of as universals or as individuals. Does Aristotle believe in *in re* universals or does he think of forms as more like tropes? The problem is complicated further by the difficulty in seeing how or if the doctrines concerning form of the late work *Metaphysics* fit together with the claims regarding qualities of the early *Categories*. (A sampling of the secondary literature: the *in re* interpretation (across both early and late Aristotle) is defended by, among others, Frede (1978), Furth (1988), Modrak (1979), and Owen (1965); the trope

For the purposes of this work we can remain agnostic between these two ways of speaking, which anyway may well both be permissible ways of speaking for Aristotle. (But notice that they seem to be good for different things. It's easy to see my tanness as a concrete feature in me, but what about my weight, or my location indoors? Different properties will be naturally construed in different ways.)

Here's the plan for the rest of the chapter.

First I'll briefly turn back to some of the texts we used to show that forms were causes. We're now in a position to tell a particular concrete story about what their efficient causation is.

I will then confront two potential objections. First, in giving his accounts of perception and cognition, does Aristotle commit to non-physical or abstract forms? One might think so based on his use of the phrase 'form without matter.' A full treatment of Aristotle's theory of perception is far out of the scope of this work, but I hope to show that in any case we do not *need* to read the theory of perception as containing such a commitment, and there is good reason not to take the theory as supporting the inert causes view.

Then I'll confront another worry, looking at a particular text in *Generation and Corruption* that has been taken to indicate that Aristotle means for forms like the art of medicine to serve as immaterial agential causes. But our conception of how a form can be an efficient cause will let us read this passage a different way. I argue that while Aristotle carefully leaves the door open for such causes, that door is not meant for the mundane forms of the sublunary world.

After that I'll go back on the offensive. While some interpreters have taken *Physics* B.3 to give evidence for the inert causes view, I argue that this is a misreading of the passage: in fact the passage is better read as claiming that forms and the material objects they inhere in are equally good candidates for efficient cause.

I close with a discussion of the mistaken commitments that make it natural to think of forms as causally irrelevant *abstracta*.

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interpretation by Ackrill (1972), Frede and Patzig (1988), and Woods (1967). A posing of the problem and summary of the debate can be found in Lesher (1971).)

Does our investigation offer any insight into this puzzle? What I insist on in the first place is that forms are concrete, capable of being active, and capable of entering into causal relations. It seems to me that both trope theory and commitment to *in re* universals are compatible with this. (But if it turns out the content of this chapter must commit me to the trope interpretation for late Aristotle, fine; we should accept it anyway.)

2.6 How an Efficient Cause Efficiently Causes

Recall our description of how an artisan makes a sword:

At *Generation of Animals* B.1.735a1–5, Aristotle says

> σκληρὸν μὲν γὰρ καὶ μαλακὸν τὸν σίδηρον ποιεῖ τὸ θερμὸν καὶ τὸ ψυχρόν, ἀλλὰ ξίφος ἡ κίνησις ἡ τῶν ὀργάνων, ἔχουσα λόγον τὸν τῆς τέχνης. ἡ γὰρ τέχνη ἀρχὴ καὶ εἶδος τοῦ γινομένου, ἀλλ᾽ ἐν ἑτέρῳ· ἡ δὲ τῆς φύσεως κίνησις ἐν αὐτῷ ἀφ᾽ ἑτέρας οὖσα φύσεως τῆς ἐχούσης τὸ εἶδος ἐνεργείᾳ.
>
> Heat and cold make the iron hard or soft, but the motion of the instruments makes the sword, since it has the account of the art. For the art is the source and the form of what is generated, but in another. The motion of nature is in a thing from another nature which has the form in actuality.

What we see is that in the hands of a skilled smith, heat and cold are instruments that are moved in ways that are rational and productive instead of random and happenstance. Both the smith's skill and the motions of the tools themselves embody, more or less directly, the form of the artifact itself. For it is because a good sword is like *this*, that it has such and such an organization and purpose, that the motions that create a sword must be like *that*. Thus the organization of the motions reflects and depends on the form of the sword they produce.[38] The contrast between this case and the case of nature is that in the case of a nature the source is in the affected object itself. Since the case of the generated artifact is brought up as an analogy to illuminate the case of natural generation, we may infer that the other properties of the artificial generation are shared by the natural case.

Finally, note that the art is cited as an efficient cause with the same terminology that describes an active power: a source in another thing, that is the source of a natural motion.

[38]My understanding of how a power is an efficient cause is thus tied up with a particular understanding of what teleological causation in Aristotle is. For something to be the end of a process is for it to be what is attained when the process unfolds "normally," in the sense that nothing interferes or disrupts the process. Therefore to say that a process has a certain end licenses modal judgments including judgments about how the future is likely to go. The end of a process is not any feature of the world after the process unfolds normally, though; it is what explains why the process unfolded the way it did, and gives it its intelligible unity.

Not all of these claims about teleological causation can be defended here. Reading the passage about the smith making a sword in the light of *Parts of Animals* A.1 shows that it is the form of the artifact that determines which motions are appropriate to creating it, and so that determines the art that is able to create it as well. This is the connection between artifact, creating motions, and art that causes them all to embody the form of the artifact. On the topic of teleological causation (and its connection to efficient causation) I found both (Gotthelf 1976) and (Code 1997) to be invaluable.

We see similar notes in *Parts of Animals* A.1.640a28–33. He says

> ὁμοίως δὲ καὶ ἐπὶ τῶν αὐτομάτως δοκούντων γίνεσθαι καθάπερ καὶ ἐπὶ τῶν τεχναστῶν· ἔνια γὰρ καὶ ἀπὸ ταὐτομάτου γίνεται ταὐτὰ τοῖς ἀπὸ τέχνης, οἷον ὑγίεια. ὧν μὲν οὖν προϋπάρχει τὸ ποιητικὸν, οἷον ἡ ἀνδριαντοποιητική, οὐ γὰρ γίνεται αὐτόματον. ἡ δὲ τέχνη λόγος τοῦ ἔργου ὁ ἄνευ τῆς ὕλης ἐστιν. καὶ τοῖς ἀπὸ τύχης ὁμοίως· ὡς γὰρ ἡ τέχνη ἔχει, οὕτω γίνεται.
>
> Similarly, too, are those things that seem to be generated spontaneously, just as those generated by the arts. For some things generated spontaneously are the same as those generated from an art, for example, health. For those where the agent is preexisting, for example the art of statue-making, the generation is not spontaneous. The art is an account of the product, an account without the matter. And it is similar with things generated by luck. For as the art is, so it is generated.

Note that "the art is an account of the product, an account without the matter." Examining the context strongly suggests that this is meant to indicate the form. Aristotle is in the process of explaining that we do biology by starting with the empirically discovered characteristics of animals and then work backward to explain the process that resulted in the animal.

> Ἔοικε δ' ἐντεῦθεν ἀρκτέον εἶναι, καθάπερ καὶ πρότερον εἴπομεν, ὅτι πρῶτον τὰ φαινόμενα ληπτέον περὶ ἕκαστον γένος, εἶθ' οὕτω τὰς αἰτίας τούτων λεκτέον, καὶ περὶ γενέσεως· μᾶλλον γὰρ τάδε συμβαίνει καὶ περὶ τὴν οἰκοδόμησιν, ἐπεὶ τοιόνδ' ἐστὶ τὸ εἶδος τῆς οἰκίας, ἢ τοιόνδ' ἐστὶν ἡ οἰκία, ὅτι γίνεται οὕτως. Ἡ γὰρ γένεσις ἕνεκα τῆς οὐσίας ἐστίν, ἀλλ' οὐχ ἡ οὐσία ἕνεκα τῆς γενέσεως. (*Parts of Animals*.A.1.640a13–19)
>
> Hence it seems right to begin, just as we said earlier, by grasping the overt phenomena for each of the types, and then stating the causes of them and speaking about their generation. For this is how it is also in the case of house building: since the form of the house is such a thing, or the house is such and such a thing, it is generated in such and such a way. For the generation is for the sake of the substance, but the substance is not for the sake of the generation.

Clearly in the case of the house we are considering its form. The idea is that the form is the cause of the house's being generated in this or that way: we explain the

process by citing how it results in the form. We do not explain the form by citing how it results from the process—or at least, that is not the sort of explanation that organizes the biological theory which Aristotle is explaining how to construct.[39]

Further on in *Parts of Animals* A.1 Aristotle takes Empedocles to task (640a18–26). Empedocles neglected the point above, explaining the product or the creature as the result of many incidental occurrences. But he neglected, too, that the form is present before the creature comes to maturity: it is present in both the parent and the seed. It is the same with art, he says, launching into our quotation from above. So the account without the matter is parallel to the form in the seed and the parent.

In concert with the previous passage, I think we ought to see that just as the motions have the form of the product, but in some different way from the way the product does, the art is the form, but in a different way. For the art is the form as an account, not as informing an actual product. But this is neither to say that there are two metaphysically irreducible sorts of forms nor that there are two such basic ways to be forms.[40]

Instead, think of how both a blueprint of a house and the house itself may share a single structure, but in different ways.[41] It is tempting to say that the blueprint instantiates the structure, but not in the matter that is necessary for an actual house to exist. While the blueprint might indicate the matter to be used in the constructing the house, it itself is not in the right kind of matter for a house: that's why it is suitable as a representation or a guide to building a house but not as a shelter.[42]

Still, we should not deny that the structure is literally in the blueprint, as literally as it is in the house. In this way we can make sense of why Aristotle sometimes says the art is an account of the product, and sometimes says it is the form; an account of the product *is* a way of having a form. The former locution is a more precise determination of the latter, not in conflict with it.

We should note several additional things in this passage. First, we see a blunt de-

[39]Note that in the next line Aristotle seamlessly moves to substituting the evolved product in the role where he had put the form. This is of course grist for the mill for those who think that the substantial form is identical with the substance itself.

[40]Apparently this was Saint Thomas' idea: there are two ways for a form to inhere in something, intentionally ("objectively," as an object of perception or cognition) or physically (in the traditional nomenclature, by having *esse intentionale* or *esse naturale*, respectively) (Lisska 2016, pp. 34–8).

[41]The image of the blueprint for form is not my own, but a relatively common one in the secondary literature.

[42]More carefully, it's not sufficient to appeal to differing matter to characterize the difference between the house and the blueprint, despite Aristotle's remark that the art is the account "without the matter." To see that this is not adequate, note that one can "draw" a blueprint in lumber and nails, or write a bread recipe in dough, and so on. But a blueprint drawn in lumber (etc.), despite sharing a structure with a house and being in matter for a house, is not a house. Instead we must say that the account configures whatever matter it is in, not to produce the artifact, but to represent it.

scription of the art of statue-making as the agent or maker (τὸ ποιητικὸν) of the generation of the statue. Recall that this was a term used to characterize the efficient cause in *Physics* B.3. Once more that Aristotle refers to the art of statue-making with the unusual term ἡ ἀνδριαντοποιικὴ, as in our quotation from *Physics* B.3.[43] It is a rare enough term that it is likely not a coincidence—it is plausible that one text was written with the other already in mind.

We also see that when something is generated by an art as agent, the agent preexists the created thing. Finally, note that this contrasted with spontaneous generation and, perhaps, with generation by luck. It is somewhat ambiguous what is meant to be common and what is meant to be different in cases of generation by an agent versus spontaneous generation or generation by luck. But the paradigm case where there is straightforwardly a preexisting efficient cause, at least, is characterized in terms of a form as agent.

Generation of Animals uses the case of generation of an artifact to illuminate natural generation of an animal; in one case the form is the art in the mind of the artisan, in the other in the seed of the male parent. In *De Anima* Γ.9–10 and *De Motu Animalium* 6–8 Aristotle gives an explanation of how the form may be an efficient cause in the case of animal purposive action—as Aristotle writes, in the case of animal self-motion. Thus once we look at that passage we will have covered the three central types of efficient causation, the three kinds of case Aristotle repeatedly returns to.

To reiterate, we hope to find that a form organizes or structure a series of motions that come from it as a starting point. Those motions transmit the form to a product (if there is one); or anyway have the form in them, themselves, though perhaps in a different way than the efficient cause.

The picture appears to be: the object of desire is perceived by the agent. A series of motions then propagate to the organs responsible for desire and imagination. The motions then interact with the nature of the those faculties to produce a series of motions turning outward, eventually moving the limbs of the animal.

If by self-motion we understood that there is a kind of spontaneous generated motion in the animal, we don't find it on this picture. Starting with the purposive action and tracing backwards which bits of matter pushed on which, etc., we will trace the series of motions into the person and then right back out again, to the perceived object of desire.[44]

[43]The manuscript divergence (see footnote 7) reappears as well.

[44]This appears to be confirmed at *Physics* Θ.4–5, where the doctrine is that if there were no external changes, no self-motion would result in the animal either. And it is confirmed at *De Anima* Γ.10.433b14–18: "There are two movers, the one unmoved, the other both moving and moved; the unmoved is the

But the animal is a self-mover still, for the character of the motion is determined by what is in the animal:

> Ὥσπερ δὲ τὰ αὐτόματα κινεῖται μικρᾶς κινήσεως γενομένης, λυομένων τῶν στρεβλῶν καὶ κρουόντων ἀλλήλας τὰς στρέβλας, καὶ τὸ ἁμάξιον, ὅπερ ὀχούμενον αὐτὸ κινεῖ εἰς εὐθύ, καὶ πάλιν κύκλῳ κινεῖται τῷ ἀνίσους ἔχειν τοὺς τροχούς …(*De Motu* 7.701b1–5)
>
> Animal motions are just like how *automata* move when a small motion sets them off, when the twisted cords loose and strike each other, or like a toy cart, which when ridden and one pushes it straight, moves back in a circle because of its having unequal wheels …

Further on we get the similar point with a cylinder. The way the toy or the cylinder rolls is due to the shape of the toy and the cylinder, despite the fact that an external motion sets them moving.

Now in the case of a human there are no twisted cords that are set loose or uneven wheels. Instead, Aristotle tells us, there is some organ which alters, which becomes larger and smaller, colder and hotter (701b13–16). The alterations are caused by *phantasiai*, sense-perceptions, and ideas (16–7), for sense-perceptions in some sense *are* alterations and *phantasia* and thinking have the power of real objects (17–9).

The *phantasia* and the sense-perceptions are being pictured here not as abstract contents, but as physical things which interact with motions incoming from the external environment and physically affect internal motions so that the animal behaves in certain ways.[45]

What is of interest here is that the efficient cause doesn't do its causing by imparting a novel impulse, or necessarily by bumping or pushing anything at all. If one tries to follow the chain of motions or impulses, one has little grounds to find the form in the agent any more causally relevant than anything else in the chain.

The form in the human reorganizes the motions that affect the human and then causes the human to act in based on those incoming motions but nonetheless is shaped by the character of the human's form. This is the point of the image of the cart: the

practical good, and the moving and moved is the faculty of desire …."

[45]A similar doctrine is given in *De Memoria*. A memory—say, of the memory of an artifact and how to make it—is an image in the soul and something like an imprint on a surface inside the body (1.450a25–31). A physical imprint is meant, since the physical characteristics of what receives the imprint explain why people have memory faculties of different qualities 450a32–450b10). And Aristotle tries to convince the reader that recollection is bodily: "This is a sign …that the affection is something bodily and the recollection is a search in a thing of this sort for an image …" (2.453a16–8).

incoming motion (your tapping the cart) moves the toy, but *how* the toy moves as a result has more to do with the toy's structure than your tap.

If all this is right, then we see the whole picture of the exercise of a craft in the following way. There is some imprint or image in the craftsman's body, which is a kind of representation of the artifact (and perhaps we ought to add, of how to make the artifact, etc.). When the craftsman's body moves the motions transmit the form to the matter; when the matter the craftsman works on takes on the form, i.e., is worked on successfully in accordance with the internal representation, it becomes the artifact. The power that is the craft is an efficient cause in the sense that it guides the process which, if all goes well, ends with the production of the final cause.

This is a kind of causation that does seem to require the form to be in the object: the motions have to somehow interact with it, and have their character shaped by it. But it doesn't require that the causal activity of the form consist in any kind of pushing or pulling (though it doesn't rule out that it involves it).

Perhaps this helps to soften the concerns that a form should not be able to be an efficient cause because it is too unlike events or material objects (or whatever you take to be the paradigmatic causal *relata*) to do so. Well this sort of efficient causation is also not quite like the paradigmatic examples of causation that might leap to your mind, even if it is not quite so foreign as Frede seemed to suggest we would find it.

2.7 Form Without Matter

There is obviously another possible reading of the claim that a skill is an account of the product without the matter, or simply is the form without the matter. It is that Aristotle is committing himself to the existence of abstract objects, for he means that the craft is a form without matter and is therefore a form which is not instantiated in matter. It is perhaps the case, then, that when craftsmen learn and exercise that skill, they come into some kind of relation with that abstract object. Unsurprisingly, I do not believe this could be right.

2.7.1 Perception

A common use of the phrase 'form without matter' is in the account of perception and cognition. When an animal perceives an object, it is affected by (in the central case) an

external object and is said to receive the form without the matter of that object.[46]

It is very controversial what the meaning of the phrase is in the context of perception.[47] It has sometimes been flagged as a reference to some kind of Aristotelian change or pseudo-change that is particular to the case of perception and that is incompatible with a wholly physicalistic treatment of it (see esp. Burnyeat 1992b, p. 15; Burnyeat 1992a, p. 421). The first thing to say is conciliatory: that if the reader insists perception is some kind of special case which violates the general claims about powers and causation which I make, I am happy enough to shelve perception.

But I think this is more of a concession than is needed. For our purposes it's not much concern whether the change in perception is a "spiritual change" or not. What matters is that it is unlikely that we can pull from an interpretation of this phrase in the context of perception the result that the form is abstract or not instantiated.

For one thing, it is quite unclear what that would mean for an animal to receive an abstract or uninstantiated object.[48] For another, it does not fit well with the details of Aristotle's account of perception. The form of the perceived object is instantiated at each point of the process. First it is in the object itself; then it is in the medium between the object and the animal, if there is one; then it is in the sense organ, perhaps the common sense, and stored as a *phantasm*.[49] A great deal about the process is difficult to construe, but the form does appear to be in some physical substrate at every stage.

[46]See *DA*.B.12.424a17–19, Γ.4.429a15, 430a8. The case of non-perceptual cognition is arguably more complicated and so I ignore it here. For it is likely that the mind (νοῦς) is incorporeal and separable and so outside the bounds of natural science (see *Meta*.E.1 for physical science as about the inseparable and movable). If that is right then it is not the nature of intentionality in the case of cognition that is responsible for this (so Caston (1992, p. 293)), but something else about the mind. For there are intentional states that do not have much to do with νοῦς and these do not seem to be pushing the boundaries of natural science in the same way. Furthermore, it is desirable that an interpretation of cognition preserves the same meaning for the phrase 'form without matter' across cases that involve νοῦς and those that do not. But for our purposes it is enough to see that the phrase in question does not refer to an uninstantiated form in the mundane case of animal perception.

[47]See Caston (2004, pp. 300–7) for much more discussion of this phrase.

[48]Notice that on the Scholastic interpretation of this phrase, on which it signals that the animal does exemplify the form but does so in a non-physical way, this intentional exemplification is regarded as primitive. Still here the form is not uninstantiated. On Burnyeat's spiritualist interpretation of Aristotelian perception the point is not that the form is abstract and incapable of changing an animal, but that the change or pseudo-change is of a sort unlike other ordinary physical changes.

[49]There is quite a bit of controversy about what it means for the form to be instantiated in the sense organ. If the form of eye is taken on by the eye, are we meant to understand that (some part of) the eye literally turns red? The debate started with Sorabji (1974) endorsing the literalist position. Burnyeat (1992b) responded with a defense of the "spiritualist" counterposition, on which there is no literally physical change of the eye, only a primitive 'spiritual' change. The first several pages of Caston (2004) contains a long list of the secondary literature the exchange touched off.

Like Caston (2004), I think that a non-literalist naturalistic interpretation is possible and probably was Aristotle's intent. But I do not think I need to take a stance on the question of literalism and spiritualism here.

In the one place where Aristotle helpfully explains the obscure phrase, he does so using an obscure simile. But it also suggests the form is instantiated

> καθόλου δὲ περὶ πάσης αἰσθήσεως δεῖ λαβεῖν ὅτι ἡ μὲν αἴθησίς ἐστι τὸ δεκτικὸν τῶν αἰσθητῶν εἰδῶν ἄνευ τῆς ὕλης, οἷον ὁ κηρὸς τοῦ δακτυλίου ἄνευ τοῦ σιδήρου καὶ τοῦ χρυσοῦ δέχεται τὸ σημεῖον, λαμβάνει δὲ τὸ χρυσοῦν ἢ τὸ χαλκοῦν σημεῖον, ἀλλ΄ οὐχ ᾗ χρυσὸς ἢ χαλκός.
>
> In general, when it comes to all perception, one ought to grasp that sensation is receptive of perceptible forms without the matter. Just so, wax receives the sign of a ring without iron and gold, and it takes up the golden or brazen sign, but not insofar as it is gold or bronze. (*De Anima* B.12.424a21–5)

The sense organ is able to receive perceptible forms without the matter as a hunk of wax is able to receive the sign (σημεῖον) carved into a signet ring. The wax takes on an impression which is the mirror image of the ring's shape.

It is clearly part of the analogy that the shape in the wax, corresponding to the form received into the sense organ, is instantiated in matter. It is in the wax, after all. Unless we take the image to be an astonishingly flat-footed way of explicating "receiving form without the matter," "without the matter" should not suggest that the form is not in matter *at all*, or that perception needs to involve some *abstractum*.[50] Rather, as I suggested using the example of a house's blueprint when looking at the passage from *Parts of Animals*, I suggest again that the meaning of the simile is that the form is not in the sort of matter that would make its instantiation a literal instance of that object.[51]

In the context of perception, one more plausible account of the meaning of 'form without matter' is given by Caston (1992). The point is that the form is instantiated in

[50]A very similar point is made by Caston (1992, p. 98) in a slightly different context. There Caston is objecting to the traditional Scholastic interpretation on which 'receiving form without matter' indicates intentional and non-physical exemplification of the form. Unlike our imagined objector's proposal, this idea does not have it that the form is literally uninstantiated, for the form is exemplified by the mind of the animal.

I do not consider this interpretation in detail in the text's body, although some of what we say here applies to it as well. For I think the discussion in Caston (1992) (see esp. 85–105) is sufficient, and I rely on it to close off this interpretive possibility. In short, it seems to me particularly damning that there is very poor textual grounds for finding a contrast between intentional and physical exemplification in Aristotle. (Notice that the use of the phrase 'form without matter' and the simile of the wax and the ring are central texts pointed to by proponents of this view. But the discussion in Caston shows that it is, at the least, not obvious that the texts are better than neutral in support of that reading.)

[51]Or to be pedantic—recalling our complication, that one might write a bread recipe in dough etc. (see footnote 42), the form is not in the sort of matter *and* configuring that matter in the way that would lead to the existence of the object itself.

the sense organ in such a way as to constitute a *representation* of the perceived object. Notice that in the case of the wax simile, what is received by the wax is arguably already something with intentionality baked into it: a sign (σημεῖον).

The form in the sense organ is not a scale model or replica of the perceived object. Fairly or not, Aristotle chastises Empedocles' theory of perception on just the grounds that it requires this, and responds by moving to the idea that the object is present in the sense organ in form alone Caston (1992, p. 86).

An alternative is that 'form without matter' may mean something much more literal than the spiritualist thinks: just that the causal activity of the perceived object is all due to its form (as e.g. a visible object) and not at all due to material factors irrelevant to being visible,[52] or, even worse, material effluences from the object *à la* Empedocles. Similarly the craftsman has an account of the form of the artifact but need not also have an account of the matter that goes into the artifact. This reading seems to me to do a much better job of respecting the context of the phrase at *De Anima*, which has nothing obvious to do with non-physical changes, and with respecting Aristotle's characteristic concerns, which tend toward dialogue with Empedocles not Descartes.

On either alternative, the crucial phrase 'form without matter' together with its passage is meant to indicate neither that the form is non-physical or uninstantiated, nor that it is exemplified in a *sui generis* intentional way. I've suggested two alternative interpretations. First, the phrase means that the form configures its matter so as to represent some object rather than constitute some object. Second, the phrase is meant to contrast the sort of causation in perception with other sorts of causation, including what Empedocles was picturing. For the purposes of this dissertation we can stay neutral—the important point is to give a sense that the "spiritual" interpretation is far from established, and there are a range of options that are compatible without any concession with the claims of this chapter.

2.8 Two Types of Movers

In *Generation and Corruption* A.7, Aristotle, in the course of distinguishing between two kinds of movers, makes remarks relevant for understanding the locution 'form without matter' as well as for understanding how arts can be causes.

Additionally, this passage has been understood by at least one commentator as indicating that forms are more correctly efficient causes in careful theoretical contexts

[52]This does happen in some cases of efficient causation, e.g., the color of a person's eyes is due to the matter not the form of the things that caused the person (*Generation of Animals* E.1 esp. 778a29–b1).

Williams (1982, p. 122). I will try to show that this reading, while admittedly superficially tempting, makes worse sense of the passage than another reading.

Let us go through this bit by bit.

> διχῶς γὰρ λέγεται καὶ τὸ κινοῦν· ἐν ᾧ τε γὰρ ἡ ἀρχὴ τῆς κινήσεως, δοκεῖ τοῦτο κινεῖν (ἡ γὰρ ἀρχὴ πρώτη τῶν αἰτίων), καὶ πάλιν τὸ ἔσχατον πρὸς τὸ κινούμενον καὶ τὴν γένεσιν. ὁμοίως δὲ καὶ περὶ τοῦ ποιοῦντος· καὶ γὰρ τὸν ἰατρόν φαμεν ὑγιάζειν καὶ τὸν οἶνον. τὸ μὲν οὖν πρῶτον κινοῦν οὐδὲν κωλύει ἐν μὲν κινήσει ἀκίνητον εἶναι (ἐπ' ἐνίων δὲ καὶ ἀναγκαῖον), τὸ δ' ἔσχατον ἀεὶ κινεῖν κινούμενον …
>
> For mover is said in two ways, too. That which contains the source of motion seems to move (for the source is the first of the causes), and again the last thing towards the thing moved and the generation. It is similar in the case of the agent. For we say the doctor and the wine heal. Nothing prevents the first mover from being unmoved in, anyway, the motion, (in some cases it is even necessary); but the last always is moved and moves. (*Generation and Corruption* A.7.324a25–32; cf. *Phys*.Θ.5.256a3–13)

There are two sorts of movers. The first is the familiar efficient cause, the source or origin of motion; if there were any doubt that this is the one of the four causes of motion meant, the use of the example of the doctor, a stock example of an efficient cause, should dispel it.[53] But in any case this is what Aristotle often means by 'mover.'

The second sort of mover is less commonly a focus of Aristotle's. Notice that Aristotle does not say this sort of mover is a source of motion or a cause.

The reason for this is explained at *Phys*.Θ.5.256a3–13: the first mover moves but is not moved by the last mover, and while the last mover's action will not occur if the first mover is removed, the first motion will occur if the last motion is removed. This latter reason may seem surprising; in particular, while it makes sense that the intermediary will not move the patient without the first movement, does not the first mover also need the intermediary if it is to actually move the patient?

Aristotle's examples, a doctor healing a patient with an intermediary drug or a man moving something with a stick, show how he is thinking of the matter: the intermediary is an instrument that transmits something from the first mover. Without the first mover, the instrument remains inert; without the instrument, the first mover finds another drug or another stick to produce the result. The first mover, then, is in *control* of

[53]See, e.g., *Phys*.B.2.192b23–7.

the overall causal process in a way the mere instrument is not, and is better suited to adapt to changed circumstances to produce the end aimed at. That is why it is more properly the mover (*Phys*.Θ.5.256a9–10) and the source of movement.

A doctor, teacher, or perceived object need not come into *direct* contact with the affected object in order to affect it; it may come into indirect contact through one or more intermediaries or instruments.[54] Then there is a final intermediary that moves the changed object.

It makes perfect sense that the intermediary must be moved as well as move, lest it not be an intermediary. But why is it possible for the efficient cause to be moved or not?

> ἐπὶ δὲ ποιήσεως τὸ μὲν πρῶτον ἀπαθές, τὸ δ' ἔσχατον καὶ αὐτὸ πάσχον· ὅσα γὰρ μὴ ἔχει τὴν αὐτὴν ὕλην, ποιεῖ ἀπαθῆ ὄντα (οἷον ἡ ἰατρική, αὐτὴ γὰρ ποιοῦσα ὑγίειαν οὐδὲν πάσχει ὑπὸ τοῦ ὑγιαζομένου), τὸ δὲ σιτίον ποιοῦν καὶ αὐτὸ πάσχει τι· ἢ γὰρ θερμαίνεται ἢ ψύχεται ἢ ἄλλο τι πάσχει ἅμα ποιοῦν. …ὅσα μὲν οὖν μὴ ἐν ὕλῃ ἔχει τὴν μορφήν, ταῦτα μὲν ἀπαθῆ τῶν ποιητικῶν, ὅσα δ' ἐν ὕλῃ, παθητικά. τὴν μὲν γὰρ ὕλην λέγομεν ὁμοίως ὡς εἰπεῖν τὴν αὐτὴν εἶναι τῶν ἀντικειμένων ὁποτερουοῦν, ὥσπερ γένος ὄν, τὸ δὲ δυνάμενον θερμὸν εἶναι παρόντος τοῦ θερμαντικοῦ καὶ πλησιάζοντος ἀνάγκη θερμαίνεσθαι· διό, καθάπερ εἴρηται, τὰ μὲν τῶν ποιητικῶν ἀπαθῆ τὰ δὲ παθητικά.
>
> The first thing in affection is impassive, and the last is itself also affected. For whatever does not have the same matter, affects while being impassive (for example the medical art, for it is affected not at all by what is healed as it heals), but the food affects and is somehow affected. For it is heated or cooled or affected in some other way. …Whatever has form not in matter is impassive among the agents; but whatever is in matter, is able to be affected.
>
> For we say the matter of each of two opposites alike is, as it were, the same, being of the same genus, and that which can be heated necessarily is heated when a heating agent approaches. Thus, as was said, some of the agents are impassive and others able to be affected. (324a33–b11)

The intermediary must be affected in its role in the causal chain. The food must share its matter with what it affects, in order to pass along its form. Thus it, like the

[54]In this way, the understanding of contact limned in A.7 is already being revised and expanded—or was this the envisaged case at 323a3–5, of a grieving man who touches us though we do not touch him?

thing affected, is the sort of thing to be heated or cooled. It is suitable to be acted on in that way. Thus, if it comes into contact with matter that is to some extent hot and cold,[55] that is to say, to some extent can heat or cool, it is necessarily heated or cooled. The affected thing, if it is a material object at all, can heat or cool, so it will affect the food "reciprocally"; and the intermediary will also pass along a form, in the course of which, at least in many cases, it will be changed.

What about the first agent? It *may* be the case that there are no intermediaries, and the first agent comes into direct contact with the affected body. Then the same reasoning as above applies, and we have a case where the first agent is affected in the change it affects.

But it may also be the case that the first agent is something like a perceived object. Perceiving an object does not (usually) alter it. The object is in indirect contact with the animal by being in contact with a medium that is in direct contact with the animals sense organ. Aristotle needs to acknowledge this as a kind of contact just because the object may affect the perceiver by transmitting its form through that chain. By contrast, in general the perceiver will not be in a position to affect the object reciprocally.

That is not to say that the perceived object is not affected *at all*. Aristotle's example makes it clear that this is not what he means: "the medical art, for it is affected in no way by what is healed as it heals ...." The claim that some first agents, like the medical art, are impassive is explicated to mean that they are not affected *by what they affect, insofar as they are the agent in the causal process*. This would be a bizarre specification if Aristotle thought, and meant to convey, that the form was incapable of being acted on in *any* way.[56] Rather the point is that the doctor and the medical art are not, *as such*, affected by what they affect: a doctor can heal you without touching you directly. And certainly they can utilize their grasp of medicine to heal you without touching you

[55]All mixed sublunary bodies contain all elements (*GC*.B.3, B.8), so it seems very likely that they will all be hot or cool to some degree. (It is plausible that the arguments Aristotle uses to get this conclusion conflict with other deeply held commitments (Williams 1982, pp. 179–180), but that doesn't mean the conclusion, or some thought like it, isn't motivating the claim about intermediaries.) It is not obviously impossible that these elemental powers to heat and cool are blocked when the elements compose a further mixed body, but I don't know of a text that suggests that Aristotle thought this.

[56]So too Williams (1982, pp. 122–3): "...the doctor will in most cases be acting because he has been acted upon—by the promise of a fat fee, perhaps—he will not in general be affected, while he acts, by the patient upon whom he is acting."

The example shows that we should add: the first agents are not *non-accidentally* affected by what they affect, while they affect it. For the doctor may receive payment or information from the patient while treating her. The reciprocal change may even be general or necessary: for example, it may be the case that any perceiver in close enough proximity to perceive an object must therefore somehow affect it. But if that affection has nothing to do with the first change aside from being necessarily coextensive with it, then it is not relevant to an analysis of what the first change is.

with the internal feature in virtue of which they are able to heal.

Notice that Aristotle has switched from writing of the doctor as the first agent to the medical art. Williams (1982, p. 122) has it—and it would be tempting for any supporter of the inert causes view to agree—that a "more promising candidate for the role of immaterial agent" has been substituted in. But according to the text the agent is not affected, *not* because it has *no* matter and so cannot be affected at all, but because it does not have the right sort of matter (i.e., is not in the appropriate genus) to be affected in turn. Note the particle γάρ, 'for,' confirming that this is the intended explanation.

If by "immaterial" Williams means the same as 'non-physical,' then we have discussed enough reason to think that Aristotle is not committed to the claim that mundane forms like the medical art are not in material objects. (The divine may well be a different story.) If Williams means merely that the agent must be a form, and so not composed of matter as a compound material object, then the concreteness of the agent is not ruled out. ('Made of matter' for Aristotle does not mean physical.)

Anyway, it is a problem for the Williams and Frede that this substitution is made with no fanfare, explicit justification, or noting that we are seeing an increase in theoretical sharpness. Rather, the passage makes it is more plausible to believe that Aristotle regards it as unremarkable and boring to fluidly move between the object which has the form (as such) and the form itself.[57]

A few lines later, at the end of the chapter, Aristotle *does* consider the case of a form entirely separate from matter. Confusingly, he uses similar terminology to that we have been examining. Nonetheless he makes it clear he is considering a new case.

> ἡ δ' ὕλη ᾗ ὕλη παθητικόν. τὸ μὲν οὖν πῦρ ἔχει ἐν ὕλῃ τὸ θερμόν· εἰ δέ τι εἴη θερμὸν χωριστόν, τοῦτο οὐδὲν ἂν πάσχοι. τοῦτο μὲν οὖν ἴσως ἀδύνατον εἶναι χωριστόν· εἰ δ' ἐστὶν ἔνια τοιαῦτα, ἐπ' ἐκείνων ἂν εἴη τὸ λεγόμενον ἀληθές.
>
> Matter *qua* matter is able to be affected. On the one hand, then, fire has heat in matter. But on the other, if something were to be separate heat, it would be affected in no way. Perhaps it is impossible for this to be separate. But if there are some such things, in those cases what has been said would be true. (324b20–4)

Fire has its quality in matter; this is in contrast to a separate form. And we see the same phrase as before, "affected in no way," when this time it can only mean not

[57]Cf. Kosman (1969, p. 46).

affected at all. (We are talking about something which lacks matter, after all.) But this means it is not possible to read that phrase univocally across *GC* A.7: earlier it was explicitly restricted from meaning not affected at all. While the use of the phrase 'in matter' may be confusing, the immediate clarification by means of the word 'separate' disambiguates: here we do not mean not in this or that (contextually salient) sort of matter, but not in matter *at all*.

These lines should be read as considering a novel case. We are pivoting from the cases of normal causation and considering a new possibility, that there might be some cause which is separate. It is at this point still open whether or not such separate forms exist ("if there were some such things"). If there are such things, then the doctrines of the chapter are now asserted to hold of them as well, which suggests that such an assertion was not already made. So the separable forms discussed here are not the first agents discussed already in the chapter.[58]

To summarize: despite plausible first appearances, when Aristotle writes of the art of medicine as being impassive and not in matter, he does *not* mean impassive in any way whatsoever, but not affected insofar as it acts; and he does not mean it is not in matter *at all*, but that it is not in the sort of matter to directly as such affect and be affected by the patient. The primary intended contrast of the chapter between two sorts of movers is not between *abstractum* and *concretum*. Rather, it is between, on the one hand, the mover that is a cause by organizing an entire chain of events, whose contact with the patient is mediated and indirect, and which need not share its type of matter with the patient; and, on the other hand, the final link in that chain, which comes into direct contact with the patient and which must share its matter type with the patient.

2.9 Forms and Their Objects Are Equally Efficient Causes

The end of *Physics* B.3 has been read as claiming that it is not the form but the possessor of the form that engages in causal activity.[59] One reason to examine this passage is to establish that this reading, which is incompatible with my claims to this point, is a

[58] *Contra* the commentary of Williams (1982, pp. 119–123). This is not to contravene the milder suggestion that a major aim of the chapter is to work up to situating active first agents that are entirely separate from matter in the developing account of causation.

[59] So Falcon (2015, sec. 2). In neither Frede (1992, p. 95) nor Frede (1980, p. 218) does Frede provide a citation for his claim that it is the art that is more properly the efficient cause in comparison to the person that has the art. But his stress on the examples of the statue-builder and the art of statue-making, both prominent examples in this chapter, as well as the fact that his student Falcon appeals to this text, make it plausible that he has this passage in mind. (Incidentally, Everson (1999, p. 48) may have had a similar thought, since after noting that Frede does not provide a citation for his claim, Everson says (without defense) that *Phys*.B.3 does *not* provide such an example.)

misreading. Another is that, on my reading anyway, this passage tells us something about how Aristotle is thinking about causation, since he puts certain constraints on what can cause what. Although he does not offer much argument for those constraints, that he finds them natural is a valuable clue. I will argue that Aristotle is asserting a kind of "matching" requirement. It is best, when citing a cause and effect, that they be cited in the same way or on the same level.

I believe that this is a very intuitive thought. Step outside of the Aristotelian system for a moment. There is something very strange about the claim that it is certain configurations of neurons, say, that cause me to write what I write on the page. It is more natural to say that it is the beliefs and desires that I have that cause me to write as I do. Conversely it is odd to say that my beliefs cause neurons in my arms to fire in certain ways. This is so even if one believes that my beliefs and desires just are those configurations of neurons—whether or not such ways of talking are strictly speaking false, at a minimum it strikes me as very plausible that they are usually inappropriate or strange.

Of course, there are many different explanations for what is going on in a case like this; and it is rather easy to believe, for me at least, that the correct explanation does not really have much to do with constraints on admissible *relata* of the causation relation. The point is only that it is very something strange about such claims.

It is a similar impulse that motivates Aristotle, I think. It is *best*, though not compulsory, to say that the form or the art of statue-making makes the form of the statue, and to cite the composite object that is the sculptor when giving the cause of the composite object that is the statue. To do otherwise is perverse, though it may not quite be to say something outright false.

The lines that may, but should not, make us suspect that forms are more precisely the efficient cause are these:

> δεῖ δ' ἀεὶ τὸ αἴτιον ἑκάστου τὸ ἀκρότατον ζητεῖν, ὥσπερ καὶ ἐπὶ τῶν ἄλλων (οἷον ἄνθρωπος οἰκοδομεῖ ὅτι οἰκοδόμος, ὁ δ' οἰκοδόμος κατὰ τὴν οἰκοδομικήν· τοῦτο τοίνυν πρότερον τὸ αἴτιον, καὶ οὕτως ἐπὶ πάντων)· ἔτι τὰ μὲν γένη τῶν γενῶν, τὰ δὲ καθ' ἕκαστον τῶν καθ' ἕκαστον (οἷον ἀνδριαντοποιὸς μὲν ἀνδριάντος, ὁδὶ δὲ τουδί)· καὶ τὰς μὲν δυνάμεις τῶν δυνατῶν, τὰ δ' ἐνεργοῦντα πρὸς τὰ ἐνεργούμενα. ὅσα μὲν οὖν τὰ αἴτια καὶ ὃν τρόπον αἴτια, ἔστω ἡμῖν διωρισμένα ἱκανῶς. (195b21–30)
>
> One ought always to seek out the most precise cause of each thing, as also in other cases. For example, a man builds since he is a builder, but a house-

> builder builds in virtue of the art of housebuilding; this then is the prior cause, and likewise in general. Again,[60] we should look for kinds of cause for kinds of thing, and particular causes for particular things. Thus a sculptor is the cause of a statue, and this sculptor here of this statue here. And we should look for capacities as causes of capabilities of change, genuses as causes of genuses and particulars of particulars. For example, the statuemaker is the cause of the statue, but this one here is the cause of this one here. And powers are causes of capable [or possible] things, and active things of active things. Let it be, then, that for us the number and ways of causes have been distinguished sufficiently.

The question at hand is what is meant by "the most precise cause." The opposition has it that it is the "prior cause," which is the art of housebuilding. But we ought to look at the context of the passage and see what Aristotle's overall idea is.[61]

Aristotle gives us no general condition for something to be the most precise, but he gives us several examples, of varying clarity. Let us start by examining the clearer cases first and then using what we learn to examine the more opaque examples and our particular question.

The clearest case is that kinds cause kinds (and, implicitly, either do not or only in a looser sense cause particulars) while particulars cause particulars (and, implicitly, don't cause kinds). Statues (in general) are caused by statuemakers (in general). On the other hand, if we ask about the cause of *this* statue, it is better to cite the *particular* statuemaker responsible.

So causes and the effects must belong to the same ontological 'type,' in some sense of the word 'type.' For causal *relata* should (if we are to be precise) not cut across the ontological division between kinds and particulars. But the example does not suggest that either the kind or the particular is the more precise or correct cause *simpliciter*. In order to tell which one is better cited as the cause, we must first know what sort of thing the effect is; we then pick what matches the type of the effect.

[60]'Again' is how Charlton (1992, p. 31) too translates ἔτι here. This translation, as opposed to something like 'further' or 'moreover,' is meant to indicate, as I will argue at length momentarily, that Aristotle it recalling 195a27–195b6.

[61]We will end up agreeing more with the reading of Ross than of Falcon; he says the following of the phrase "τὸ ἀκρότατον ζητεῖν" (195b22) in Ross (1960, p. 514). It "is not the highest, ultimate cause, like the ἀκρόταται αἰτίαι of *Met.* 1003a26 or the ἀκρότατον τῶν πρακτῶν ἀγαθῶν of *E.N.* 1095a16. It is rather, as T.47.2 expresses it (cf. P.258.16), τὸ αἴτιον ἑκαστου τό κυριώτατον καὶ προσεχέστατον, that which corresponds precisely to, is commensurate with, the effect. …This sense of ἀκρότατον is unusual, but may be paralleled by Pl. *Polit.* 268e ἐπ'ἄκρον ἀφικνεῖσθαι τὸ ζητούμενον, *Phys.* 209b20 τῆν ἀκροτάτην ἔχει θέαν, 'it demands the most precise consideration'."

What about the less clear claim that powers are the cause of possible things? Perhaps we readily hear the claim as saying that dispositions or disposition-like objects, say, fragility or conductivity, are the causes of objects' being able to (or tendency to?) break or conduct electricity. But the other examples seem to be of efficient causes, and however fragility explains an object's being able to break, it does not seem to be as efficient cause. So this reading has at least this much against it.

Instead, recall my prior claim that forms, and thus, powers too, are often better thought of as objects under a guise or as *qua*-objects than as properties which are separate from objects. This allows us to see a more plausible alternative interpretation. For then the point is that a certain class of *qua*-objects are the causes of another class of *qua*-objects. It then makes sense that the correlate of this claim it that active *things* are causes of active *things*, as the use of the participle in the Greek makes clear.[62]

With this clue in hand, we see that this whole passage is a natural continuation of the thought of the whole chapter. First Aristotle distinguishes causes according to the famous four-fold division. He concludes this section, and opens the next topic, at B.3.195a26–28: τὰ μὲν οὖν αἴτια ταῦτα καὶ τοσαῦτά ἐστι τῷ εἴδει · τρόποι δὲ τῶν αἰτίων ἀριθμῷ μὲν εἰσί πολλοί, κεφαλαιούμενοι δὲ καὶ οὗτοι ἐλάτους ("The causes, then, are these and so many in kind. But the modes of the causes are many in number, but when organized under their heads they too are few.").

Following this, we get a new set of distinctions.[63] These distinctions cross-cut the four-fold division (and each other). First, Aristotle tells us that we may specify the cause more or less exactly, e.g., by citing a doctor or a technical expert, or by citing a specific ratio or ratio in general (195a30–32).

Second, we may cite the cause by an accident, which I take to mean, by a concomitant attribute which is relevant to neither the cause's causal activity nor the cause's substance. Aristotle's example is that we do this when we say that Polyclitus caused the statue. The point seems to be that what it is to be Polyclitus coincides with the sculptor, but what makes the thing Polyclitus is not what makes it a sculptor. Given such an accidental cause, we may cite it as well by giving it specifically or by a more

[62]Aristotle does suggest that, at least in some contexts, a name or a phrase may ambiguously denotes a composite or a form (cf. *Meta*.Z.11.1037a5–10). We could disambiguate by saying "Socrates, I mean the form, is the cause …." But that disambiguation may well belong to a level of precision not usually present in non-philosophical discourse. So it is no knock against his claim if the distinction between these two cases is embedded in the Aristotelian system rather than immediately intuitive; and, it is no knock against the interpretation as long as that part of the system is salient and in the common ground in the passage's context, as the distinction between compound and form is in *Physics* B.3.

[63]These distinctions appear to apply just as much to effects as to causes, though Aristotle focuses on causes.

general type it falls under: so an animal, too, caused the statue (32–35).

Finally, whether we give an accidental or non-accidental cause, we may give it as active or as potential. Here Aristotle's example is that a house being built is caused by either a housebuilder who is building or by a housebuilder (simply) (195b3–6).

The nature and importance of the example becomes clearer later on in the corpus,[64] since the distinction between cause that is actively causing and cause that is currently inert becomes a far more important theme later in the *Physics*, in book 3. What is clear already is that there are two causes of the house *qua* being built, one actively building and one not. According to Aristotle in this chapter, causes and effects that are active and particular exist at just the same times (195b16–20). We see later, in *Phys*.B.3 (e.g., 202a13–21), that the activation of the cause and of the effect are identical phenomena, in the sense that they are one in number. It is very natural to think that two things, whenever they are same in number, must exist at precisely the same times.[65]

If we take it that the active and passive causal activities take place at exactly the same times, the claim is a bit dubious. It is intuitive enough that a student may ruminate on the master's words and continue to be taught long after the teacher has passed away and does no more teaching. The doctrine may perhaps be saved if we restrict attention to cases where the causal activity is not mediated by intervening tools. But Aristotle also says that the two activities are both "in" the patient. In the case just given the activity of teaching may happen when the patient is not even alive, and seems to manifest in the teacher's actions. (The learning happens long after.) This seems intuitive to me even in cases where agent and patient are in direct contact. In the end, I am a bit doubtful that Aristotle's claims about the identity in number between the active and passive causal activities will hold up to careful examination.[66]

However, from this we still learn something interesting about the way Aristotle is thinking about the problem. It appears there is one thing, the causal process, and we

[64]See 20 for the idea that there is an order in which the corpus is meant to be read.

[65]Notice that this *follows* from the understanding of oneness in number in Code (1976b, p. 366) and Code (1976a, p. 171). For his idea is that we may think of objects as four-dimensional worms spread out in space-time (in his terminology: mereological sums of space-time slices of individual substances), and then say that two things are one in number at a time iff the worms coincide. (I take him to mean by 'coincide' that the worms at that moment will have just the same individual-slices; he notes too that the times when they coincide "will also be when the [one thing] spatially coincides with the [second thing]."

[66]Tad Schmaltz suggested to me that the distinction between cause of being and cause of becoming may help here; in the latter case "the effect can exist only as long as the agent is causing it." I like the distinction and think it may well be in Aristotle's writings, but I am skeptical that it helps with this problem. For it seems to me the teacher is naturally construed as a cause of the student's *becoming* learned. In our example the teacher effects the student's transformation from unlearned to learned after death. Anyway if such a distinction can help us here, then, it seems not to be the distinction between becoming and being as it is most naturally construed from English.

are picking out aspects of it that are different in being (but not number) as the causal actors. I believe this is the way to understand the four causes in general: as parts of the whole phenomenon of an intelligible, teleologically ordered change.[67]

For now, what we ought to understand is that the cause of the activation of a passive capacity is, precisely speaking, the activation of an active capacity. To put it in a less roundabout way, the activity of the cause *qua* cause is the cause of the activity of the effect *qua* effect. It is the moving around of the builder as she builds that is the cause of the house's coming into being.

In any case, we see now this is what our passage is referring back to when it tells us that active things are causes of active things. The claim that powers are causes of capable things, then, should be understood in contrast to that. If we want to know the cause of some effect as it is actively being affected, we should cite the actively working cause. But it is also clearly acceptable in normal speech to cite inert objects as the cause of inert objects: the cause of the completed house is a builder who may no longer be alive right now, let alone actively building. This sort of relation is parasitic on the active one—it is natural to suppose that the point of such a claim is that there was some time when the builder actively built the house. But, again, there is in this text no suggestion that it is less precise, or less admissible as a way of speaking, or a less real sort of causation.

However, it is slightly clumsy for Aristotle to make this point in this way. To make the point concrete, consider a freezer which freezes a bucket of water. According to Aristotle, there is a mode of causation, the active mode, according to which the freezer causes the water to freeze; as far as this mode goes, the causation happens when the freezer acts on the water. The powers involved in the relation are the powers to freeze (active and passive).

Our point was that it is perfectly natural to say after the event that the cause of the frozen water is the freezer (in the present tense!), though the two may no longer be interacting. But the water is no longer capable of freezing: it *is* frozen, but it no longer has any feature in virtue of which it could be acted on to freeze. It is *actually* frozen, so it is possibly frozen, too; so perhaps we could take the statement to mean that the power to freeze is the cause of objects that are possibly frozen. But this is too generous, since the power to freeze is not the cause of objects that are *merely* possibly frozen, but of objects that have realized that possibility.

[67]This view has some similarity to that of Furley (1996). There, the other three causes are aspects of or act through the efficient cause (72–73). But it seems to me that, while Furley cites cases of formal and material causation that are readily understood this way, not all cases can be; and further, I worry that this view does not do justice to Aristotle's insistence that the final cause is prior to the efficient cause, and not the other way around.

So Aristotle has chosen a strange way to express himself. And since *in general* a thing's being changed involves its being moved from one state to the contrary state, in so doing losing the capacity for such a change of state, the example is not a mere corner case.

But this is too fast, or too picky. It is good to remember that at this point in the corpus[68] the notion of a power has not yet been developed in the sort of detail that may cause the reader to be puzzled in the above way by this usage. We do better to understand the usage as primarily intending to draw a contrast with citing the active causes. The point is that the cited causal *relata* are not *at the time of ascription active*.

Happily, on this reading we preserve the idea that Aristotle is requiring some kind of fit or match between causes and effects. Note that the line is in the middle of a series of clauses, each of which gives such a requirement (whether or not the fitness is understood in terms of matching ontological categories).

Now we should finally turn to the difficult lines we are primarily concerned with. To recall:

> One ought always to seek out the most precise cause of each thing, as also in other cases. For example, a man builds since he is a builder, but a house-builder builds in virtue of the art of housebuilding; this then is the prior cause, and likewise in general. Moreover …

We have already seen that the passage covers two of the distinctions in modes of causation covered earlier in the chapter's text. I propose that our own, perhaps more puzzling example, is meant to call back to the remaining distinction. To recall, Aristotle tells us that a cause may be *per se* or *per accidens*. We may say that the statuemaker makes the statue, or that the cultured man (who happens to be identical to the statuemaker) makes the statue.

Here Aristotle is telling us that the more precise cause of a house is a builder, not the thing that accidentally inheres in him. The reason given seems reasonable enough: the builder builds because he is a builder, because he has and is employing the ability to build, not because he is a cultured man. I believe that Aristotle is picturing the following: the explanation for why it is that the cultured man builds must run through the fact that the cultured man is identical to the builder. But the converse is not true: that the builder is the cause of the house is not to be explained by the fact that the builder happens to be identical to the cultured man.[69]

[68]See footnote 20.

[69]On this point, and similar points in this chapter, Tad Schmaltz has asked me "Why not say that what

In a moment I want to speak a bit about what this means for the type of explanation Aristotle is talking about. But first it would be good to look at another way of reading the passage.

Writing about this passage, Falcon (2015, sec. 2) says "However, an adequate explanation of the production of a statue requires also a reference to the efficient cause or the principle that produces the statue" and Aristotle insists "the art of bronze-casting [is] the most accurate efficient cause of the production of the statue." It is natural to suppose that Falcon is taking 'this' (τοῦτο) to refer back to 'the art of housebuilding,' τὴν οἰκοδομικήν. Of course τοῦτο is neuter and τὴν οἰκοδομικήν is feminine. On this reading it must be that τοῦτο is attracted into the neuter by the sentence's predicate, τὸ αἴτιον. Such attraction is quite possible grammatically, but certainly not necessary.[70]

We can accept the claim that precisely stating the cause of the statue requires some reference to the art of bronze-making. That is exactly what happens when we say that the housebuilder is the cause, rather than the cultured man. So agree with the first part of the quote above. But this does not force us to take Aristotle's point to be *contrasting* the art of housebuilding with the housebuilder and claiming that the former is the more the cause than the latter. Rather, the contrast is between on the one hand the housebuilder, who builds *per se*, that is, in virtue of the art that makes him a housebuilder, and on the other hand the cultured man, who builds in virtue of an art that is unconnected to his culture.

On this reading, 'this' refers not back to 'the art of housebuilding,' but to the entire

makes the man cultured and what makes him a builder inhere in the same man?" Similarly when it comes to Polyclitus he asked whether the point shouldn't be that what makes Polyclitus Polyclitus isn't the same thing as what makes him a sculptor.

As you can see I incorporated the suggestion above where it came to Polyclitus, so it shouldn't come as a surprise that I'm not hostile to it. Indeed I see that as the ontological underpinning for the remarks about explanation, as the reason why different sorts of explanations are available.

However I don't see reason to accept the suggestion that this way of talking is more precise than saying that Polyclitus and the sculptor are identical (in number) to each other or to remarks about what explains what. (The former was Professor Schmaltz's suggestion; I'm not sure if he'd like the latter as well.)

It is like the difference between saying that some product explains (in a particular way) a process and that some form or object is the telos of a process. They may differ in logical form but they're inter-entailing (over the Aristotelian system) and they in some loose sense say the same thing. The difference is rather that one way of putting it focuses on the things and properties that inhere and the other on the way they are exposed to us, i.e., how some properties explain certain behaviors and others do not.

Similarly one is citing the explanatory part of the ontology when one talks about the source for this thing being a sculptor and for its sculpting behavior rather than facts about who is the same in number as a sculptor or the movements of the person. But our observations of the second type are what give us access to facts of the first sort. That's not in itself a distinction in precision or one sort of statement being more accurate or true than the other.

[70]So Charlton (1992, p. 31) takes it, translating "the art of building, then, is the prior cause." Hardie and Gaye are more respectful of the ambiguity of "τοῦτο," translating in Barnes (1984a, p. 334) "This last cause then is prior."

clause giving an example, set off by οἷον. This too is grammatically unexceptionable; we might gloss it as 'this, what I was just saying, is ….'

Grammatically both readings seem to me to be possible, but contextually our reading fares better. For us, Aristotle is in all three examples referring back to the modes of causation already distinguished and telling us that, for each mode, one sort of causation is more precise and prior. On the competing reading, Aristotle is highlighting a distinction novel for the chapter, that between the efficient cause as form and as informed thing, and telling us that the former is prior to the latter. But if the point were to make such a new distinction, we would expect to be told about it in more detail; and we would expect more of a pivot as Aristotle leaves the new topic and returns to the distinctions made earlier. On our reading all three examples are cut from the same cloth, which explains why Aristotle goes to no overt lengths to separate their presentations; and each example hearkens back to a distinction already introduced. This explains why Aristotle does not feel the need to give a full description: he is summarizing the chapter rather than making new points.

I claimed that our first two examples were cases of commensurability requirements. It is fruitful to explore the thought that this example, too, is a commensurability requirement. The idea is that to say that there is a match or fit between the *relata* when we say that the statuebuilder builds the statue that is absent when we say that the cultured man builds the statue. This is another way of putting the familiar point that there is a sort of *similarity* between the cause and the effect: that similarity is brought out clearly when the cause or effect are given *per se*. When the *per accidens* cause or effect is given the similarity is obscured, or only indicated in an oblique way and through identity in number with the *per se* causal *relata*.

So this section gives a clue as to the nature of the similarity. For the explanation given of the precision requirement is that the builder builds in virtue of the art of housebuilding. At least one way to take the intent of this explanation is that the commensurability or similarity *consists* in just this. There may not be, or it may be quite hard to find, any intuitive qualitative similarity between the skill of housebuilding and its canonical effect, a house. And, that one is required is not suggested in this chapter. Instead, the point may be that the source of the commensurability is the very fact that one skill (the art of housebuilding) and not another (say, cultural knowledge) is that in virtue of which the house comes to be.

Obviously these lines are not enough to secure such a reading of the meaning of the requirement that the cause and effect must be similar. But they may at least prepare us to see such a reading of other passages.

2.10 Stepping Back

I wish now to briefly comment on what has happened. I hope to have convinced you that, whatever 'form without matter' means, it does not (or usually does not) mean uninstantiated or abstract form; and that whatever a form or a power is, it is on as firm a ground to be called active efficient cause as the object in which it inheres. I will now say a word about the source of temptation toward the competing idea that arts are uninstantiated or abstract objects.

It may be tempting to think of the hylomorphic analysis of material objects in the following terms. The function of form is to convey properties to material objects, while that of matter is to serve as a substrate for those properties. Aristotle does say things that encourage this (mistaken) impulse. Among the many uses of 'form,' one means, more or less, accidental property. It is tempting to regard another use as indicating the essential property of a thing. Matter is indeed, from its introduction in *Physics* A, called a substrate, and properties inhere in it. Forms are said to be predicated of matter.[71]

Focusing on these roles for form and matter leads us in deceptive directions. Since matter is itself a compound of a form and some still lower level of matter, we can push the idea further in the following way. How are we to explain the qualitative character of the matter of some compound material object? We can appeal to Aristotle's conception of objects as "layered," that is, to his distinction between proximate and distal matter.[72]

Proximate matter (e.g., my organs and limbs) is itself to be understood as a compound of other matter (e.g., flesh and bone) and some form. If matter's role is fundamentally to serve as the seat for properties that explain why the matter has a certain character, then we find that we expect the *primary* sense of matter to be featureless stuff, or perhaps stuff whose sole positive feature is spatial extension.[73]

But Aristotle overwhelmingly focuses on the proximate rather than distal matter: 'the matter of a human' usually refers to arms and eyes and livers, not earth and water and air, let alone prime matter. On this way of thinking, we find the theoretical concept of form to be dangerously overburdened, and have trouble reconciling its various roles.[74] We fail to make sense of Aristotle's examples: how can the conclusion of

[71]For more discussion of the idea of form as a property or complex of properties see Galluzzo and Mariani (2006, pp. 65–70).

[72]For more on the distinction on proximate and distal matter, see J. Whiting (1992) and Irwin (1989).

[73]And it does indeed seem that the problem of matter became, for the Scholastics, the problem of prime matter (Pasnau 2011, pp. 17–19). The idea that matter's central characteristic is spatial extension comes to explicit and clear statement in the Peripatetic tradition with Philoponus and Simpiclius, though there are seeds for the interpretation/view in Plato and in Aristotle (as well as the Stoics) De Haas (1997, pp. 46–131).

[74]Bostock (2006c, pp. 79–102) and Ackrill (1972) are instructive discussions.

an argument be its form, to the premises' matter, on this conception of hylomorphism (*Phys*.B.3.195a18–19, *Meta*.1013b19–20)? At best, on this reading, this is a confused analogical use of the doctrine, hardly suited to Aristotle's use as a paradigmatic case when introducing the four causes. How is it that both my soul and the human activity it makes possible are my form? What does it mean to suggest that beings that are part of the physical world, even divine beings that are not part of the sublunary natural order, are form without matter? Why would Aristotle identify the matter of a material object with the genus that it falls under?

All these puzzles arise because it is a mistake to think that, in Aristotle's mind, hylomorphism was primarily introduced to make sense of how properties are exemplified by objects. On the contrary: in the *Categories*, Aristotle writes without reservation of secondary substances (substantial kinds), qualities, quantities, and locations being predicated of primary substances. There is no sign in that work that there is a problem or puzzle in taking properties to hold of primary substances, of ordinary material objects. The concepts of form and matter do not appear there. It is only when we attempt to develop an account of the possibility and nature of change, in the *Physics*, that the hylomorphic machinery must be introduced.[75]

There, the concept of matter is not in the first place of *stuff* that may be informed with some property. It is rather of the material whose positive nature opens up the possibility of its being worked up or transformed into a further object. To say that divine beings (planets) do not have matter is not to suggest that, to our surprise, they are not concrete: it is rather to say that they are eternal, necessary, unalterable, and indestructible.[76]

Thus, to let proximate matter drop away in favor of focusing on distal matter is to miss the point of matter's introduction. Matter is at least closely related to a potentiality to become a new object—it is systematically one in number with such potentiality. For, in general, an activity is the realization that arises out of a potentiality. Matter is the

[75]Cf. the similar remarks of Furth (1988, pp. 33–38). Furth stresses that what pushes Aristotle from the simpler theory of the *Categories* into the complexities of the *Metaphysics* is not merely accounting for the sheer possibility of change, but giving an account which makes change intelligible in such a way that constrains which changes are possible in intuitive ways. It is this that requires us to abandon the "critical factor in maintaining that simplicity [of the *Categories*]," "the designation of the substantial individuals as ultimate subjects, at the 'floor of the world,'" such that it is appropriate to say that material objects are "wholly self-sufficient: the dependencies all terminate in them" (36). That is to say, it is abandoning this fiction that forces us to analyze primary substances as compounds of form and matter. This seems right to me: the world of the *Categories* is not one of Parmenidean stasis. The resources of the *Physics* are introduced so that change will not be the mere flux of properties, but will have intelligible structure and explainable origins.

[76]See, e.g., *Meta*.Z.7.1032a20–22, *Meta*.H.5.1044b26–28, *Meta*.Θ.8.1050b7–28.

special case where the realization is the determination of the thing into a new object.

At this point we know that powers are (at least sometimes) forms that are sources for a change. The power plays an important explanatory role for the change which we have yet to explain, though we have identified it with the familiar name of efficient causation. I have just suggested that powers' close relative, potentialities, are at least sometimes sources for a generative change (that is, a change in which a new object comes to be). It is time to turn to *Physics* A to see how power and actuality, no less than form and matter, arise from the desire to analyze the mechanism of change.

CHAPTER 3

Powers, Generation, and Hylomorphism

3.1 Introduction

In this chapter I will focus on the role of powers in generative changes. The bulk of *Physics* A.7 appears to be concerned with explaining how genuine generation and destruction are possible by introducing the machinery of form and matter. Power and activity are mentioned briefly toward the end of the chapter as another possible solution.

I will try to explain how that solution should go. We would like to avoid two situations. First, A.7 is apparently meant to motivate the introduction of form and matter, i.e., to give us an Aristotelian reason to believe these things exist. If another totally different solution exists, using a basically different conceptual apparatus,[1] then that reason is weakened. Second, it would be another sort of mistake if form and matter turned out to be too intimately related to actuality and potentiality. If they turned out to be two sets of labels for the same distinction, it would seem that Aristotle has been both clumsily misleading and needlessly over-complicated.

Thus we would like to find a way to relate potentiality and actuality to the solution given in terms of form and matter, but also to be able to say how that second solution adds something of value. I will try to steer between the two sorts of mistakes mentioned above. These distinctions are indeed closely related, and I will try to say how. But they are not synonymous. Even if it turns out that the frameworks differ only in sense or aspect, in that the solution envisaged can be rephrased in either framework, each set of concepts illuminates the subject matter in a different way.

It is not at all a novel idea that A.7 is meant to be a central argument for Aristotelian hylomorphism; on the contrary some version of that claim is probably the standard view.[2] But according to a more "deflationary reading" of A.7 (Kelsey 2006; Kelsey

[1]Such is the view of Wieland (1975, p. 135).

[2]A partial list: Ross (1960, p. 22), A. Mansion (1946, pp. 70–71), Wieland (1970, p. 111), F. Lewis

2008; Kelsey 2010), the chapter is not meant to rely on or introduce a distinction between form and matter. Obviously if this were right it would be hopeless to try to leverage a reading of this chapter into a further understanding of the relation between power and matter. I will try to answer the objection by showing how reading this chapter as introducing hylomorphism makes interpretive sense and is a reasonable solution to the puzzle Aristotle raises, contrary to Kelsey's objections.

3.2 Potentiality and Actuality in *Physics* A.7 and A.8

In *Physics* A.8, Aristotle presents a puzzle, attributed to philosophers from the Eleatic tradition, which is designed to show that genuine generation is impossible. His solution relies on the machinery of the principles of change which he developed in the previous chapter. That machinery is traditionally taken to be a first pass at hylomorphism's distinction between form and matter. At the end of the chapter, Aristotle mentions that there is another way of proceeding: what has come before

> εἷς μὲν δὴ τρόπος οὗτος, ἄλλος δ' ὅτι ἐνδέχεται ταὐτὰ λέγειν κατὰ τὴν δύναμιν καὶ τὴν ἐνέργειαν· τοῦτο δ' ἐν ἄλλοις διώρισται δι' ἀκριβείας μᾶλλον. (*Phys*.A.8.191b28–30).
>
> is one way [of dealing with the problem], but another is that it is possible to speak of the same things in virtue of potency and activity. But that is discussed in more detail elsewhere.

A rather natural way to read all this is as claiming that the solution to the puzzle in terms of potentiality and actuality is quite distinct from the introduction of form and matter in A.7. This is indeed how Wieland seems to understand the situation, for example:

> …Aristotle recognizes a plurality of systems of principles, which lie unconnected side by side and cannot be reduced in their turn to a higher principle (one thinks of matter—form—privation; potentiality—actuality; …). (Wieland 1975, p. 135).

Now we have already begun to see that there are some important connections between form, matter, and power, so that we ought to be suspicious of the claim that, in

(1991, p. 193), D. Graham (1987, p. 133), and Bostock (2006a). Called "the orthodox view," "the entrenched view," etc. by Henry (2015, 144, cf. 150) (who does not endorse it).

general, these distinct systems "lie unconnected side by side": on the contrary, Aristotle thematizes the connections among these two systems. This may make us suspicious of the claim that the two systems are unconnected in this specific chapter, as well.

There is, too, a textual hint. Chapter 8 opens with the following remark:

> Ὅτι δὲ μοναχῶς οὕτω λύεται καὶ ἡ τῶν ἀρχαίων ἀπορία, λέγωμεν μετὰ ταῦτα. ζητοῦντες γὰρ οἱ κατὰ φιλοσοφίαν πρῶτοι τὴν ἀλήθειαν καὶ τὴν φύσιν τῶν ὄντων ἐξετράπησαν οἷον ὁδόν τινα ἄλλην ἀπωσθέντες ὑπὸ ἀπειρίας, καί φασιν οὔτε γίγνεσθαι τῶν ὄντων οὐδὲν οὔτε φθείρεσθαι .... (*Phys*.A.8.191a23–27)
>
> After these points, we ought to say that the puzzle of the ancients is resolved in this way alone. For the first inquirers into the truth and nature of beings turned aside, as it were, onto another road, driven off by inexperience, and they say that none of the beings either comes to be or perishes ....

The "puzzle of the ancients" must be the dilemma about the number and nature of principles set forth in *Physics* A.5 and A.6. It is solved by the presentation of the machinery in A.7. It is a common-place, and I think a correct one, that this machinery is introduced with an eye to solving as well the puzzle in A.8.

Based on this, we should expect the content of chapter 8 to be an explanation for why the solution in A.7 is the only available solution. That is because Aristotle tells us that the given resolution is the only one available, and the next sentence begins with 'for.' The explanation in chapter 8 consists in a new puzzle, one purporting to show that generative change in particular is impossible, and in a solution to that puzzle using the old machinery. So apparently this is meant to confirm that the machinery is indeed the correct way to resolve the old dilemma.

But the proffered explanation is not sufficient if the machinery is not the only way to resolve the puzzle of chapter 8. Then the puzzle gives us a much weaker reason to think the machinery was the only way to resolve the dilemma. There would still be some confirmatory force in the same machinery's solving multiple puzzles. It would have the effect of making a posit and then showing how the posit can fruitfully deal with many problems. But the whole line of thought is much more convincing if the puzzle in 8 is meant to constrain available solutions to the extent that only one answer, the answer using the machinery of 7, is available. And the flavor of the whole of book A of the *Physics* is not that of making such a posit and then seeing how productive it is, but rather of more organically letting the principles emerge from a sensitive treatment of the problems.

My suggestion, then, is this. The solution presented in A.8 can be put in two ways, in two different sets of concepts. So it is fair to say that, in some sense, the solution in terms of potentiality and actuality is "another" solution than the solution in terms of form and matter. On the other hand, there is a good sense in which the two solutions are really two ways of framing the same idea. So there is good sense, too, in saying that there is only one solution to the puzzle raised about generation, and so that the puzzle confirms the earlier inquiry in A.7. Finally, the two concept-sets highlight and emphasize different features of the explanation. So there is some positive good in having two separate solutions, and something added by the formulation in terms of potentiality and actuality; it is not a mere redundancy.[3] (This is of course not to suggest that it is impossible to formulate that additional positive good in the language of the first solution.)

3.3 The Solution in Terms of Matter and Form

To start, let us go through the problem and the solution in terms of matter and form. I want to accomplish two things. First, to set up the solution in terms of form and matter so that we will be able to fit actuality and potentiality into the picture in subsequent sections. Second, to give a version of the solution which confronts some of the objections raised by Kelsey against reading these passages as an argument for hylomorphism.

3.3.1 The Dilemma

The quote I've already given continues:

> καί φασιν οὔτε γίγνεσθαι τῶν ὄντων οὐδὲν οὔτε φθείρεσθαι διὰ τὸ ἀναγκαῖον μὲν εἶναι γίγνεσθαι τὸ γιγνόμενον ἢ ἐξ ὄντος ἢ ἐκ μὴ ὄντος, ἐκ δὲ τούτων ἀμφοτέρων ἀδύνατον εἶναι· οὔτε γὰρ τὸ ὂν γίγνεσθαι (εἶναι γὰρ ἤδη) ἔκ τε μὴ ὄντος οὐδὲν ἂν γενέσθαι· ὑποκεῖσθαι γάρ τι δεῖν. (*Phys*.A.8.191a27–31)

[3]It is possible, even plausible, that the remark that there is "another" solution in terms of potentiality and actuality is a later insertion. We might suspect this in part because we think the remark contradicts Aristotle's claim that there is only one solution (so D. W. Graham (1995, p. 555)). The insertion could be by a later Aristotle who had come to think more of the metaphysical importance of the power concept, or even by an editor concerned to make sure that the text acknowledged the later, more mature development.

Still, the inserter let the remark stand together quietly with the preceding remark at the opening of A.8. Either this was an oversight or the inserter thought rightly that there was not much tension and that the two approaches are not so disunified as all that; and we should try to see what can be done to find an interpretation that makes it not an oversight, before we decide that there was an error.

> …and they say that none of the beings either comes to be nor perishes, since it is necessary on the one hand that what changes change either out of what is or what is not, and it is impossible for it to change out of both of these. For what is cannot become—for it is already—and nothing can come out of what isn't. For something has to underlie.

The puzzle seems to arise from commitment to three claims which sound commonsensical.

1. What is does not come from what is.
2. What is does not come from what is not.
3. The only two possibilities are that what is comes from what is or comes from what is not.

That is, we appear to have a dilemma between two exhaustive and unacceptable options. So, Aristotle's predecessors conclude, change is impossible.

On my interpretation, Aristotle presents a framework in *Phys*.A.7 which, together with other common Aristotelian analytical tools, shows each of these claims is actually mistaken. Sometimes what is *does* come to be from what is; what is *does* (in a sense) come from what is not, every time; and furthermore, the division into those two possibilities is not exhaustive. That is, despite its pat appearance, the dilemma disappears once we understand it correctly.[4]

In order to understand what the intended solution is meant to be, we need to understand what the pictured dilemma is. The following question, which has been prominent in the contemporary discussion of this passage, is a good place to start. What is meant by phrases like 'what is' and 'what is not?' Depending on the interpretation, the horns of the dilemma will be different. In each case there are two common interpretative options. The first is that 'what is' should be understood as 'what exists;' the 'is' is existential. The second is that 'what is' should be understood as tacitly needing to be completed with some predicate; the 'is' is predicative. In this case we will need to decide what the intended predicate is.[5]

[4]It strikes me as very plausible that Aristotle's analysis of his predecessors' problem is not quite fair to their own understanding of the issue. I will put aside the question of the accuracy of Aristotle's own exegesis in this chapter; for now, I care primarily about what Aristotle's treatment shows about his own views.

[5]For the various senses that the verb 'be' can have in Greek, see Kahn (1973). The verb may also have a veridical sense, in which case 'what is' would mean 'what is true;' but I find it hard to make sense of the idea that this could be what is meant in these passages.

The existential reading is tempting because it makes it clear why it is a problem for being to come from not being: that is generation *ex nihilo*. But it makes it very difficult to understand what the problem is supposed to be with a being coming from being (cf. Kelsey 2006, pp. 333–334; Kelsey 2010, pp. 115–6). If there is to be any sense made of something coming to be out of something, of one thing turning into another, then it seems it must be that the thing it comes out of something that exists already. So the dilemma will be seriously under-motivated.

Another reason to favor the predicative reading is that the solution to the problem will seem to turn on the idea that what is and what is not may be or not be merely accidentally:

> Ἐκεῖνοι μὲν οὖν ταύτην ἔλαβον τὴν δόξαν διὰ τὰ εἰρημένα· ἡμεῖς δὲ λέγομεν ὅτι τὸ ἐξ ὄντος ἢ ἐκ μὴ ὄντος γίνεσθαι …ἕνα μὲν τρόπον οὐδὲν διαφέρει ἢ τὸ τὸν ἰατρὸν ποιεῖν τι ἢ πάσχειν, ἢ τὸ ἐξ ἰατροῦ εἶναί τι ἢ γίγνεσθαι· ὥστε, ἐπειδὴ τοῦτο διχῶς λέγεται, δῆλον ὅτι καὶ τὸ ἐξ ὄντος καὶ τὸ ὂν ἢ ποιεῖν ἢ πάσχειν. οἰκοδομεῖ μὲν οὖν ὁ ἰατρὸς οὐχ ᾗ ἰατρὸς ἀλλ' ᾗ οἰκοδόμος …ἰατρεύει δὲ καὶ ἀνίατρος γίνεται ᾗ ἰατρός. …ὅπερ ἐκεῖνοι μὲν οὐ διελόντες ἀπέστησαν, καὶ διὰ ταύτην τὴν ἄγνοιαν τοσοῦτον προσηγνόησαν ὥστε μηθὲν οἴεσθαι γίγνεσθαι μηδὲ εἶναι τῶν ἄλλων, ἀλλ' ἀνελεῖν πᾶσαν τὴν γένεσιν.
>
> But we say that that generation out of something or out of not-something …is in a way no different than the doctor doing something or suffering something, or being or becoming something from being a doctor. As a result, since this is said in two ways, it's clear that it's that way too for 'out of something' and 'something either does or suffers.' For the doctor builds not *qua* doctor but *qua* housebuilder …but they heal and become a not-doctor *qua* doctor. …They [i.e., our predecessors] did not make this distinction and so gave up, and through this ignorance compounded their error. As a result they believed that nothing comes to be or is from other things, and they did away with all generation. (*Physics* A.8 191a34–b17)

The distinction seems to be between saying something does something *per se* and saying something does something accidentally or by coincidence. In the first case the thing is picked out in a way relevant to the action done. In the second the thing is picked out in an irrelevant way, but could have been picked out in a relevant way. Aristotle imagines that the distinction can be made for something's coming into being, just as it can for actions like doctoring, housebuilding, etc.

According to Aristotle this distinction solves the puzzle. So any interpretation must either explain how it does so or why Aristotle mistakenly thinks it does. In particular one may worry that this distinction is not the distinction between form and matter, and so the standard reading must be on the wrong track (Kelsey 2010, p. 115). Thus we will discuss this distinction again further on.

But for now I only want to note that this pushes us to read 'what is' a particular way. It makes no sense to say that something *exists* merely accidentally. It seems that we say that *a* has some relation to *b* accidentally when either *a* has that relation to *c* and *c* is accidentally identical to *b*; or, when *c* has that relation to *b* and *c* is accidentally identical to *a*. It isn't a notion built well for existence simpliciter.[6] And indeed, although Aristotle's discussion in this chapter of accidental predication is opaque, it does seem clear that he means to talk about the ways in which objects stand in relations to each other: his example is that the doctor builds *qua* builder, not *qua* doctor; but he learns and practices medicine *qua* doctor, not *qua* builder. The point is not the doctor or the builder merely accidentally exists, whatever that means.

Therefore we ought to favor the predicative reading. But the intuitions pressing in favor of the existential reading can be retained. Let *F* represent our predicate. We are told that it cannot be that what is *F* comes out of what is not *F*, since something must underlie.

It may be that the phrasing "something must underlie" is Aristotle's explanation in his own terms, and not the way the dilemma was originally formulated (cf. Waterlow 1982a, pp. 8–9). It still seems to me likely that the thought was not an Aristotelian innovation; the thought that something must underlie a generation plausibly motivated accounts of generation like the atomists.[7] We can take a good guess at what the original thought was, shorn of Aristotelian terminology. The puzzle was supposed to be a puzzle for a special case of change, generation. So it should fail in the case of mere change in location or alteration. And it does: if a human changes from ignorant to learned, then what is learned comes from what is not learned. In this case it is okay, because "something underlies": the human persists through the change. But this is exactly the

[6]See *Metaphysics* Δ.7, esp. 1017a7–a22. This way of putting the point relies on an independent understanding of when two things merely coincide versus when they are one in their own right; for this, see *Metaphysics* Δ.9. A useful discussion of the *per se*-accidental distinction can be found in Gill (1991, pp. 24–25).

[7]Hence I agree with Kelsey (2010, p. 114) that the idea that something persists through a generation is neither likely to be an Aristotelian innovation nor to be the heart of hylomorphism. However his own inference from this goes too far: it does not follow that "Aristotle's argument for hylomorphism does not turn on the idea that in any coming to be there is something that survives." Taking this claim as an important premise in the argument for hylomorphism does not require that the premise is original to Aristotle or that it secures the conclusion by itself.

requirement which seems to be broken in the case of generation and which explains why, *in that case*, it cannot be that what is *F* comes from what is not *F*. For a human comes to be from what is not a human, and this is not a case of a substance persisting and taking one property and then another.[8]

Why is it a problem if nothing underlies? Here we must speculate a bit, but it doesn't take much imagination to come up with something reasonable. The thing that results from the generation, if it is to come *out of* something, must have some connection to what it comes out of. Otherwise there is no explanation for why this is a generation *of this out of that*, as opposed to a destruction of that into nothing and a spontaneous arrival of this out of nothing.[9] All change will be made mere succession of distinct objects. Whatever we may think about such a theory of change at the end of the day, it is revisionary enough that it is easy to believe that someone like Aristotle, so concerned to preserve the phenomena, would be loathe to accept it.

In addition, it isn't the case that things come into existence in undetermined and unpredictable ways: they systematically come from some other things under certain circumstances. If that systematicity is to be explained, and not just observed and generalized about, then we have to be able to point to some connection between what comes into existence and what it comes from.[10] These worries are, I think, very simi-

[8]I take this to be the point of *Phys*.A.7.190a32–190b5.

I agree with the overwhelming majority that the requirement of persistence is meant to apply to generations as well as non-generative changes; minority disagreement can be found in Henry (2015), Charlton (1992), and B. Jones (1974). *Contra* Henry it seems very likely to me that Aristotle does require that something persist through the change in every case of coming-to-be (190a7–17) and then imagines that coming-to-be simply, coming-to-be a new substance, is a type of coming-to-be (190a32–33) (cf. 190a23––26). The text may be compatible with nothing persisting in the case of a substantial generation. But if so it seems to me it would be an unnatural reading as well as one that finds Aristotle guilty of a very misleading exposition.

A significant motivation to read the text this way is the wish for A.7 to be consistent with (one interpretation of) the doctrines of *Generation and Corruption* (Henry 2015, pp. 152–155; Charlton 1992, p. 77). I don't wish to commit in any direction as to the requirement of a persistent substrate in *GC*. But anyway I apparently find it less implausible than Henry and Charlton that Aristotle contradict himself across these two texts—especially if the contradiction can be reduced to one special case (the generation of the elements).

[9]So too Bostock (2006a, p. 6):

> For considering now the mere concept of becoming we may argue that if one thing is properly said to become another then …there must be something which does persist throughout the change, for otherwise the change would merely consist in one thing coming to be where another had ceased to be, and there would be no reason to say that the one became the other.

Also compare Gill (1991, pp. 108–9).

[10]Obviously for this argument to work there needs to be some background assumptions about what counts as a reasonable explanation—in particular, fitting instances under generalizations is not sufficient on this way of thinking. But I think it is very plausible that Aristotle's search for explanatory principles

lar to the worries that prompted philosophers of antiquity to deny that there could be generation *ex nihilo*: such a thing threatens to make a wild coincidence of the order and intelligibility of the changing natural world.[11]

On this reading, Aristotle's phrasing of the problem by saying that "'something must underlie" already contains the seeds of the solution. We must posit something else that remains through a generative change, since we no longer have a single substance that is first this way and then that way. That thing is the substratum; it is matter. Aristotle posited matter in the first place to explain how generation was possible.[12] The puzzle will be how to insist that matter persists through generation without effectively doing away with (real) generation, without making what appears to be generation only the

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is not consistent with that vision of explanation.

[11]Here Professor Tad Schmaltz asks: is it not rather the case that atomists denied generation *ex nihilo* because they of the "inconceivability that something just pops into existence?" If we take the question literally the presupposition seems flatly false to me: as far as I can tell I can indeed conceive of something just popping into existence, and I think plenty of people can. I imagine that's a more literal interpretation than Professor Schmaltz intended. But then I worry that saying this is inconceivable is merely another way of saying one finds generation *ex nihilo* incredible, not a reason why one finds it incredible.

It is possible that the atomists found generation *ex nihilo* incredible as a sort of bedrock article of faith, and had nothing more to say on the matter. But I think this is a quite uncharitable interpretation. Not only are we then finding the atomists guilty of a singular failure of imagination. We find that in their metaphysics they are quickly out of the business of giving reasons for their assertions and into the business of merely stating how things seem to them—therefore out, I would think, of the business of doing philosophy.

But I think there are plausible reasons to think that, whatever the facts about conceivability, generation *ex nihilo* does not in fact happen. For as Schmaltz puts it this is something "popping" into existence; that is, something is happening apparently for no reason, let alone sufficient reason. Of course this way of putting it has nothing really essential to do with the assertion that material objects must be preceded by material objects; it would be just as comprehensible if material objects systematically came from some other sort of physical entity. This wouldn't be generation *ex nihilo*, but generation ex whatever that other sort of object is. This suggests that what's being imagined in the possibility of generation *ex nihilo* is that there is no systematic conservation going on in such an instance of generation. That is to say, what is being imagined is that what is generated at a moment is not constrained and ordered by what came before. That is why I suspect that the horror for generation *ex nihilo* is at root a horror of a world whose physical character is fundamentally unordered and not graspable by reason.

[12]This is somewhat similar to some of what Waterlow (1982a) says; as she puts it,

> the expression 'underlying subject' is Aristotle's comment in *propria persona* …the expression 'underlying subject' is his, not theirs, and the clause in which it occurs does not, as might first appear, pose one side of the ancient dilemma; on the contrary, it carries Aristotle's own solution. Yet the phrase …reflects a conceptual requirement to which the earlier thinkers were no less sensitive than Aristotle himself …it is impossible to accept that the X which comes into being was not somehow rooted in what went before …. (Waterlow 1982a, pp. 8–9)

So, too, St. Thomas thinks that in the end the discovery of matter is the crucial point: "Driven on by certain difficulties, some of the ancients denied some of the things mentioned above, i.e., generation and corruption, and a plurality of substantially different things. But once matter is understood, all of their ignorance is removed" (Aquinas 1999, p. 67).

taking on of new properties by the substrate.

In the case of mere alteration, then, we have as our hypothesis that *F* is to be the terminus of the change: *F* is being *learned*.[13] We should attempt to extend the same idea to the case of generative change. What comes to be, is, say, a human. Here it is helpful to look to the discussion of generation in *Generation & Corruption* A.3, which recaps some of the material we are talking about. There Aristotle tells us that in generation the terminus is not a human in this or that way (learned or ignorant, for example), but a human *simpliciter* (*Generation & Corruption* A.3.317a32–34). What comes to be *simpliciter* comes to be either in its highest category or universally (*GC*.A.3.317b5–7).

It's a bit unclear what generation of the 'highest of each of the categories' actually means. I know of two main interpretations. First, endorsed by Philoponus, it may mean a quality, category, quantity, etc., comes to be. Second, endorsed by Thomas, it may mean that substance, i.e., the foremost amongst all the categories, comes to be. [14]

Thomas' interpretation seems to me to strain the Greek and furthermore to leave the intended contrast between the sorts of simple generation opaque. As I will argue in a moment, coming into being in every way is the generation of a new substance.

On the other hand Philoponus' interpretation appears mildly surprising from a doctrinal standpoint, though we would have to reach for other texts to show it. For one might think the Aristotelian thing to say is that a substance becomes qualified in a new way, not that a quality comes to be.[15] But I think it is characteristic of Aristotle to allow and use many ways of speaking, even when one better gets at the fundamental underlying phenomena, and indeed even when he has suggested that some ways really do badly enough to be wrong. In other words it seems enough in line with Aristotelian tendencies for him to trade 'there is no generation of qualities as such' for 'generation of qualities really turns out to be a certain non-generative kind of change in an underlying substance' (or even for him to be somewhat uncareful with the distinction between those two.)[16]

Furthermore, *Physics* A.8 is about substantial generation in particular, and does not seem to treat generation of a quality as such. Indeed, the machinery of the *Categories*

[13]Or perhaps it is better to say that the terminus is *the learned thing*; see Charlton (1992, pp. 70–71). But it makes little difference for us.

[14]See Williams (1982, pp. 82–83) for more discussion.

[15]*Metaphysics* Z.8 offers some compelling reason to think this, in my opinion; see in particular 1033b1–10.

[16]I realize a certain kind of analytic philosopher will find this to be uncharitable. Obviously I disagree, but this isn't the place for extended methodological remarks defending against this sort of objection. But such a reader should note that this is one plank in the defense of Philoponus over Thomas, not the whole thing; and also that I have tried to provide some justification for proceeding as I do on the Thomas branch as well.

seems almost entirely absent from this text. It seems present only in the vague sense that we have predications holding of substances. So if Philoponus is correct, I think we can put aside the first sense of becoming *simpliciter* for the purposes of reading *Physics* A.8. I doubt Thomas' interpretation is right, but if he is, then it seems likely to me that the two sorts of generation *simpliciter* will turn out to be different takes on the same phenomenon, anyway. In either case we may proceed by examining the hypothesis that Aristotle is thinking of generation *simpliciter* in the second way mentioned, 'universally.'

So we are left with the idea that the thing that results from the generative change is what is *F* for every *F*. And this makes good enough sense. When a new object comes into being—not into a new state of being, but begins to be at all—it takes on all its predicates. It must, since it is *F* for each of those predicates *F*, and it wasn't *F* for any of them before it came to be, since it wasn't around at all.[17]

This way of interpreting the claim is textually grounded in both the *Physics* (A.8.191b15) and *Generation & Corruption* (A.3.317b11–13). For part of Aristotle's solution is that the statue, which is a formed thing, comes to be out of a lacking thing, a formless thing. And the lack, *as such*, does not have any predicates hold of it. (Here we should recall that *F* is probably meant to range over possible predicables in Aristotle's sense, not properties in our sense. A lack of knowledge has properties in some plenitudinous sense of 'property,' but does not have intrinsic positive properties.)[18]

[17]A prominent metaphysical tradition disagrees that being in a certain way simply entails existing, but Aristotle is not a part of it. For him predicative assertions, if they are to be genuinely meaningful, let alone true, must not have empty terms (Crivelli 2004, pp. 153–163).

On this paragraph Professor Caston objects that it would be a triviality if the interpretation were correct. But given the above I doubt this is right: it is an open issue whether non-existent things may have properties correctly applied to them (including, possibly, before they exist, and including, possibly, properties that they continue to have post-generation). Caston has his view, and admittedly it seems to me to be the standard view in contemporary metaphysics, but I anyway am not comfortable with dismissing dissenters as *trivially* wrong.

But even if he is correct I don't see that it is an objection to the interpretation. Presumably the point of a paradox is starting with obvious-seeming premises and getting to conclusions that seem false, and presumably the solution to the paradox will in part involve seeing how at least some of the appearances that seem obvious to us can indeed fit together as desired.

[18]Here Caston asked first what the textual basis is, and second if we are to think that the lack "has no positive predicates at all, even as regards genus?"

But Aristotle does say that a lack "in itself is not" (191b16). Either this means it is not *F* for all *F*, as I have taken it, or it means it does not exist.

(The only other reasonable completion I see is that it is not the *F* that it is a lack of, but if this is the *meaning* of the phrase then it is hard to see why Aristotle thinks it will "make people wonder" (17) to remark that something comes to be *F* out of such a lack.)

If the second reading is right then it appears to be Aristotelian to deny it all properties (see footnote 17 above). If the first reading is right then it is right to deny it all *F*'s, whatever the *F*'s have been throughout the discussion. In the body of the text I suggested they are predicates in general. I am unsure to what extent the overall interpretation suffers if I fall back to their being predicates at the lowest level of the categories—i.e., not to take it as including genuses—I think this may work well enough.

The lack is, on Aristotle's account, another way of specifying the substrate. Or, to put it in the material mode as Aristotle does: though there is one thing in number, there are two in account or form. There is the substrate, the bronze, alone; and the lack, the bronze *qua* thing with the privation, lack of statue-shape, which we might call the formless thing (*Phys*.A.7.190b25–27). When the generation happens, the first persists—underlies—and the second perishes. So the statue comes to be out of what is not *F*, that is to say, out of the lack. But it comes to be out of the lack only accidentally (A.8.191b10–17). For it is the bronze as such which is causally relevant to the statue's coming to be; the lack as such, on it's own, does not.

So the solution is actually given: (for the general case) Aristotle seizes one horn of the dilemma, and says that what is comes to be out of what is not, for it comes out of the lack. This only "makes people marvel" (A.8.191b16) since they don't make distinctions about what is *per se* and what is merely accidentally.

How is the alternative, that what is comes from what is, to be understood? A venerable tradition[19] suggests that 'what is' be completed with 'that very thing.' On this reading the horn of the dilemma where something comes to be from what is is indeed terrifying: surely Socrates does not come to be *from Socrates*! For, prior to Socrates' coming to be, Socrates is not around as a source for that coming to be; as Thomas says, were Socrates around as such a source, then it could not come to be, for it would already be.[20]

However I suspect such conciliation is unneeded. I think it is intuitive and natural enough to take it that the lack is not *in itself* anything positive, including falling under a genus. Consider someone who thinks that the colors are varying combinations of light and dark, understanding the light as a positive property and darkness as its absence (or pick whatever similar spectrum you'd like). It does indeed seem strange to say that the complete absence of light is itself and properly speaking a color as well—it seems like such a view claims to have discovered that total blackness is rather what you what you get when there isn't any color. (Compare: an object at 0 Kelvin doesn't have any heat, something with 0 dB isn't a sound, etc.) Or, think of an object with no heat, no charge, no color, etc. There's no positive feature to point to in order to differentiate the lack of heat, of charge, etc.—one is rather looking at the same object and thinking of it in different ways, by contrast to different possible positive qualified versions of it.

We needn't say that the lack has no properties at all, though—it does, but not in itself. Its properties (e.g., its genus) are held because it is in a certain substrate; the absence of light is a lack of light because it is in the kind of thing that is ready to be colored. That is, so to speak, what puts the object on the relevant spectrum at all, and what makes it a lack as opposed to a mere absence.

[19]It is discussed but not endorsed in (Kelsey 2006, p. 335). This seems to be how Waterlow pictures the alternative: "…if *X* comes into being, *X* could not have existed before, since *X* would then be nothing new in the world, and would not have *come* to be" (Waterlow 1982a, p. 9). (Correspondingly the variable seems for her to be ranging over individuals, not properties.)

[20]This seems to be the point in Lecture 14 of Aquinas (1999):

> The weakness of their understanding forced them to hold this position because they did not know how to resolve the following argument, according to which it seemed to be proven that being is not generated. If being comes to be, it comes to be either from being or from non-being. And each of these seems to be impossible, i.e., that being comes to be

Further, it might be thought that this way of completing 'what is' solves the problems discussed below and in footnote 27, which recommends it as an interpretation.

But it cannot be right. There are two reasons. First, on this reading, the horns of the dilemma are that i) nothing comes to be from what it already is, and ii) …what? If it is that nothing comes to be from what is not the individual that is the resulting thing, then the second horn has no intuitive force: that is exactly what we would have pre-theoretically thought generated individuals come from.[21] If it is (as Thomas has it[22]) that nothing comes from what is not in *any* way, then the second horn has force, but the dilemma is obviously not exhaustive: there are plenty of things out there which are not not in any way and also not identical to the result of the change.[23]

Now, our interpretation too will have it that the dilemma is not exhaustive. But on Thomas' reading no special machinery or inquiry into principles, *contra* Aristotle, is necessary to see that the dilemma is not exhaustive. On our interpretation the way to discovering that the dilemma is not exhaustive will lie through the analyzing the original argument in terms of Aristotle's distinction between generation *simpliciter* and generation in a qualified way, and thus, his distinction between universal, *per se*, and accidental predication. The appearance is that Aristotle thinks the purported problem is solved and the appearances saved by the introduction of an Aristotelian doctrine, so it is better for an interpretation to capture that.

Second, Aristotle *does* say what is comes from what is, sometimes; but in those cases it comes to be only accidentally (*Phys*.A.8.191b17–27). I submit that it is impossible to come up with such examples if we take 'what is' to be completed with 'that individual.'

> from being or that it comes to be from non-being. *It is clearly impossible for something to come to be from being, because that which is does not come to be, for nothing is before it comes to be. And being already is, hence it does not come to be.* It is also clearly impossible for something to come to be from non-being. For it is always necessary that there be a subject for that which comes to be, as was shown above. From nothing, nothing comes to be. And from this it was concluded that there is neither generation nor corruption of being. (emphasis added by me)

I take the crucial objection to the being-from-being horn to be that "that which is does not come to be." I.e., if Socrates already is, he does not also come to be.

[21]*Contra* Waterlow (1982a, p. 9), this is far less unintuitive than something coming into being from nothing at all. There may be some problem with claiming that some thing *X* can come to be without having been present before, but it is not a matter of facial absurdity or seeming paradox.

[22]See above, footnote 20. This time the crucial lines are

> It is also clearly impossible for something to come to be from non-being. For it is always necessary that there be a subject for that which comes to be, as was shown above. From nothing, nothing comes to be.

Apparently Thomas is imagining that coming to be from nothing means coming to be without any prior subject at all.

[23]As Kelsey (2006, p. 334) points out in response to Simplicius' version of the proposal.

As Thomas soundly convinced us, it makes no sense that an individual can come from itself. The addition that it comes from itself accidentally does not help defuse Thomas' logic.

Aristotle's examples of cases of what is coming to be from what is accidentally are quite obscure. They are given in terms of species like dog and horse, not with proper names or demonstratives, which would more clearly indicate Thomas' reading.

> ὡσαύτως δὲ οὐδ' ἐξ ὄντος οὐδὲ τὸ ὂν γίγνεσθαι, πλὴν κατὰ συμβεβηκός· οὕτω δὲ καὶ τοῦτο γίγνεσθαι, τὸν αὐτὸν τρόπον οἷον εἰ ἐκ ζῴου ζῷον γίγνοιτο καὶ ἐκ τινὸς ζῴου τι ζῷον· οἷον εἰ κύων <ἐκ κυνὸς ἢ ἵππος>[24] ἐξ ἵππου γίγνοιτο. γίγνοιτο μὲν γὰρ ἂν οὐ μόνον ἐκ τινὸς ζῴου ὁ κύων, ἀλλὰ καὶ ἐκ ζῴου, ἀλλ' οὐχ ᾗ ζῷον · ὑπάρχει γὰρ ἤδη τοῦτο (*Phys.* A.8.191b17–23)
>
> In a similar way there is no generation out of what is or of what is, unless by coincidence. In this way what is comes into being, in the same way as if an animal came to be out of an animal and some animal out of some animal. For example, if a dog comes to be out of a dog or a horse out of a horse. For the dog would come to be not only out of some animal, but out of animal—but not insofar as it was an animal, for that belongs already.

It is not so hard to come up with and explain further our own examples (and we will in a moment), *if* we take it that 'what is' is meant to be completed by a term meaning a species,[25] and not meant to be completed as 'what is that very thing.'

Anyway, the philosophical dilemma is solved if it is right that what is does in fact come from what is not (though accidentally)—it turns out that one horn is not so bad as it might have seemed at first. However, from an exegetical perspective, we are not done. We would like to see that the story we have told about the verb 'be' and our Philoponian interpretation of being *simpliciter* can be extended to the other horn of the dilemma. There is a reasonable desire to treat the cases symmetrically, and to see the same solution to both horns in terms of accidental and *per se* predication.

But the desire for symmetry is not borne out.[26]

Let us look closer: what happens if we try to apply the preceding way of understanding the verb 'be' to the other horn of the dilemma? Insert our Philoponian take

[24]Accepting Ross' insertion. If we do not accept it then Aristotle is imagining different details in his examples, but much the same overall remarks apply.

[25]Cf. Kelsey (2006).

[26]That there is a lack of the expected symmetry seems to be the usual view, although there is less agreement as to how the symmetry breaks down. See Kelsey (2006, p. 351) for an example of a rarer attempt to uphold the symmetry, as well as a brief discussion of various proposals for how it breaks down.

on being *simpliciter* into the slot after 'is' in the 'what is comes from what is' horn of the dilemma. We will end up saying that this horn has it that what is (in all the ways it is) cannot come from something that is (in all the ways *it* is). But, for the same reason as we rejected the existential reading of the verb 'be,' we cannot accept this reading. It amounts to saying much the same thing: that a thing that comes to be out of something comes to be a fully determinate thing out of another fully determinate thing. But this is exactly what you would expect to happen in a case of generation of one thing out of another; so if this is meant to be an unacceptable option, we would expect more explanation.

We can see why there would be a general problem with what is coming out of what is by looking at the notoriously difficult passage where Aristotle suggests that sometimes this does happen unproblematically. For sometimes it does happen, but only accidentally (*Phys*.A.8.191b18). In such a case, a dog would come out of a dog.

What kind of case is Aristotle imagining such that it would be relevant to the sense in which we have been talking about one thing coming to be out of another? (It's true that Aristotle is always happy to remind us that humans come from humans, but this really *doesn't* seem like it's the same way that statues come from bronze! The construction of a human out of human analogous to the construction of a statue out of bronze is, I suppose, more like the construction of a flesh golem than giving birth.) Aristotle's next remarks from 21–23 seem meant to explain the example, but they are obscure at best. But we don't need to understand all that to say that the case imagined is a case of an *F*-type object coming to be from an *F*-type object. And indeed, in general, this seems right: how can it be that what is already a human gets turned into a human? To generate a substance means to bring into being a new object of that type. But in such a case the object is there and of the same type already. Insofar as our judgments about the lifespans of objects has to do with their falling under species, we seem to have a problem.

We can at least supply cases for Aristotle. Think of building a statue out of many smaller statues (where you use the smaller statues as the building blocks). In this case what is (a statue) comes out of what is (statue).[27] But in this case it is a sort of accident

[27]If you insist the matter not be a plurality of the relevant type, here are more cases, though they are less clean. Recall that Duchamp turned a urinal into art by putting a label on it and submitting it for art consideration as art. Now imagine Duchamp's heir submits for exhibition the following. She takes an old painting—say, a particularly kitschy or unskilled one—and submits it again with a new label and her own signature. It seems to me that she creates a new piece of art. It has new properties—a new author, a new birthdate, a different engagement with the Dada tradition—but seems to be the same species of thing (painting).

Here is another (grotesque) example. Imagine a mad scientist pulls a Dr. Frankenstein, but with only

that what the thing comes out of is of the same type; it is really because the statues are made of wood (or whatever) that they can serve as the matter for the larger statue; and since the matter should be picked out in the functionally relevant terms, maybe in this case we should even say that the matter is *per se* wood, and only accidentally statues. That seems to be a reasonable way to understand Aristotle's claim that what is can come from what is, but when this happens it will be an accident.[28]

At this point, we have given a reading of the dilemma that completes the phrases with different predicates *F*. On the one fork, the proposed source of what comes to be is what is not *F* in any way; on the other fork, the proposed source is what is *F* where *F* is the species of the resulting object. This asymmetry may seem like a problem: in the first place, because it gives an implausible meaning to the phrase 'what is or what is not,' which certainly seems to suggest parallel cases (Kelsey 2006, p. 351); in the second, because it makes the dilemma silly, since it is clearly not exhaustive. But neither objection is good.

The proposal is not that we have given the *meaning* of the phrase 'what is or what is not.' How could it be so? We supplied the elucidation by looking at Aristotle's own doctrinal commitments in *Physics* A.7 and *G&C* A.3. They were not the sort of commitments that the original creators of the dilemma were likely to have had in mind. It is exactly Aristotle's point that when the dilemma is examined in the light of his own doctrines, it falls apart. This is why Aristotle's solution to the dilemma confirms his account of the principles. This explains what Aristotle means when he says that

one corpse. Then it seems she has made a human from a human. But admittedly I find the lines between resurrection/transformation and making a new person start to blur.

Finally, imagine a smith who has built a machine that connects a melter with a mold. He can push into the machine hunks of metal, which the machine melts and then pours into the mold. Out pops a statue. The smith can feed in hunks of metal that are unformed, but he can feed in a hunk that happens to already be a statue, too. It seems to me that if the resulting statue has a dramatically different shape, representational content, artistic intent, etc., it is a different object, though it is of the same type and has the same matter.

[28]But there seems to be no real guarantee that this solution will always be available; nothing rules out similar cases where it is causally relevant that the materials are of the same type as what they go into. However, these considerations bring us into larger thorny issues in Aristotelian metaphysics. The problems arise because we rely on the form to mark out when an object persists in time, and regard that as only carrying information about the type of thing the object is, and rely on the matter to distinguish individuals at a time. But then we run into these sorts of examples which are jury rigged to confound the theory. (Compare the remarks in footnote 27 to the example in K. Fine (1994): if one person eats another live, then the first incorporates all the matter of the second and they shared the same species-form all along. So what prevents them from literally becoming the same object?)

We can take these to be serious problems for the theory, perhaps assuming that Aristotle did not see them; or propose our favorite solutions, whatever they are. But the main point is that the problem is actually a deep one, not one that appears here only because we have fumbled the interpretation of this particular passage. Accordingly defending an interpretation that does not run into it is not necessarily an important task for us.

the earlier philosophers went astray because of their "lack of experience": they took the dilemma to establish that there is no change because they did not have Aristotle's metaphysical tools at their disposal.[29]

This, too, explains why it is no knock against the interpretation that it makes the dilemma non-exhaustive. Indeed, seeing that the dilemma is non-exhaustive seems to be an important part of how the dilemma is solved. Aristotle vindicates our common-sensical feeling that what comes to be comes to be, on the one hand, from something other than it, and on the other hand, that it is connected to and rooted in what came before: he finds a third way between the horns of the dilemma. He *also* shows that what comes to be comes to be from what is not, albeit accidentally; and that the earlier philosophers were wrong to think that it is obviously true that what is does not come to be from what is, since sometimes it does happen, albeit accidentally. The overall effect is to show how the phrasing of the dilemma by earlier philosophers was clumsy, and once the dilemma is cleaned up, the problem is dissolved.

3.4 Hylomorphism

Before we turn to fitting the potentiality-actuality concepts into the story we have just told, I want to explicitly turn to the criticisms Kelsey makes of the traditional view that by introducing in A.7 something that underlies generative changes, Aristotle introduces the concept of matter.

First, our discussion of the solution in the last chapter turned most clearly on a distinction between *per se* and accidental predication, not on a distinction between form and matter. The textual motivation is that this is the distinction Aristotle himself points to as the source of his predecessors' error. We might worry that this shows that the introduction of matter, form, or hylomorphism is not the crucial point:

> …there is a distinction that he says earlier thinkers failed to make, on account of which they fell into difficulties; very roughly, this is the distinction between holding 'unqualifiedly' (ἁπλῶς) or 'per se' (καθ΄ αὑτό), and holding only 'in a way' (πῶς) or 'incidentally' (κατὰ συμβεβηκός). But this is not the distinction between form and matter. Aristotle does not locate the

[29]The quote is from A.8.191a6–7. Caston says of 'lack of experience' "That would be a *very* peculiar sense for apeiria." I'm unsure what he means. The LSJ gives "want of skill, inexperience, ignorance," which seems to me tolerably close to 'lack of experience.' Charlton (1992, pp. 18–19) translates "The first people to philosophize about the nature and truth of things got so to speak side-tracked or driven off course by inexperience." Hardie and Gaye translate "The first of those who studied philosophy were misled in their serach for truth and the nature of things by their inexperience" (Barnes 1984a, p. 326).

> error that led his predecessors into this *aporia* in their failure to distinguish between form and matter, nor does he appeal to any such distinction in the course of his solution. …this is just what we should expect, inasmuch as the *aporia* in question is quite resistant to any such 'solution'. As Aristotle presents it, the *aporia* takes the form of a dilemma. …how is the posit of a pre-existent, persisting matter supposed to help? Either this matter 'is', in which it case it 'is already', or else it 'is not', in which case it is not a 'subject'; either way we face exactly the dilemma posed by the original *aporia*. (Kelsey 2010, p. 115)

I count several claims:

1. Aristotle does not claim the key to solving the puzzle is the introduction of matter.
2. Aristotle does not appeal to the distinction between form and matter in his solution.
3. Such a distinction could not solve the problem anyway.

Let us take these in turn.

I concede the first point. As I've noted, it seems plausible that the claim that something must 'underlie' the change is not new to Aristotle at all, and he does not present it as if it were (cf. Kelsey 2010, pp. 109–110). But this shows that distinguishing matter and form in itself does not solve the problem; I claim that understanding them in Aristotle's particular way is important. And I will try to show how it is the distinction that Aristotle does highlight as the key to the solution which allows us to understand form and matter in Aristotle's distinctive style.

Thus unsurprisingly I think it is wrong that Aristotle does not appeal to matter in the text; he does need to show that something underlies if he is not to give good reason to reject that part of the dilemma, and this thing is the matter. As Kelsey acknowledges, Aristotle uses the language of composition throughout A.7.[30] As Kelsey does not acknowledge, Aristotle repeatedly uses the language of forms (μορφή, εἶδος, their α-privatives, etc.).[31] Finally, Aristotle does once call what underlies the "countable

[30]See (all in A.7) 189b34, 190a3, 190a12, 190a20, 190a29, 190b11, and 190b22.

[31]See 190b15-16, 191a3, 190b20, 190b28, 191a10-11, 191a19. At this last passage Aristotle suggests that it is at this point still unclear whether εἶδος or what underlies has better claim to be called the reality—if we understand this as talking about form and matter, then this is one of the central questions of *Metaphysics* Z and H.

matter."[32]

This is all to say that there *is* decent textual evidence to think Aristotle is in A.7–8 anticipating and introducing the hylomorphic framework.

We have already said enough to see that the third point is not obviously right. The *mere* posit of matter does not help. And Aristotle does not present such a posit as the crucial part of the solution to the dilemma. But it does help us understand the solution to the dilemma in a way that respects the requirement that something underlie and persist through the change. It has to be that what the generated *F* object comes out of, which is not *F* (and so is not in a qualified way), persists through the change. So it has got to stick around, but not *qua* not-*F*. But it also cannot simply *be* the resulting generated object, or we are back to the vision of all generation as really alteration. So it does help to say it persists as matter, which is first not *F* at all, and then is, but by constituting something that is *F* not by being it *per se*. The new distinction in A.8 helps us understand how the requirements broached in A.7 can be maintained in the light of the solution to the dilemma given in A.8.

This matches the textual appearances: the crucial point that resolves the dilemma posed by Aristotle's predecessors is the one about predication. Still, on this reading it is tolerably sensible of Aristotle to think that the discussion of the principles in A.7 is required first if everything is going to fit together correctly.

According to Kelsey, however, finding in A.7–8 an anticipation of hylomorphism will embroil us in unacceptable philosophical difficulties.

> Aristotle certainly does use the vocabulary of composition in making the point that τὰ γιγνόμενα are not "one." However, this vocabulary notwithstanding, it is a mistake to think that the point is therefore tantamount to a statement of hylomorphism. In the first place the "components" are all wrong …the "components" he has in mind [in chapter A.7] are not matter and form, but matter and privation. Second, and more importantly, not

[32]Matter may also be mentioned at 191a10, but the reference is excised by Ross, following Diels. Matter is mentioned at 190b9, but it does not seem to me that it is in any clear way being identified with the underlying substrate. It is worth mentioning that the substrate in this machinery seems relatively clearly to be called matter in other places: see *GC*.A.319b31–320a5 and *Meta*.Z.7.1033a7–10; perhaps less clearly, *Meta*.θ.7.1049a27–36.

'Countable matter' (ἡ ὕλη ἀριθμητή) is a pretty curious phrase. Charlton translates "measurable matter"; this makes more sense to me as an isolated phrase, but it still comes out of the blue in the context; and anyway 'measurable' for ἀριθμητή seems dubious. I find better Ross' explanation that 'countable' is in reference to the claim that we count how many substrates are present, and not how many lacks or oppositions, when we reckon up the number of things there are. But this is still not quite satisfying, since we count substances *per se*, and if we count matter, it is only accidentally. It seems acceptable that we count the matter when we have in mind humans and lumps of clay; but matter includes things like gold (and that is one of Aristotle's examples here), which is not straightforwardly countable.

> only are the "components" all wrong for the doctrine of hylomorphism, but also the manner of composition is wrong as well. The kind of "complexity" Aristotle is attributing to τὰ γιγνόμενα, when he says that they are "two" or "composite," is the kind exhibited by a single token exemplifying two distinct types. …the "unity" of these forms consists solely in the fact that they are exemplified by a single token (in Aristotle's language, they are one "in number"). By contrast, the kind of complexity at issue in hylomorphism is …exhibited within the structure of a single type. …[the doctrine entails] that matter and form be "combined" or "united" far more closely than could be ensured by the fact that they are exemplified by a single token …they [must be] combined so as to be in some sense one "in being" …. (Kelsey 2008, p. 198)[33]

What I mainly want to point out is that this criticism relies on a substantive view of what hylomorphism amounts to. Not only that, we already gave in the last chapter some reason to be chary of that view. *Physics* A.7–8 seems unproblematically to introduce hylomorphism if we adopt the first way of understanding the concrete form view outlined in the last chapter, that is, the idea that a form *is* the formed thing that results from working up a bit of matter, *qua* thing formed in that way. For example, the form of grammatical knowledge is better taken to be the person *qua* knowing grammar than an abstract object.

Kelsey worries that Aristotle distinguishes privation from substrate, where we would expect, were he to be mooting hylomorphism, to distinguish form and matter "within" one object. While the substrate is reasonably taken to be the matter, it is more puzzling to identify form and privation.

The first thing to say in response is that, while it is perhaps surprising, 'form' does take a wide sense in *Physics* A.7. It appears to mean not only substantial form, but to include qualities and locations and so on (Bostock 2006b, p. 82). What is perhaps even more surprising is that it seems at one place explicitly to include privation and the formless (*Phys*.A.7.190b20).

This only shows that the word is used in a wide sense, and leaves open the possibility that the word is used for a different concept than hylomorphic form in this chapter. But this is unlikely, for the primary use of 'form' in this chapter is to characterize the single thing that is generated by the change: the knowledgeable thing, or the formed thing. And this primary use, whatever the facts about an unaccustomed wider use, is what we might expect on a conception of hylomorphism that is not Kelsey's.

[33]Much of this material is repeated at Kelsey (2010, p. 113).

If we take the doctrine of hylomorphism to be, at its core, a claim about the synchronic constitution of an object, then this will indeed seem to be an unhappy way to introduce the distinction. But if we take the concept of form in relation to matter to be essentially motivated by change, and to be more properly analogous to what is constituted in relation to what constitutes, or determinate to determinable, or what is realized to what realizes, then the characterization is consonant. For my idea is that the form is what is realized out of the activation of the matter, of the substrate. This is just what the machinery of A.7 seems to describe, when it describes how the substrate over the course of a change gets worked up to a formed thing.

On this conception it does still make sense to talk of the matter of an object at a moment, without regard for any given change. But it would be a strange way to introduce the idea.[34] We grasp the 'underlying nature' by comparing it to the formed thing. The easiest way to do this is to see how the formed thing is formed out of something else. This *is* to distinguish the form and matter.

Second, Kelsey worries that form and matter cannot be related as two types instantiated by the same token. For this is to say that the form and matter are one in number. On this last inference I agree: it is reasonable to understand the one in number locution as at least implying, and possibly as simply meaning, that there is one token that falls under two types. In this case, I, for example, fall under both the types human and human-who-is-ignorant-of-French. That is, the thing which will undergo the change falls under both the type of the matter and of the matter-with-the-privation. And I agree with Kelsey too that this relation is potentially quite weak, weaker than we would expect from the relation between form and matter.

But it is a mistake to conclude that form and matter are therefore not one in number, but must be identical in a stronger sense. Kelsey infers that they must be one in being. But if an object's form and matter were identical in being, then I cannot see how questions about the priority in being of one to the other make sense. Similarly, it is hard to see how a question could even arise over how the form and matter could be unified in a material object. But both of these are central questions in *Metaphysics* ZHΘ. At the

[34]Perhaps just this sort of expansion of the matter-form conceptual system is what happens when Aristotle suggests that the matter for living bodies is matter that cannot be recovered through any simple changes; there, matter seems to be the capable things (i.e., organs) that are organized to give rise to an animal body. Here it still makes sense to think of the form as a realization that emerges from a substrate, not over the course of a generation (the matter for the generation of a human is not the human's organs, but the material involved in reproduction) but as what is constantly maintained by the homeostatic processes which themselves enable the organs to continue functioning. On this reading the concepts of form and matter in *De Anima* are therefore an extension of the concepts in the *Physics*, but one which remains rooted in the core idea that form is a realization that matter is worked up into.

least, the idea that form and matter are one in being is therefore not plausibly present *before* that inquiry, but a discovery of it.

It can be that *X* and *Y* are identical in both number and in being—presumably Socrates is both one in number and one in being with Socrates. So it could be that form and matter are one in number, and *later* we discover they are one in being. That is, even if Kelsey is right that identifying form and matter in number is not *enough* to explain their unity, it does not follow that they are not *at least* one in number. Nor does it follow that it is pragmatically or dialectically inappropriate to say so. Therefore if two things are said to be one in number in *Physics* A.7, that is not a reason to revise the supposition that the things in question are form and matter.

Among things that are one in number but not being, there is a wide range of causal unification that may take place. The man in the corner and Socrates are one in number, but in a way that is modally and temporally fragile: he may simply decide to walk away, and thus the unity (and one of the objects) is destroyed. At a kind of intermediate position, Socrates is one in number with Socrates-the-philosopher, but it is no accident: their unity is fixed with some modal reliability by Socrates' desires and beliefs. Even further on: the presence of a form requires certain matter, and form is what causally keeps the matter together in a unified whole. But this sort of causal unity does not in general entail or even suggest identity in being between the different aspects of the object. We should not infer from the observation that the weakest sort of unity in number is not a strong enough connection between form and matter all the way to their being one in being: that acts as if there are no further alternatives.

Finally, all this seems to assume that Kelsey is right to think that, if form appears in the chapter, it appears as privation. But I have already suggested that the primary use of form is not for privation, but for the worked up object that is the product of the generation. So *privation* and *substrate* are identified in number, but *form* (in the primary sense) and *matter* are not even identified in number. Instead, matter is introduced as (one way of looking at) the thing at the start of the generation that is worked up, while form is introduced as the thing at the end of the generation that has been worked up. It is because the matter persists through the change that the distinction between form and matter can also be made as a distinction between "parts" of an object at one moment.

So, I conclude, the traditional thought that hylomorphism is introduced in the Aristotelian corpus in *Physics* A.7–8 remains very plausible. At any rate, Kelsey's objections to that thought are, as they are stated, inadequate.

3.5 The Place of Potentiality in the Picture

3.5.1 Finding Potentiality in the A.7 Picture

At first glance, the second solution in terms of potentiality and actuality shares only superficial similarities with the first solution in terms of form and matter. Like the first, Aristotle will distinguish between two different ways a substrate can have a property.

This time, Aristotle claims that something that is not-*F*, prior to becoming *F*, is potentially but not actually *F*. So what is *F* in one way comes from what is *F* and in another way does not. What becomes *F* does not become *F* "out of nothing"—it in fact was already *F*, just in another way, in potential. At the same time (although the further point is not necessary to solve the dilemma) what is merely potentially *F* is in another perfectly good sense not *F*: we usually are not willing to say that such a thing is *F* unqualifiedly in normal speech.

There is, as far as I can see, no hope at all for identifying this distinction in ways of being *F* with the *per se*-accidental distinction. That is to say, whatever is going on, distinguishing between actuality and potentiality is not merely a rephrasing of the distinction and solution I outlined in the previous sections. Indeed the two distinctions seem to cross-cut: I may be potentially *F* either *per se* or accidentally, and being actually *F* either *per se* or accidentally seems just to be the old *per se*-accidentally distinction once again.

Aristotle frequently identifies matter and potentiality on the one hand and form and actuality on the other hand.[35] Can we see how the two theories fit together by simply treating "substrate" and "potentiality" as synonyms (and likewise, perhaps, for "form" and "actuality")?

No, we can't, at least not straightforwardly, though following out the attempt is more fruitful than the last suggestion. Take the case of an ignorant man becoming a doctor. In this case (we said) the matter, the substrate for the change, is the man. The man has a certain property, a lack or deprivation, ignorance (that is, a lack of knowledge). According to the proposal, the matter, which is the man, is the potentiality for being (or becoming) someone who knows the art of medicine.

But this is wrong. For man is not potentially a doctor—not in general. Some people *are* doctors, and they already have the art of doctoring. They are not potential doctors, for they are actual doctors.[36]

[35] E.g., *Meta*.Z.1032a20–25, H.2.1042b9–10, 1043a12–13, 3.1043a32-b2, 6.1045a23–24, 29–30, b18–19, Θ.8.1049b21–23, 1050b1–5.

[36] Here Caston remarks that I seem to be assuming that activity and potency are mutually exclusive.

It is not enough, either, that the substrate not have the property *F* that we are considering. No less than an ignorant man, a table lacks knowledge of medicine. But it is not potentially a doctor. A table isn't the right sort of thing to become a doctor.

When we say the object's change traces a path from being not–*F* to being *F*, then, we had better understand not-*F* in the correct way. Look to *Metaphysics* Δ, under the definition of the same word we saw in A.7. The word we're interested in is 'lack,' στέρησις. We can see that in one sense, we use this word when an object simply lacks a positive property, "something naturally possessed" (*Metaphysics*.Δ.22.1022b22–24). Aristotle's example is that "a plant is said to lack eyes," which strikes me as similar to remarking that a table lacks the art of medicine.

But the text of the chapter is dominated by more restrictive notions of lack on which the possession of a lack must take place against some sort of expectation or norm that the thing have the property. Of particular interest is the suggestion that the expectation is grounded in the species or genus that the thing falls under.

> We speak of 'lack' .... In another sense, if a thing which naturally would possess something, either in itself or by its genus, does not possess it. For example, a blind man and a mole lack sight in different ways, the one by

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That would certainly be sufficient to get what's asserted above. But it's not clearly necessary.

I'm not sure why Caston thinks I assume it is true so I can't speak to that.

The view that they are opposites and incompatible seems to be somewhat popular; see Sentesy (2018, p. 240) for a block of citations (in a paper that argues against it).

What *I* need here is that who has already undergone a qualitative change into some state is no longer (at least in general) potentially of the sort they have actually become. I think Aristotle rather consistently writes like this. Take a look at *De Anima* B.5, e.g., 417a22–32. I submit that the exposition would be very clumsy of Aristotle if he thought it were right to say that the man who has learned grammar is, after the learning, still potentially a learner of grammar. He *does* here think that the person is potentially a knower, since he is potentially someone who could actively use the knowledge. But this is not distinguished from a supposed potency to undergo the change that he has already undergone (and indeed cannot undergo again, at least not without a mediate blow to he head or something).

It is true that Aristotle does not explicitly add that the man lacks the potency to learn grammar, but this typology is exactly where we would expect him to mention it if he thought he did.

Even worse, Aristotle appears to continue to *contrast* this case with a case where activity and potency *do* coexist. For becoming a knower in the sense of moving from ignorance is *different* from the case where someone moves from passively knowing to actively using their knowledge. In the latter case but not the former what is potential is 'maintained,'—which, to be tediously clear, sounds to me incompatible with saying it is destroyed—and therefore what is potential continues to persist as the knower actively uses his knowledge.

This seems to me all very intuitive. If one has the potential to become an adult, that is their being in a state, viz. being a child, which will be destroyed upon their becoming an adult. On the other hand if one is potentially but not actually speaking French, one does not destroy that in virtue of which they are potentially speaking French (certain features of their brain, etc.) by speaking.

What shall we say in the case of generation? Well in one sense what was potentially Umer, the sperm and egg, is gone. But in another sense what is potentially Umer, the bone and flesh, remains. Anyway I have a lot to say about this, so read on.

virtue of its genus, the other in itself. (*Meta*.Δ.1022b22–27)

I take the point to be that humans in general, by their nature as humans, have the power of sight; and that moles fall under a genus, namely animal, that in general by nature has sight.[37] Aristotle understands lack as lack of some positive property from among a constrained set of properties, namely, properties the thing would have by nature. A more Aristotelian way to put this is to say that the presence of a lack implies a positive nature for the thing that is subject for the lack (cf. *Metaphysics*.Γ.2.1004a14–16).

I think this sense is suggestive for our purposes. We could suggest that in *Physics* A.7 the possession of the lack, ignorance of medicine, implies that the lacking thing has a positive nature of the sort suited to learning medicine.

Now I think there are multiple reasons to take this as merely suggestive, and not to say that this is exactly how Aristotle saw the matter himself. To start, this conception of a lack fits poorly with the discussion in the *Categories*. Lack in the *Categories*) is not fixable; a blind man cannot recover sight (*Categories*.10.13a33–36). [38] It is not exactly clear to me why Aristotle thinks this, but in tone it seems to go along well with the idea that lacks are often the result of violent removal or gradual degradation (*Metaphysics*.Δ.22.1022b28–32). Second, lacks and possessions are on-off: it is contraries, and not lacks, which have intermediary states in between them (*Categories*.10.13a3–13a16). (Nevermind that Aristotle's own examples of sickness/health and blindness/sightedness do not seem to clearly illustrate the claim.) A change would have to go through such intermediary states, so it seems there is another reason a change could not be from a lack to a possession.

Finally, most importantly, in *Physics* A.8 we are clearly told that the lack is not the *per se* source of the change, but only the source by virtue of concurrence or accident. This is readily explained if we take the lack to merely be an absence of some positive property, as in *Metaphysics* Δ.22's first sense of lack; the lack would then compare poorly

[37]So too (Ross 1958, p. 337).

I do not really understand the anxiety in Kirwan (1993, p. 172) over whether what naturally or characteristically has a property has it because that type of thing always has the organ for that property (in this case, eyes) whether functioning or not or because that type of thing naturally has the power. In the first place, the first option must immediately be weakened, since neither all humans nor all animals (both individually and as a species) have eyes, even non-functioning ones. More importantly, given what Aristotle thinks an eye is—something which naturally, i.e., when everything goes according to plan, gives the power to see—it seems very likely that he would have thought that a species or genus whose members mostly have eyes will therefore naturally have the power to see. To ask which alternative he meant in this passage seems to me to assume more determinate meaning and more precise distinctions than is very plausible. But even if this is not correct, I do not see what hangs on the question.

[38]On the other hand in *DA*.A.4.408b21–22 we have that an old man who somehow got a new eye could recover his sight. Perhaps then the difficulty pictured in *Categories* is imagined more as practical than in principle.

to the substrate as an explanatory source of the change. But if we take the lack to imply the positive nature that the substrate has, then it is the lack and not the substrate that seems more explanatory. So it cannot be the case that Aristotle means to use the word 'lack' in *Physics* A.7 in precisely the same way that he uses it in the *Categories* or in *Metaphysics* Δ.

But the important suggestion can still survive. That is that an object-*qua*-deprived in a certain way, a formless or ignorant object, can itself be an explanatory source by implying a positive nature that is apt for being formed or for learning. That would seem to be the compound object, in Aristotle's example, the not-knowing-music-man (*Phys*.A.7.190a1–5).

So my suggestion is this. Neither the lack nor the bare substrate seems an adequate explanatory source for the possibility of the change taking place. But the combined whole, the not-knowing-music-man, is an adequate source. The man is in a position to learn music because he is the right sort of thing with the right sort of nature, a man, and in the right position, lacking knowledge already. It is the patient of the change that in one way perishes and in one way survives. On the one hand, when we notice that in one way it survives and in another way it perishes, we immediately have some reason to analyze it into two corresponding parts, the substrate and the lack. But on the other, this may obscure the fact that the ability of the object to be transformed lies in the unity of those two facets within it.[39]

Therefore I identify the potential *F* which gives rise to the actual *F* with the deprived matter, the compound object which, on the the first solution, Aristotle analyzes into two aspects. It is this that is the *per se* source of the change, [40] for it is this that has the complete nature which can explain a generation as patient worked upon and worked up into something new.[41]

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[39]Cf. the similar remarks at Waterlow (1982a, p. 118).

[40]Here Caston points out that I am "treating the deprived *matter* as the (*per se*) source of change, whereas in the previous chapter you were at pains to say that forms were the sources of change."

There's no contradiction though, for a couple of reasons.

First, in the prior chapter we were talking about the efficient cause. As noted at the start of the last chapter, matter is a source of change too—it is an explanatory principle for the change—but it is not of the same type, and is not the primary source. In the case of generation there will be a cause that is an efficient cause and (at least usually) also a form, namely, the form in the parent, artisan, agent, etc., that is transmitted to the recipient matter.

Second, in the prior chapter I did not commit to the idea that *every* efficient cause is a form. Rather we were looking at a subset of forms that are efficient causes and a subset of efficient causes that are forms. But there are efficient causes, let alone sources of change of every type, that are matter (see footnote 52).

[41]Here I am, I think, following the suggestion of St. Thomas. On the first solution to the puzzle he says

> This, then, is one way of resolving the problem raised above. But this approach is not

3.5.2 Potentiality and Making Sense of the Persistence of Matter

I have already mentioned that this way of analyzing the objects which are participating in the change preserves the unity of the patient-*qua*-thing which can be affected. In addition, it makes it clearer what the *source* of the unity of the persisting substrate is. There is a notorious puzzle when it comes to the matter for organic living bodies. When considering an artifact like a statue made of bronze, it seems natural to think that the statue is produced out of the formless bronze and that the bronze then persists as what the statue is made of. But this seems much less intuitive in the case of animal generation: humans are generated out of seed or out of menses,[42] but those things appear not to still exist in adult humans as what they are made of. As Code (1976b, p. 365) puts it, "The end product—the man—is made of not semen or embryos, but of flesh and bone." Even if we could find some material thing that does persist from the embryo (perhaps as a part of the embryo?) to the adult, it seems that it would be contingent and not a necessity given the nature of change itself.[43] For it is easy to

> sufficient. For if being comes to be *per accidens* both from being and from non-being, it is necessary to posit something from which being comes to be *per se*. For every thing which is *per accidens* is reduced to that which is *per se*. (Aquinas 1995, p. 66)

(When Thomas says that what is *per accidens* is "reduced" to what is *per se*, I believe he is agreeing with my claim that what stands in some relation accidentally does so by being in accidental concurrence with something that stands in that relation *per se*.)

Since Thomas understands the dilemma differently, he is led to this position by slightly different considerations; but the central idea remains that the first solution to the puzzle does not contain an adequate *per se* source for the change. But it seems to me that Thomas suggests elsewhere that the *per se* source is not the compound object but the substrate: "Rather a thing comes to be *per se* from that which is in the thing after it has been made" (66). It seems to me that what remains in the thing after it has been formed is not the compound, which as such is destroyed over the course of the generation, but the bare substrate. It is unclear to me whether St. Thomas contradicts himself or whether his position can be made coherent if it diverges further from my understanding of the chapter on other points.

[42]In *Generation of Animals* books 1 and 2, Aristotle discusses the details of which originative principles are at play; predictably, the details are controversial. But the details largely don't matter for our purposes, since what I say in the body of the text seems to apply to equally well to the menses, sperm, and seed (however those relate to each other).

[43]F. Lewis (1994, pp. 257–262) does think that Aristotle accepts the existence of such a thing. He argues that for Aristotle blood is our "'before' matter" and also our "concurrent matter" (257).

Looking at *GA*.II.4.740b30–6, Lewis says it is "perhaps barely possible" that Aristotle means to say that the two matters are the same *type* of thing, not numerically the same thing (259). I disagree—it seems to me the passage is naturally read as saying that it belongs to the same type of faculty to cause us to grow during our generation and to take nourishment for us when we are older, precisely because the matter we are generated out of and which we use for nourishment once grown is of the same type. (The idea that different faculties work on different matter—perhaps Aristotle would be more likely to say, matter insofar as it falls under different types—goes back at least to *Republic* V.447b.)

Lewis claims that on the type reading it would be necessary to convict Aristotle of confusingly equivocal usage of 'same,' since then Aristotle would in quick succession claim that the faculties are the same (meaning that is "straightforwardly identical") and then that the matters are the same. But it is not unambiguous that Aristotle means the faculties are numerically identical, either—Aristotle might agree with

imagine that it is a biological possibility that every organ is gradually replaced with a new one over the course of generation to maturity. The Aristotelian doctrine that form, and not matter, is what fixes identity of a material substance over time seems tailor-made to answer that imagined situation.[44]

Part of the solution here must be simply to say that there are different types of matter. We regard matter as what gets worked up to generate an object; but in several places it seems Aristotle is thinking that something is matter because the compound object could be destroyed to recover those parts. That sense of matter does not neatly line up with matter as what gives rise to an object, since sometimes, as Aristotle acknowledges, you cannot directly recover the components you used to create something.[45]

Similarly, we might think that there is a sense of matter, separate from but tightly related to matter for a generation, where the matter is for the existence of a body over time. This may not necessarily be the same as the matter from which the thing is generated. On this view we simply have two different types of matter, which we might call 'constitutive matter' and 'matter for a generation.' It is controversial (but I think likely) that Aristotle distinguishes power to become a sort of thing from power to *be* a sort of thing. Perhaps this is helpful: as there are two powers, there are two matters.

However: while this might help with the problem that a human's matter is both menses and flesh and bone, it does little to answer the objection that the menses does not (or easily could not) persist into an adult human in any way.[46]

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that claim, but nothing he says makes it clear that this is his *meaning*.

But no matter: I don't claim Lewis' reading of the passage must be wrong, either. I would say instead that while it seems no philosophical mistake to claim that our blood is like this, it would be a mistake to claim that it is *necessary* that there be something like this in order to solve the Eleatic puzzle. Happily, I don't see that Aristotle says about blood that it fills such a necessary role, and I see in this chapter no reference at all to the Eleatic puzzle. (Lewis' motivations to bring up blood are not much like my own, and he neither suggests that something like it *must* exist nor that Aristotle's claims about blood have anything to do with the Eleatic puzzle.)

[44]The puzzle is presented at Charlton (1992, pp. 76–77), where Charlton notes that "Readers have sometimes tried to close [the serious gap in the argument] by positing something called prime matter." Whatever the merits or demerits of such a posit, I agree with Charlton that it is not so helpful here—but certainly not by, as Charlton does, denying that anything need remain. Prime matter would provide for something that necessarily persists through the generation of a human. But that something would not be matter as Aristotle writes of it in *Physics* A, or indeed as he writes of it anywhere with consistency: it would not be proximate, but as remote as possible; it would not fall under any determinate type, like bronze or menses, but under as indeterminate and featureless a type as possible. Textually, it does not seem to be what Aristotle had in mind. Conceptually, as something as indeterminate as can be, it seems not to fit the idea that the matter is matter for a *generation* by having a positive nature aimed at the thing that can come out of it. Perhaps we must posit prime matter in order to make sense of generation of elements out of one another, but it is both unnecessary and unsatisfying to make use of it at this juncture.

[45]I discuss these possible reasons to call something matter—and try to find something in common between them—in the next chapter.

[46]Gill (1991, pp. 163, 167) distinguishes the functional matter, the matter that is configured by the

Better, I think is to suggest that the matter for generation does not always have the intuitive unity of the favorite case of bronze as matter for a statue. As long as a generation is ongoing, the process must still be working *on* something; there must still be something which is being worked up into the new thing that will result. This is the matter. That means that what is the matter across the whole generation may appear highly gerrymandered or disjunctive from the perspective of our usual identifications of organic matter: perhaps the matter for a growing human is first menses, then menses together with seed, then ….[47]

But, just as we think that a single disposition, say irritability, might be realized across different people in very different material configurations, or even that a single belief in a single person might be instantiated in different configurations over time, so too we should think that matter may have differing implementations over time. What unites

form, from the matter out of which and into which a thing is generated. F. Lewis (1994) and Bogen (1995) make a similar distinction by talking about "concurrent matter" and "concurrent constituents." I take it that the functional matter of a thing is its proximate concurrent matter, and that the concurrent matter of a thing is the functional matter of a thing and the functional matter of the thing's concurrent matter.

(To clarify: picturesquely, if we think of a material object as a "layer cake" of matter configured by form which serves as the matter to be configured for another form …, the concurrent constituents are the matter exist at the same time as the object and constitute it, while Gill's functional matter is the "top layer" of the concurrent constituents. The concurrent matter seems to be the functional matter of the whole object, call it f_1, and the functional matter of f_1, call it f_2 and ….)

F. Lewis (1994, p. 277) has it that matter in the sense of matter for a change is "the standard conception of matter" among several "variant conceptions." I'd prefer to call it matter in the 'primary sense,' which leaves aside the connotation that it is a more legitimate type of matter and instead calls to mind the way in which Aristotle thinks several important metaphysical kinds are organized, by *pros hen* homonymy. For then matter in the sense of matter for a change would be the paradigmatic or core sense of the kind, which would be united by various relations of family resemblance to it. This mirrors the way that Aristotle thinks that the kinds being and power are united, for example, and matches as well the characteristic flexibility with which Aristotle uses these concepts. While I know of no place where Aristotle explicitly says that matter, too, is united as a kind by *pros hen* homonymy, it seems like a natural extrapolation. (Note that he does seem to think potentiality has many senses (*De Anima* B.1, 5, *Phys*.Θ.4 (see esp. 255b17) and that 'power' is said *pros hen* homonymously (*Meta*.Θ.1, Δ.12).)

[47]This is what I take Aristotle to be indicating at *Meta*.Z.7.1032b26–1033a1.

It is not exactly clear to me what Code's solution to the puzzle is supposed to be at Code (1976b, pp. 364–5), but it seems to me that at least one way to read him has him making similar claims. His picture seems to be that the menses gradually disappears as the animal matures and the menses is worked up into flesh and then organs. This must be right, but seems not to be a solution quite yet: for either the menses is present as the matter of the flesh in the end, or it has disappeared by the end; what is gained by noting that its disappearance is gradual? But he closes the paper by saying:

> 'Matter,' then, is a functional term (*Physics* B2, 194b8-9) for whatever it is that endures through a change in the capacity of substratum. (Code 1976b, p. 365)

And this seems to express just the view I have defended. So perhaps the way to read the passage about the gradual disappearance of the menses is as stressing the spatio-temporal continuity of the matter-out-of-which as it gets worked up into constitutive matter.

those implementations is that they are the matter for the generation of a certain form, just as what unites the material configurations underlying irritability is that they all give rise to certain behavior. This is just what is stressed by moving from the terminology of matter to that of potentiality: while 'matter' makes us think of what underlies and what is worked on, 'potentiality' makes us think of what is able to do something or be some way. As Aristotle's claims that potentiality is posterior in being and definition to actuality should be understood as claiming that what unifies various instances into one type of potentiality is what they are potentialities *for*, so to we should understand that matter is posterior to form in the sense that it is matter *for* a change that ends in that form.[48]

None of this *needs* the language of potentiality to be said. But it doesn't hurt.

You may worry at this point that the claims of A.7–8 have disappeared into triviality. For (you might say), grant that we have now shown that something persists through the change; but it was at the price of weakening the sense of 'something' until the word seems to merely mean 'whatever it is that is being worked up.' So (you might worry) Aristotle has really failed to show us anything particularly interesting about the constituents of change.

I think this is misguided, for two reasons: first, it undersells the accomplishment, and second, it hopes for too much. In the first place: the Aristotelian story tells us why it makes sense to see a genuinely unified thing persisting through every change. This is a real alternative to the idea that changes are merely a succession of qualitatively distinct states. That is a valuable thing to have even if we suspect that Aristotle's dismissal of change as mere succession is too quick. And we have a solution that does *not* work by making all generation reduce to the reconfigurations or alterations of simple material components; this seems to me both an important desideratum of any non-revisionary theory of change, and something which contemporary metaphysics seems overly blasé about.[49]

[48]If we have this solution in hand, do we still need to distinguish matter for a generation from functional matter? Yes, I think so: it is implausible that it is *necessary* that the matter which persists into me ends its gerrymandered journey as my proximate concurrent matter, i.e., as my eyes and hands and organs, rather than as some part or constituent of my organs. My organs are my functional matter because they have the relevant powers that are organized to give rise to my ability to live a characteristically human life. There is nothing that guarantees that the matter that persists through a generation all by itself becomes such proximate parts; it would be a coincidence.

[49]Caston on this passage objects on the grounds that any unity that the matter has is now due to the form. As he puts it, "the functional conception of matter is parasitic."

But I don't see how this is a downside. On the contrary I suspect it is one Aristotle's deepest commitments when it comes to matter, and I am happy to claim it as an implication of my view. For Aristotle actuality is prior in account (i.e., in "real definition") and being to potentiality (*Meta.*Θ.8) and form is prior to matter (*Meta.*Θ.8, Z.17).

In the second place, Aristotle's account is motivated entirely by logical and linguistic concerns. It seems to me that it would be incredible if such considerations could lead us to realize not only that there is always a persisting substrate in change, but also that it always fits neatly into our pre-theoretical classification of natural kinds. That would be a substantive result that would require a different sort of considerations than those given in A.5–6 and the first half of A.7. If what we get seems empty, that is only because it remains as schematic an account as the sort of evidence used can deliver.

This is all just as well, because it is just not true that the man who is deprived as such is potentially such as to be not deprived. The blind man is a man who is deprived, and he is not potentially sighted. It may be that an ignorant man is in some sense potentially a knower of medicine, but it is not hard to imagine cases where no realistic scenario could result in that potentiality being activated.[50] Nothing about being deprived, in general, guarantees that the lack can be remedied—even if you are a member of the

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What is potentially a substance is so because it can become that thing, i.e., being potentially a substance of such and such a sort is functionally defined and parasitic:

> τῷ λόγῳ μὲν οὖν ὅτι προτέρα, δῆλον (τῷ γὰρ ἐνδέχεσθαι ἐνεργῆσαι δυνατόν ἐστι τὸ πρώτως δυνατόν, οἷον λέγω οἰκοδομικὸν τὸ δυνάμενον οἰκοδομεῖν, καὶ ὁρατικὸν τὸ ὁρᾶν, καὶ ὁρατὸν τὸ δυνατὸν ὁρᾶσθαι· ὁ δ' αὐτὸς λόγος καὶ ἐπὶ τῶν ἄλλων, ὥστ' ἀνάγκη τὸν λόγον προϋπάρχειν καὶ τὴν γνῶσιν τῆς γνώσεως)· (*Meta*.Θ.81049b12–18)
>
> It is clear that [activity] is prior in account, for what is capable in the primary sense is capable by means of it being possible for it to be active. For example I mean by housebuilder the one able to build, and by seer one able to see, and visible one able to be seen. And the same reasoning applies too to the other cases, so that it is necessary that the account and the knowledge precedes the knowledge [sc. and account of the other]

Potentiality and matter are hardly distinguished in this chapter; see how right after the above quote Aristotle runs together "matter and seed and that which is capable of seeing" as what he claims is posterior to "a man and corn and seeing" (21–23). continues

Further on, as an example of the priority of actuality to potentiality in being:

> ἔτι ἡ ὕλη ἔστι δυνάμει ὅτι ἔλθοι ἂν εἰς τὸ εἶδος· ὅταν δέ γε ἐνεργείᾳ ᾖ, τότε ἐν τῷ εἴδει ἐστίν. (*Meta*.Θ.8.1050a15–16)
>
> Furthermore, matter is in potentiality since it may come to its form; when it is in activity, then it is in form.

To be matter as such (and not yet worked up into a thing) *is* to be potentially some further thing, just as to be potentially a builder is to have the art for producing a certain product, to be visible is to be capable of being seen, etc. etc.

[50]Unfortunately, even if it were true that all people who did not already have the art of medicine had the potentiality to learn it, simply in virtue of being people at all, some people are cognitively disabled in such a way that the potentiality cannot be activated. We can also imagine people who have the potentiality but are about to die and do not have time left to exercise the capacity, who otherwise lack the resources needed, etc. These sorts of cases may leave it open whether or not in the widest sense of metaphysical possibility a potentiality implies possible activation; I say more about this in the next several chapters.

right genus to not normally or naturally be deprived in that way.

All this shows up further the sense in which the account in *Physics* A.7–8 is very sketchy. It is an outline of the broadest features of change as such; it is *a priori* and conceptual rather than empirical. So it shouldn't be surprising that the account does not have much to say about how change relates to our existing intuitions about which kinds are natural or that it doesn't tell us when potentialities are masked by unfortunate external circumstances. To expect otherwise is to demand too much of the substantive and concrete from conceptual and linguistic analysis.[51]

3.6 Conclusion

Actuality and potentiality on the one hand, and matter and form on the other, are not "systems of principles, which lie unconnected side by side," to recall Wieland's quote. It is not a mistake for Aristotle to act as if potentiality and matter, and form and actuality, are each tightly connected pairs; and the appearance that he envisions they both play some important role in explaining how genuine generation is possible is justifiable.

On the other hand, they are two distinct—and productively distinct—ways of looking at generative change. Matter and form highlight the way in which something persists through the change and the mundane and familiar sense in which generation consists of configuring some prior thing.

Thinking of generation in terms of potentiality and actuality, on the other hand, stresses that what changes passes away (what is actually *F* is no longer potentially *F*) but the change is nonetheless a perfection or working up of the subject of the change. It explains how the system does not fall apart when we move from the generation of artifacts to the generation of biological organisms. And it begins to explain why Aristotle should think that matter is posterior to form. As a potentiality is posterior to its actuality because it is defined in terms of its actuality and teleologically aimed at it, so too matter is matter *for* a change. And we see how this is more than pulling a metaphysical conclusion out of a preposition by seeing how the unity of matter is provided for by what it is matter for.

[51]Charlton (1992) argues for a position like this at length in the introduction to his translation and commentary on *Physics* AB. Aristotle, he says, gives dialectical and logical characterizations of change, and is careful to avoid stepping on the toes of experts in the physical sciences. The investigations into the foundations of the physical sciences are meant to be conducted at a very high level of abstraction and freedom from the discoveries of the sciences themselves. The philosopher of physics establishes foundational results such as the intelligibility and possibility of change. It is not for the physicist to establish these, because the physicist takes these sorts of things for granted when doing physical science. See also similar remarks in Bostock (2006a, p. 4).

CHAPTER 4

Being in Potentiality and Possibility

4.1 Introduction

Alongside the use of the noun δύναμις to denote power or ability, Aristotle uses the dative of that word together with a predicate, verb, or just the bare verb 'to be,' εἶναι. This is what is customarily referred to by commentators as 'being in potentiality.'[1]

Understanding this new locution is important for understanding Aristotle's overall metaphysical project. The idea that there are multiple "ways of being" is obviously dear to Aristotle. The reason Aristotle turns to powers in *Metaphysics* Θ is to introduce being in potentiality as a way of being (*Meta*.Θ.1, esp. 1045b27–1046a5). Apparently he has some independent interest in canvassing the different ways of being, but it seems very plausible that the discussion is also somehow supposed to help with the quandaries about material substance raised in the preceding books of the *Metaphysics*.[2]

We would like to understand why Aristotle should think there are ways of being in addition to different sorts of beings, and why he should think this has some important payoff for understanding substance. We would like to understand how the "physical" concerns of this dissertation connect to the higher part of Aristotelian metaphysics, the science of being and theology. A first step toward this is to come to examine the particular ways of being in turn. Here we will only be concerned with one part of that first step, understanding what being in potentiality is.

[1]It is difficult to translate this in a way consistent with the translation of δύναμις as 'power.' See Makin (2006, pp. xxii–xxvii) for discussion of the problems here.

A common practice, which I will follow, is to translate 'being in potentiality.' Despite its stiltedness, this has the virtue of not begging the question as to meaning. I will also follow the traditional translation of ἐνέργεια as 'actuality,' although I think it is inappropriate—at least if we hear it, as a contemporary philosopher is liable to, as indicating the contrary of mere possibility.

[2]Cf. Kosman (1984, p. 122) and Gill (1991, pp. 171–2).

4.1.1 Potentiality as Possibility

This chapter will argue against the idea that being in potentiality is about possibility—either that to be in potentiality simply is to be possible, or perhaps that it is some restricted version of being possible. Though I think this is a misunderstanding, it isn't unreasonable. Let's take a moment to see why is might seem natural.

Metaphysics Θ gives us plenty of reason to think Aristotle thinks there is *some* interesting connection between powers, potentiality, and possibility. The first half of the book ostensibly is meant to focus on power, but it has lots to say about possibility of propositions or states of affairs as well.[3] Aristotle suggests in *Meta*.Θ.1 and 6 that he will introduce a new sense of δύναμις, apparently in addition to δύναμις in the sense of a source of change, analogous to that sense but not (like other subsidiary senses) defined in terms of it (Θ.1.1045b35–1046a5, 6.1048a25–30, 35–1048b1, 1048b6–8). Therefore when he begins to use the dative δυνάμει in *Meta*.Θ.6, it is natural to think that this is the crucial intended novelty, and to think that the new locution introduces a dramatically new concept. And it is natural to think that the structure of Θ mirrors the structure of Δ.12, the summary treatment of senses of δύναμις: there it seems very clear that Aristotle starts with powers and then halfway through pivots to possibility.

Treating potentiality as possibility gives a natural candidate for being ἐνεργείᾳ, the correlative kind of being to being δυνάμει. Since the latter is being (merely) possible, it is natural to construe the former as being actual.[4] It makes intuitive Aristotle's claims that being δυνάμει is posterior to and dependent on being ἐνεργείᾳ: this would be to say that the possible is derivative from the actual. Perhaps there is something to be said for the idea that identifying being possible and being actual as ways of being in the late metaphysics has some connection or continuity with Aristotle's thinking in the *Organon* of modal operators as indicating mode of predication.

Accordingly it is a simple hypothesis that possibility is the new concept introduced by the locution 'being in potentiality.' To be δυνάμει *Y* means or partially means to possibly be *Y*. Then for something δυνάμει εἶναι is for it to be possible or possibly exist.

[3]See the end of section 4.2.1.1 for the locations.

[4]Aristotle tells us that what is in actuality is what is, but is not in the way of things in potentiality (*Meta*.Θ.6.1048a30–32). Commentators tend to write as if they are opposites (see footnote 33). Sentesy (2018) argues that they are correlatives but not opposites, i.e., not incompatible. I do not think they are always incompatible and do not assume that; see below.

Providing a way to understand the δυνάμει-ἐνεργείᾳ duality motivates two recent defenders of connecting being in potentiality and possibility, Charlton and Menn; see below.

Potentiality is possibility (PIP) For Aristotle, for all things x and properties Y,[5] x is potentially Y iff x is possibly (and not actually) Y; and, there exists something which is Y in potential iff it is (merely[6]) possible that something Y exists.

Let us use this as a simple and relatively clear statement of the idea behind PIP, while acknowledging that a sophisticated defense of PIP might require taking this as a skeletal first pass upon which to add caveats.

Who are the defenders of PIP (construing PIP broadly)? For the rest of this section I'll say something about this.

Charlton and Menn have defended the view at length as part of larger interpretations. I'll start by discussing their views at some length, since I take them to be particularly clear and committed defenders.

According to Charlton (see Charlton (1980) and Charlton (1991)) being in potentiality is "exist[ing] as an unfilled possibility" and is to be contrasted with what actually exists or what properties are actually exemplified Charlton (1991, p. 9).[7]

Charlton assimilates the modal possibility-actuality distinction to the type-token distinction, claiming that a token of a type is a realization just as what is actual realizes a possibility. Thus the discovery of being in potentiality is meant as a solution to the Platonic problem of universals that avoids commitment to Platonic Forms (Charlton 1991, pp. 13–15). (A similar idea is pictured at Owens (1963, p. 409); according to Owens book Θ "gives no indication of having been originally written for or consciously directed toward this purpose," but he seems to suggest that Aristotle means to eventually turn the material of Θ to that purpose (cf. 413).)

Supposedly this way of understanding being in potentiality allows us to understand Aristotle's definition of soul (Charlton 1980, p. 184), as well as his distinctions between *praxeis* and *poesis* (Charlton 1980, p. 180), form and matter (Charlton 1980, p. 178), and change and activity (Charlton 1980, pp. 182–183). In general I think these distinctions are cross-cutting and that the central hypothesis about the meaning of δυνάμει therefore

[5]Typical examples of what something is in potential are given using noun phrases: the wood is potentially a statue, the earth is potentially a man, etc. Therefore I suspect Aristotle thinks of the Y that x potentially is as an object of a certain type, though of course not an actual existing individual. But this plays no important role in this chapter. The formulation of PIP is intended to provide generality, not to decide on a particular way of construing the ontology behind such formulations or of understanding Aristotelian predication.

[6]'And not actually' and 'merely' are required since otherwise everything would be in potentiality (perhaps in addition to being in other ways?). (As far as I know there's no hint in Aristotle that impossible objects might have being.) But then Aristotle should not think, as he does, that things that are necessary and indestructible are not in potentiality (*Meta*.Θ.8.1050b15–20).

[7]See too Charlton (1987), which mentions the theses of the older papers (e.g., see p. 277). But since the focus there is on exercisable causal power, not being in potentiality, it is less directly useful for us.

does not have the explanatory force Charlton is hoping for.

In Menn (1994), Menn is primarily concerned to understand Aristotle's use of the term ἐνέργεια. According to him the central and original sense of that word is activity or use of a power, but in Aristotle's late metaphysics the term is expanded to include a modal sense, actuality (see Menn (1994, pp. 78–80, 92–93); so read also by Graham in his reply (D. W. Graham 1995, p. 552)).

When it comes to being δυνάμει, Menn's claims are in some ways similar to Charlton's. Being δυνάμει is a sense of δύναμις separate from the sense of δύναμις as power, and it is centrally a modal concept (Menn 1994, p. 93).

> These datives functioning as adverbs now seem to be at the core of the meaning of δύναμις and ἐνέργεια: 'ἐνέργεια is the thing's obtaining *not* in the way which we call δυνάμει' (1048a30–32), so that ἐνέργεια is the condition common to all things which are ἐνεργείᾳ, as δύναμις is the condition common to all things which are δυνάμει. …
>
> The awkwardness of the statement [the quote from 1048] results in part from the general difficulties of elucidating any notion so basic as actuality, but it reveals something more than this. *There was no expression for actuality in Greek before Aristotle introduced* ἐνέργεια *or* ἐντελέχεια *in this sense.* Aristotle does not have a commonly known synonym that he can use to explain ἐνέργεια, so he settles for an antonym, τὸ δυνάμει …And this order of proceeding is natural enough: we do not need a concept of actuality until we have a concept of potentiality or possibility to contrast it with. (Menn 1994, p. 93) (emphasis in original)

So: the idea is to come to understand ἐνεργείᾳ in a certain way based on the assumption that δυνάμει, with which it is contrasted, has a certain meaning.[8] (I read 'or possibility' as an epexegetical gloss on 'potentiality;' surely Menn is not imagining that Aristotle might *not* mean potentiality as the Aristotelian contrast to actuality, so possibility is not being raised as an alternative to potentiality.) Menn wants us to see the new senses of δύναμις and ἐνέργεια as emerging out of the old (respectively, power and the use or activation of power). However, no explanation is provided for why the change to the dative and with the use of the verb εἶναι is meant to change the meaning

[8]Incidentally, it is fair enough to say that ἐνέργεια is the condition shared by things that are ἐνεργείᾳ. The corresponding claim about δύναμις is rather surprising to me: Aristotle seems to use the nominative to mean 'power,' or 'ability,' never 'possibility,' quite apart from the more open question of what the dative might mean.

of δύναμις from power to possibility. There is more to a power or ability than it being possible to bring about the result, and it is reasonable to ask why that is discarded in the move to the dative.

Menn sees the discovery of being in potentiality/being merely possible as an answer to Platonic puzzles about non-existent objects (Menn points to *Parmenides*' fifth hypothesis).

> We can best study the emergence in Aristotle of a concept of being-as-actuality by studying the emergence of a theory of non-existent objects (or non-present attributes, or non-obtaining states of affairs) .... It is not immediately obvious that 'δυνάμει' is the right way to describe the diminished sense of 'being' possessed by the greenness of this sheet of paper (if this paper is actually white) or by my first-born child (if actually I have no children). The only serious discussion of this sort of being before Aristotle is in the fifth hypothesis of Plato's *Parmenides* .... Aristotle is innovating over Plato in explicating this being through δύναμις .... We will have the key to Aristotle's mature doctrine of δύναμις and ἐνέργεια-as-ἐντελέχεια if we can grasp how he came to construe non-existent objects (or non-present attributes, or non-obtaining states of affairs) as having their being through a δύναμις. (Menn 1994, pp. 94–95; cf. Menn 1994, p. 98)

I too think that the explanation for the being of a non-obtaining state of affairs is to be had through δυνάμεις (*not*, as he says, through *a* δύναμις), and I will argue for this at greater length in the next chapter. I concede that Aristotle may allow quantification over objects in such states of affairs, so that this might explain the being of non-existent or non-actual objects, too. (That is, for example, the being sturdy of my possible house is to be explained by a certain set of actually existing powers, including my skill at carpentry.)

But Menn acts as if there is a theory of such objects in Aristotle, and that the discovery of being δυνάμει is a discovery of such objects. I doubt this. There is no fixation on non-existent objects in late Aristotle. (Perhaps this is why Menn cites the *Parmenides* for such a discussion, and not, say, some portion of the *Metaphysics* leading up to Θ.[9] And, as we will see in detail, being δυνάμει does not boil down to being (merely) possible. That is, although Menn acts as if being δυνάμει *is* being a non-existent object (or non-present attribute, etc.), this is not so, even if the former is to ultimately explain the latter.

[9]A similar complaint about the looseness of the connection Menn finds here, though from another angle, is made in Graham's reply to Menn (D. W. Graham 1995, p. 555).

We are likely to understand *Metaphysics* Θ, and even the whole stretch ZΘH, quite differently depending on whether or not we accept Menn's interpretation. On my view, following up on the suggestions of Kosman (1984, p. 122) and Gill (1991, pp. 171–2), the concern with activity and potentiality in Θ is meant to solve the problems in ZH, to provide a solution to the problem of the unity of substance, by clarifying form so that we see that it was incorrect in the first place to think of form and matter as if they were separate components that produce an object by addition. The form of the matter *is* the matter *acting* in a certain way, a way that sufficiently changes its character. Menn has, or at least provides, no such connection between ZH and Θ; and he will have to offer some rather different take on passages where Aristotle suggests that form is ἐνέργεια.

Older commentators: Averroes says some things that may commit him to PIP, although I am no expert on his views in general. Averroes (2010, p. 45) looks committed to potentiality implies possibility (specifically, possibility in the future): "In a certain way, potency [means] non-existence, but only those kinds of non-existence where what is non-existent can naturally exist in the future" (editor's insertion). (I am not sure what to make of the qualifier 'naturally;' the examples do not make me think Averroes means to restrict attention to natures in the Aristotelian sense; perhaps, like πέφυκε in Aristotle's own definition of active causal power (*Meta*.Θ.6.1048a28), it merely means something like 'by its own character.' In any case if potentiality implies this particular sort of possibility, then it implies possibility.) Averroes (2010, p. 98) claims that potentiality is predicated of "what we signify by saying 'that which is possible,'" which I take to mean that if something is possible, then it is in potentiality.

As Frede (1994, p. 177) points out, Bonitz seems to have endorsed PIP. In his glossary of Aristotle's terminology he glosses δύναμις, τὸ δυνάμει ὄν, τὸ κατὰ δύναμιν ὄν, (distinguishing being in potentiality from the first sense of δύναμις, power) as "possibilitas (Möglichkeit)" (Bonitz 1955, p. 207). In commenting on Θ.6 he distinguishes being in possibility from Θ´s first sense of δύναμις by telling us that it is "mera possibilitas, quae nunquam ad actum progreditur, ab ea distinguitur potentia, quae perficitur actu" (Bonitz 1955; Bonitz 1960, p. 393), and in general writes as if potentiality is possibility.

Code (2003, pp. 254–257) is a relatively explicit and deliberate-appearing example of this; e.g., at 254 he tells us that what is actual, in contrast to what is in potential, is described as "something that actually exists rather than something that merely could or might exist". This appears to cast both ἐνέργεια and δύναμις as actuality and possibility respectively.

4.1.2 Potentiality as Being Through Power

But PIP is incorrect. There are several cases where Aristotle thinks something is possible but is not in potentiality, and there is at least one important case where he thinks that something is in potentiality but not merely possible.[10] Whether or not you find PIP to be compelling in the first place, it is worth considering how PIP stands up to Aristotle's examples of what is in potentiality; these examples show us where PIP went astray and what the better path is. They suggest that PIP misses at least that for x to be Y in potentiality there must be a teleological relation between x and Y.

When x not only could become Y but is Y in potentiality, x has Y as the end of some teleological process it could undergo. Such a process would be the activation of a power x has or the result of activating such a power. One way for something to be in potential is for it to be realizable by the activity of a power.

To say that x is Y in potential is (in a case like this) to say that it has a character so that it could give rise to being Y, where to be Y is not to take on any old property, but a completion or perfection of the actual original object. This may or may not transform x into a new substance altogether.

This idea takes the use of the dative in δυνάμει and ἐνεργείᾳ seriously. It is natural to talk about the house in the blueprint, the animal in the DNA, the artifact already in the craftsman's mind. These things really and actually exist when the blueprint, DNA, and craftsman actually exist. Aristotle generalizes this when he talks of the object in the power. The metaphor can be spelled out literally: a power is a form inhering in the powerful object, and when the power is activated, the same form manifests in the powerful object's external activity. The thing is in potentiality in the sense that its form is encoded in the power of some powerful object.[11]

There is another way something might be in potentiality: according to Aristotle, organic parts are in potentiality.[12] Here I claim the point is not that some power is

[10]Note that if being possible is not sufficient for being in potentiality, then adding a disjunct to the *analysans* will not save the biconditional; and if being possible is not a necessary condition of being in potentiality, then PIP as written above will not be saved by adding a second conjunct to the *analysans*. So there is a certain amount of complexity that would have to go in to saving PIP by means of accumulating riders.

[11]To be clear my claim here is *not* that this is what this naturally means in normal Greek. As far as I can tell being in actuality and in potentiality must be terms of art. But 'what inspired these choices of terms of art' is a good question that can help us see what they might be meant intended.

[12] I suspect that this sense of potentiality is closely connected to the (controversial) idea that Aristotle believes there are potentialities to *be* some sort of thing, in addition to and distinct from potentialities to *become* some sort of thing. Although I hope I do not require this to be right for my claims in this chapter, I do accept that idea. It is defended by Anagnostopoulos (2011), Kosman (2013), and Charles (1984, pp. 19–22) and Charles (2010, pp. 189–190); it is a species of the view that Aristotle introduces a second type of potentiality in Θ.6, which is endorsed by Ross (1958, pp. cxxiv–cxxv, 250), Ross (1963,

aimed toward creating those organic parts. For they already exist. But the point is that what it is to be an eye *is*, at least in part but essentially and as an eye, to contribute a certain power to the organic whole it is a part of. That is, being for an eye is (in part) contribution of a power to a further thing. Aristotle's point is not that the eye is not an actual existent, but that its being consists in the power of a further thing.[13]

Again, I take the Greek seriously. Early Aristotle was prepared to say things like bravery is in the brave person, for what it is for bravery to be is for the person to act in a certain way and for those actions to be explained by that characteristic. Note that bravery both depends on the whole person in order to exist but in another way is explanatorily prior. What it is for an eye to be is for there to be a certain power in the person and for that power to be explained by the eye. Thus when the eye is, it is in potentiality, that is, in a power. (No doubt the analogy should not be pressed too hard—the claim is not that Aristotle is applying the machinery of the *Categories*, but that this is a natural way for him to express his point.)[14]

Again it is useful to sum up these claims:

Potentiality is teleological (PIT) For Aristotle, for all things x and properties Y, x is potentially Y iff x has a power to become or be Y, where Y is a real and positive property;[15] and, there exists something which is Y in potential iff Y is a real and positive property and either there is some x which has a power to become be Y, or there is an x which is Y and its being Y as such consists at least in part in its contributing a power to some distinct object y.

On PIT's way of seeing things, what it is to be in potentiality is not *about* possibility. But that does not mean that nothing follows for what is possible. If I am right in the

p. 173), Bonitz (1955, p. 207), and Bonitz (1960, p. 393).

The idea that there is only one type of potentiality (perhaps some new way of speaking of it is introduced in Θ.6) was kicked off, or at least made much more popular, by Frede (1994). Others who have run with that idea include Witt (2003), Makin (2006), Beere (2010), and Code (2003).

[13]"This looks equivocal," says Caston. Indeed, PIT must have it that there are two senses of being in potentiality (or that the sense is disjunctive). But Aristotle is not shy about using the same terms in distinct related senses. If an interpretation comes along that is acceptable on other grounds and is not disjunctive, well, perhaps that will be a legitimate strength of that interpretation.

[14]Caston claims that what I really mean is that the power is in or belongs to the *F* (is this meant to be to the thing that is *F*?). I don't see why he thinks this. The house in potentiality is in the power of the builder. I don't see what sense is to be made of the idea that it is instead in the house, which is the *F*. (NB the house in potentiality may actually be a particular pile of lumber, but of course that is not in or by means of the housebuilders power.) The hand exists in and by my power to grasp, punch, and so on. I don't mean to say here that my power is in or by my hand (although this may also be true!).

[15]I.e., a property under a sparse conception of properties, not a mere lack, not a gerrymandered or conjunctive property, etc. (Roughly, perhaps, a being in one of the categories.)

next two chapters, the explanation for some state-of-affairs being possible lies in the existence of actual powers to bring about such a state.

In particular here is a plausible principle: if there is actually a power to bring about a certain state of affairs, then in the widest sense of 'possible' that state of affairs is possible. This provides an inferential link between something's being in potentiality and what is possible. I will have much more to say about this in subsequent chapters. So it is not an accident that being in potentiality and being possible have substantial overlap. Still, we will be confused about Aristotle's project if we take it to be his meaning when saying something is in potentiality that it is in the widest sense possible.

4.1.3 Some More Concrete Stakes

What is at stake in whether PIP or PIT is right, beyond the general remarks above about understanding 'being in potentiality?'

First: in the next chapter I will argue that Aristotle had the elements of a theory of the foundation of metaphysical modality. What is possible is to be explained by 'constructing' possible situations out of a subset of possible situations, the contents of actual powers. A set of primitive modal properties, the powers, explain why what is possible is that way.

In order to find establish such an explanation we will need to get clear on what categories Aristotle has in mind. In particular we will want to show that Aristotle does write about possibilities (τὰ δυνατά) and means something separate from powers and from what is in possibility. If Aristotle just *means* what is possible when he talks about what is in potentiality, such an explanation is superfluous and on the wrong track: we will have found possibility in the wrong place in the Aristotelian system.

Second: several scholars have suggested that 'actuality' is, at best, a misleading translation for Aristotle's pair of terms ἐντελέχεια and ἐνέργεια. Better to understand Aristotle as meaning activity, they say.[16]

I agree. But Aristotle ties together potentiality and activity as correlatives or opposites. This is surprising and difficult to understand this if ἐνεργείᾳ is bled of modal content but δυνάμει is not. PIT works much better than PIP if we concede that activity, and not actuality, is what ἐνέργεια denotes. Then the pair 'actuality/possibility' is replaced with the pair 'what is being realized by a power/what could be realized by a power.'

[16]See Anagnostopoulos (2011), Blair (1995), e.g. 569 (compare also Blair (1993)), Beere (2010, pp. 155–167, 211–218), Gonzalez (2019).

4.1.4 The Plan

The chapter proceeds in two parts.

First, I try to establish the existence of several counterexamples to the right-to-left direction part of PIP. There are types of event where the teleologically oriented PIT can understand Aristotle's analyses, but PIP struggles (section 4.2). In cases of destruction, chains of successive changes, and luck, x is possibly Y but not potentially Y. Therefore possibility is not sufficient for potentiality; one direction of the PIP biconditional cannot be right.[17]

In the second part, I examine the case of the proximate matter of a living being (i.e., its organic body). Those parts are in potentiality but not ἐνεργείᾳ. On the assumption that 'potentiality' is substitutable with 'mere possibility,' we ought to conclude that, since they are in potentiality, they are merely possible. As we will see, several commentators do defend this idea. But that organic parts are *merely* possible objects flies in the face of common sense and broad Aristotelian commitments.

Furthermore, say we grant that organic parts are merely possible objects. According to Aristotle it is not possible for organic parts as such to be removed intact from the living whole. When the eye is removed from the body it loses the power to see, and is an eye only in the sense that a statue has an eye—as it were, by courtesy. Thus to say the parts are in potentiality cannot mean that they are possible existents, either: assuming PIP is right, it seems we have the result that they are merely possible existents but also that there is no way to get them to actually exist as such.

However: if we understand neither δυνάμει as possibility nor ἐνεργείᾳ as actuality, but accept both PIT and the mentioned interpretation of ἐνέργεια as activity, then we can reinterpret these passages without attributing to Aristotle the extremely dubious commitment that a living human's organs do not actually exist.

[17] I want to mention without pursuing another possible example of potentiality without possibility. According to Aristotle, there is potential infinity even though it is not possible for there to be an actual completed infinity (e.g., *Phys*.Γ.206b12–4). However it seems to me likely that this is resolved by noting that the adjective 'potential' can be taken in this case distributively, as applying to each member of the infinity as opposed to the completed totality. ("Distributively": compare how I can say 'Illinois' basketball team is tall this year' while meaning that each member is tall, not that the collection is tall.) While the completed totality does not possibly exist, each member both potentially and possibly exists.

4.2 Counterexamples to the Coextensionality of Potentiality and Possibility

4.2.1 Possibility Is Not Sufficient for Potentiality

Let us now look at examples where what is possible nonetheless does not exist in potentiality.

4.2.1.1 Successive Changes

First, it may be that *x* can turn into *Y* for the following reason: there is a chain of changes that would take *x* into being *Y*. It may be that in each link of the chain, the starting point is teleologically directed at what it turns into. Still, the starting point of the whole chain is not directed at the final end: it is the proximate end, not the final end, that determines the nature of its change.

We see this clearly in *Meta*.Θ.7. There Aristotle asks: when is it that *x* is potentially *Y*?

> Πότε δὲ δυνάμει ἔστιν ἕκαστον καὶ πότε οὔ, διοριστέον· οὐ γὰρ ὁποτεοῦν. οἷον ἡ γῆ ἆρ' ἐστὶ δυνάμει ἄνθρωπος; ἢ οὔ, ἀλλὰ μᾶλλον ὅταν ἤδη γένηται σπέρμα, καὶ οὐδὲ τότε ἴσως; (1048b37–1049a3)
>
> It is necessary to determine when each thing is potentially and when it is not, for it is not so at any time. For example, is earth potentially a human? Or not, but instead once it has become seed—and perhaps not even then?

There is good reason to suppose that Aristotle is thinking of substantial and non-substantial changes as on a par, since his examples fluidly switch back and forth between someone getting healed and some matter getting worked up or naturally growing.[18] For his purposes in this text, these isn't an important difference between becoming a human and becoming a thing-that-knows-French.

Aristotle must think that things that can eventually be worked up through some series of changes into another sort of thing are nonetheless not always potentially that other sort of thing. If it were sufficient that there be *some* series of changes, however large, then earth would always potentially be human. This is just what he denies when he says "it is not so at any time"; and in this case the contrast between something's being

[18]Examples of a person being healed: 1049a3–5, 7–8; examples of matter getting worked up: 1049a1–3, 5–7, 8–11, 11–18.

potentially another thing at one time or another would be unexpected. And it would be puzzling why Aristotle thought there could be a different answer to whether earth is potentially human and whether seed is potentially human, when they are both stages in the series of changes taking earth to human.

So already PIP is in trouble: it is true that earth can possibly become a human, but false that earth is human in potential. When all you have is earth, the human possibly exists, but does not (yet) exist in potential. So being a possible thing and being in potentiality cannot be coextensive.

Aristotle's holds that x is potentially Y when x is in a position—already—to serve as the matter for Y or to be the sort of thing that can become Y.[19] To make x into Y takes only a single change, a single exercise of a power or art, instead of several changes in succession.

What does it mean to say that "one change" is what is required? It is the activation of a single power or art, as opposed to a succession of such activations: so it is the house-building as opposed to the lumber-jacking and then house-building. That means that it is a process which is unified in the sense that a single principle and a single end can guide its unfolding: the individuation of changes, for Aristotle, is spelled out in teleological terms. A power can function by organizing other changes toward a new goal and thus unifying them as a group.

This way of reading Θ.7, on which the individuation of changes and therefore of potentialities is explained in terms of teleology, is given in more depth in Charles (2010). Much more discussion of how to individuate changes for Aristotle is given in Charles (1984).[20]

So a bit of earth may eventually get worked up into a human, by way of getting worked up into seed first, without yet being potentially human. It is not potentially human "whenever."

Charles (2010, pp. 173–183) makes a convincing case that the suitability of matter

[19]As Aristotle puts it, ὁμοίως δὲ δυνάμει καὶ οἰκία · εἰ μηθὲν κωλύει τῶν ἐν τούτῳ καὶ τῇ ὕλῃ τοῦ γίγνεσθαι οἰκίαν, οὐδ᾽ ἔστιν ὃ δεῖ προσγενέσθαι ἢ ἀπογενέσθαι ἢ μεταβαλεῖν, τοῦτο δυνάμει οἰκία · (*Meta*.Θ.7.1049a8–11), "similarly too for what is a house in potential; if none of the things in it, that is, in the matter, prevent the house from coming to be, and there isn't anything which needs to be added or taken away or changed, that's a house in potential."

See Gill (1991, pp. 150–151), Charles (2010, pp. 173–178), and Makin (2006, pp. 158–164).

[20]If I were to launch a full defense of teleological individuation of changes could draw heavily on the first three chapters of *Physics* Γ, where we get the constituents of a change sketched for us. Since that change is the joint activation of active and passive powers, we can then turn to texts in the *Metaphysics* (perhaps most explicitly Θ.8) to show that the change is defined in terms of its end. I would also turn to books 5 & 6 of the *Physics* to show how changes are individuated in terms of their "endpoints," and argue that this should be given a teleological reading in the light of the other texts.

Obviously this is a big task and here I can't do much more than sketch how the argument would go.

is to be cashed out in teleological terms. Individuation of processes, for Aristotle, is a matter of their teleological structure. What it is to be *one* change is to be a process that is causally united by the end the process "aims" at. The end determines the character of the process—the process must happen in a certain way in order to reach that end. In so doing, the end gives modal robustness and reliability to the process: under counterfactual perturbations, the process will compensate to reach the end.[21]

Of course, a large complex change like the generation of a new animal may consist in a bunch of smaller sub-changes, organized so that they jointly produce more than their sum. By contrast, a series of processes may not be teleologically directed at the result of the whole chain of processes, if the bunch of processes is more like a disordered heap than something that produces some end greater than the sum of the subproducts. In this case it is *possible* for me to produce a certain product, but I don't have a *power* to produce it, and it's not true that I'm *potentially* a producer of that end. The activity and the change doesn't have the right sort of unity. As a consequence, my attempts to make the whole series of changes happen will lack modal robustness and reliability.

Extended sequences of changes are dealt with naturally by PIT, but PIP struggles to explain why the results do not exist in potentiality.

Before leaving this passage, I want to discuss an alternate way to read it, one that would, if correct, be a problem for me. If Aristotle is using the dative of δύναμις to mean the same thing as 'possibly,' then Aristotle's point is not to deny the transitivity of the relation that holds between two things when the one is teleologically aimed at becoming the other. Instead, Aristotle would be imagining that some things that are

[21]The goal of building a house might directly determine the nature of the matter for the house's generation—you can build a house out of bricks, but not of feathers. But as you go further "down" in levels of composition, seeing what the bricks are made of and what that is made of, from the perspective of the housebuilder anyway, there will be more freedom and less constraint by the nature of the house. The housebuilder can be indifferent to what exactly goes into the brick, and so doesn't have to know the art of brickmaking—as long as the brick they get is hard enough, the right shape, and so on.

That is: since an art is an art aimed at producing some end, the individuation of the process by its end is matched by individuation of the efficient cause—in our example, the art (cf. Charles 2010, p. 174). Just as what we think counts as being engaged in the process of building a house depends on what a house is and the reasonable ways to construct it, so we think that what it is for an ability to count as the power and skill of housebuilding depends on what it is for that power to be successfully exercised.

It does follow from this that there are not two distinct types of arts, skills, or powers that produce exactly the same type of thing. I don't find this to be terribly plausible as an account of how we distinguish arts or powers in natural language. Nor do I take it to be particularly plausible as a more "realist" view of the individuation of powers. (For one thing I am not sure I'm convinced that makes any sense, but put that aside.) At a minimum it seems very plausible that *how* the object is produced ought to enter into the equation. But I think there is good reason to read Aristotle as committed to the idea that the unity of a process is given through its end, and that the end determines through hypothetical necessity facts about how the process should unfold. (Here I would particularly lean on a reading of *Parts of Animals* A.1 and *Generation of Animals* B.1.)

not possible are still possibly possible: they may become possible if other possibilities are actualized first.[22]

That what is possibly possible may not be possible is a doctrine unpopular in contemporary metaphysics, but it is neither unreasonable nor crazy.[23] We cannot simply conclude that possibility is not the subject of discussion because possibility is in fact transitive or because the imagined cases involve no contradiction (*contra* Frede (1994, p. 177)). The doctrine may be wrong, and it may strike (some) contemporary ears as very strange. But it is no stranger than some other Aristotelian doctrines, and even if it is not true, it is not unreasonable. We should not dismiss the reading out of hand on the grounds, anyway, of its being uncharitable.

This interpretation is bad for me. Then Aristotle would mean, not that the earth is not potentially a man, but that it is not possible that the earth is a man, even though a series of changes may result in its becoming a man. Certainly I could not then point to this passage as an example of potentiality being more restricted than possibility. Worse, the idea reveals a general tactic for objecting to my claims: perhaps it only looks like possibility outstrips potentiality to me because I have a much more permissive (and, the subtext is, modern) notion of possibility than Aristotle.

Luckily for me, the interpretation is dubious.

Consider the sorts of examples Aristotle uses to make his point. Something will not be potentially healed if there is something that prevents the doctor from doing the healing whenever they want; something will not be a house if there is something in the matter that prevents it from being worked up straightaway, when the builder wants to build the house.

However plausible the *general* denial of the transitivity of possibility is, it's not terribly plausible for these mundane cases. In these the result does seem easily attainable, after all; it's just that one of the participants in the change has to be prepared or changed, first. (Note that contemporary metaphysicians who deny the transitivity of possibility are not talking about *these* sorts of cases.)

Furthermore, Aristotle is considering the sorts of changes that regularly actually happen, e.g., the generation of humans and of artifacts. On this interpretation he would have to be saying that, in general, it is only possible for something to be (to become)

[22]Notice that this is equivalent to denying that that which is necessary is also necessarily necessary. In the jargon of contemporary modal logic, Aristotle would be denying the transitivity of the accessibility relation and so insisting that S5 is not a good model for metaphysical modality.

[23]On the contemporary scene, it is defended by Salmon (2005) and Stalnaker (2003). Plausibly, Stoic philosophers defended such a view, if they thought that a necessary condition on an event's possibility is the absence of external obstacles to it (Burnyeat et. al. 1984, p. 112; Sorabji 1983, pp. 78–79).

something else when it is already prepared to become that thing in a single change. So Aristotle would be denying that extended transformations that *will* in fact come to pass are possible: while it will be the case that this earth becomes a human, it isn't (yet) possible for it to be a human. This contradicts his own claim a few chapters earlier in *Metaphysics* Θ.3.[24]

Second, consider the context of the passage. In the immediately prior chapter Aristotle introduced and explained the new concept of actuality. He introduced a family of new technical notions, which are closely related to notions already discussed in the first half of Θ. The chapter ends "Let it be clear for us, then, from these things and things of this sort, what that which is in actuality is (τὸ μὲν οὖν ἐνεργείᾳ) and what sort of thing it is" (1048b35–36). The next line, as we saw, turns the conversation to what is "in potentiality," δυνάμει, using the dative of δύναμις.

The most natural way to take the topic to which Aristotle turns at this juncture, then, is as being in potentiality, as the partner to being in actuality. Having outlined the new concept of actuality—an outlining which in part involved expanding and elaborating the concept of potentiality in its most encompassing sense—Aristotle turns to a question about actuality's counterpart, the newly expanded and improved notion of potentiality. In both cases, Aristotle is talking about a way an object can be. He is not talking about characteristics of a proposition or state of affairs. So we should not understand him to be denying the transitivity of possibility, but of being in potentiality.[25]

Bonitz thought that in Θ.6 Aristotle introduced a novel, second idea over and above power; and, he thought that idea *was* the idea of possibility. (Thus the structure of *Metaphysics* Θ would nicely parallel the structure of Δ.12.) If Bonitz is right, then this last response falls flat. It relied on the assumption that the sense of potentiality introduced in Θ.6 was distinct from the possibility of propositions. For Bonitz would say that

[24]There he says:

> …someone who says, of something that is impossible to happen, that it either is or will be, says something false (for the impossible meant that) …. (*Meta*.Θ.3.1047a.13–15)

[25]Caston: "Good, though wouldn't your opponent hold that this is only a superficial difference b/c of the biconditional?" Hopefully not; linking by a biconditional is not sufficient to guarantee superficiality of difference (and not because of minor edge cases: it's true that I'm sitting at this moment iff it's night …).

But perhaps they have something more to add in hoping to show minimal the conceptual distance between possibility and being in potentiality. That might address the above points, but if they go too far they will end up being fellow travelers with Bonitz, who I object to below. So they will have to find some way to thread the needle: the distinction has to be superficial enough that Aristotle is denying both transitivity of possibility and potentiality without feeling the need to be explicit about it, but deep enough that something novel is indeed being addressed at this point. Perhaps there is some story like this that will do, but I think it is a tall order.

Aristotle *would* be, in using δυνάμει to mean 'possibly,' explaining the just introduced technical notion.

However, Bonitz's idea is implausible. There is much in Θ.1–5 that *is* focused on possibility in the sense of the modality of propositions. As Makin (2006, pp. 86–79) convincingly reads the chapter, this must be the case in a large chunk of Θ.3: 1047a11–29. Chapter θ.4 is clearly about possibility and not abilities of objects. (Burnyeat et. al. (1984, p. 59) also groups 3 and 4 together, as both having a wider subject area than the sense of δύναμις treated in 1 and 2.) See also Γ.5.1047b36–1048a9, where capability of objects and possibility are related to each other (and so in the process recognized as distinct). So, on Bonitz's interpretation, it would make little sense for Aristotle to pivot to possibility of propositions in Θ.6 with such fanfare; and his claim in Θ.1.1046a1–4 that he would pivot to the more useful sense of power only after discussing the first sort would be a lie.

So we ought to see in this passage a clear indication that being in potentiality and being possible diverge, not only in meaning or intension, but in extension.

4.2.1.2 Destruction

Very often, it is possible to destroy an object. But Aristotle is clear that things are not destroyed in virtue of exercising a potentiality to be destroyed. That is, although it is possible that I be destroyed into a heap of blood and bones, it is not the case that I am potentially a heap of blood and bones; although it is possible that wine degrade into vinegar, it is water, that which wine comes from, that is potentially vinegar.

> ἀπορία δέ τις ἔστι καὶ διὰ τί ὁ οἶνος οὐχ ὕλη τοῦ ὄξους οὐδὲ δυνάμει ὄξος (καίτοι γίγνεται ἐξ αὐτοῦ ὄξος) καὶ ὁ ζῶν δυνάμει νεκρός. ἢ οὔ, ἀλλὰ κατὰ συμβεβηκὸς αἱ φΘοραί, ἡ δὲ τοῦ ζῴου ὕλη αὐτὴ κατὰ φθορὰν νεκροῦ δύναμις καὶ ὕλη, καὶ τὸ ὕδωρ ὄξους · γίγνεται γὰρ ἐκ τούτων ὥσπερ ἐξ ἡμέρας νύξ. (1044b34–1045a3)
>
> There is a puzzle: why is it that wine is not the matter of vinegar and not potentially vinegar? (Even though vinegar does come out of it.) And why is it that an animal is not potentially a corpse? Or not, but instead the destructions are accidental, and the matter of the animal itself is the power and matter of the corpse, in accordance with destruction, and so water of wine; for it comes to be from these just as night from day.

Wine, in some sense, does turn into vinegar. That is the sense in which night turns into day. Night comes after day regularly and reliably—it's not a mere coincidence, in

our sense of the word. But it is an accident in the Aristotelian sense, because it is not the case that day is a *source* for night. That it was day does not causally explain that it is now night. Instead, they are both the products of a common cause. Day turning into night is a mere pseudo-process, in the same way that a spot of light moving across the wall is a pseudo-process: the presence of the spot at one location neither causes nor explains the presence at the next spot.

How should one extend the idea to the destruction of material individuals? Like this. Death follows life, but it is not the life that causes the death; they are both explained by underlying processes. Those processes are the activities of the matter. My matter "cooperates" to keep me alive, but my various parts also have their own agendas.

My destruction is a failure of my potentiality to continue sustaining myself. There is a tragic tension within me: my matter has powers for things other than to play their roles in keeping me alive. For example, the elements in me have potentialities to be located to their proprietary locations in the universe, which include, for different elements, the universe's center and edges. This is a problem for me: like all material substances, I consist of all the elements (*GC*.B.8), and like most of them, I am not already at both the edge and the center of the universe. Those material powers cause my destruction: as Aristotle puts it, what constitutes me is also what destroys me (*De Caelo* A.12.283b21–22; cf. *De Anima* A.4.408b19–24). What is material is subject to destruction; what is immaterial is not (see, e.g., *Meta*.Z.7.1032a20–22, *Meta*.H.5.1044b26–28, *Meta*.Θ.8.1050b7–28).[26]

[26]This account of the cause of destruction is from Gill (1991) (discussed throughout, but see e.g. pp. 212–213, 234). The account is criticized in Bogen (1995, pp. 381–382), but the criticism seems to me to rely on an implausible understanding of *De Caelo* A.12.283b21–22. There Aristotle tells us that material individuals are destroyed by what constitutes them. Bogen reads this as: they are destroyed by the same type of thing that constitutes them, i.e., the elements. No doubt that happens sometimes. But if this means that things are destroyed only by the elements, it is clearly false; if it means they are destroyed by things that contain the elements, it is trivial, since all things contain all elements to some degree; and it seems to be a poor general explanation for aging or decay.

The passages Bogen cites show that at least some destruction involves external features, but that is compatible with what is said above. Nothing in Gill's account rules out the possibility that the degenerative process can be (or even must be) hurried along by external influences: indeed, the natural motion of the elements is the result of passively suffering a change, and the elements are moved by the sun's motion (*Phys*.Θ.4.255a4–19, 255b32–256a3, *GC* B.10.10.15–18, *Meteorology*.A.9.346b20–24; see Scharle (2008, pp. 171–173) and Furley (1994, pp. 3–4)). Therefore this seems like at least a natural way to understand the proximate "triggering" cause for a substance's degeneration.

In interpreting this passage, and in particular why it is that I am not the matter for my corpse, Bostock (1994, pp. 277–278) puts a lot of emphasis on the fact that corpses are not made of people. True enough. But if the results of the previous chapter are right, to say that this explains why death is a destruction and accidental gets the order of explanation backwards. *A priori*, nothing rules out the possibility of generations where the generating source, under every common-sensical description independent of the change at hand, perishes over the course of the change. But it persists as a unified object under some description exactly because it is matter for the change. Under the description of matter for such-and-

So I am not potentially my corpse; still, it is of course a possibility for me to perish and be replaced by a corpse. A fan of PIP might try to repair things like this. They could say that while the argument shows that 'x is potentially Y' cannot be understood as synonymous with 'x is possibly Y,' nonetheless, the *possibile* which is the corpse still is something that exists in potentiality—though it is not *me* in potentiality, it is my matter in potentiality.

Fair enough. But from the standpoint of sheer possibility, all the following seem on a par: the bronze is possibly a statue, the statue is possibly bronze, a human is possibly a corpse, menses (according to Aristotle, the matter whence a human) are possibly a human. They all receive the same account in terms of bare possibility and of *possibilia*. By contrast to the case of simple possibility, it seems the facts about potentiality are sensitive to the direction of the change, to whether the change is a positive production or a destruction. While it is true that which objects are possible has some connection to which things are in potential, PIP must leave out something important of what determines being in potentiality.

4.2.1.3 Luck

Here is a third kind of case in which the possible comes apart from the potential. For Aristotle events can happen and objects can be generated by mere *luck*. If I meet a friend I had hoped to run into at the market, not by planning or foresight on either of our parts but just by happenstance, that is a case of luck. Of course it was *possible* that we meet: indeed (we're imagining) it was actual. But the point of saying that the thing happened luckily is precisely that there was not a power exercised to order things to happen that way.

There are a lot of unclarities in Aristotle's account of luck, but for these purposes we don't really need to understand the account in anything but its broadest strokes. Neither luck nor its outcome is the cause of what happens always or for the most part (*Phys*.B.5.196b11–13). Lucky events are in some way accidental events: when luck

such change, it is unified insofar as it is the right sort of thing to be the matter for that change. Thus it is the fact that a generation consists in the addition of new order and a new form that explains why the source persists as a constituent of the resulting product, and the fact that a destruction consists in a loss of order and form instead that explains why it does not.

Finally: according to Bostock, Aristotle's remark that the death of organisms is coincidental is not helpful. But we are now in a position to understand it. I am in (at least) an accidental unity with my matter, but am not identical with it in being. And it is the matter which is the *per se* cause of the destruction. This is what it is to be a coincidental cause of something, a cause *per accidens*. For this understanding of the coincidental see, e.g., Aquinas (1999, p. 100), C. A. Freeland (1991, pp. 55–57), or Judson (1991, p. 79) on *Phys*.II.3. On the other hand, this passage provides a clear counterexample to Freeland's claim that the accidental is not regular or predictable. Sadly, so far anyway, we all die.

is a cause, it is by virtue of being an accidental unity with some other cause of the event (*Phys*.B.7.198a5–10).[27] Luck causes the kind of event that a person would choose, but doesn't happen because the person chose it; instead it happens because the person chose something which happens to coincide with the lucky event (*Phys*.B.6.197b18–23). In this way, surprisingly, luck is genuinely a cause for the sake of something (*Phys*.B.5.197a5–6).[28]

Aristotle puts the point in terms of cause, not in terms of power: there is no unqualified non-lucky cause of the chance event, only incidental ones (that produce processes which happen to coincide with the chance event). The man who gets a lucky benefit does not have the end in himself as cause (*Phys*.B.5.197a1–2). That is to say, he does not have in himself a power as efficient cause that aims at the resulting meeting, and which he exercised by choice. Such a power would be an efficient cause. Since Aristotle denies that lucky events are caused unqualifiedly by some choice for that end, he also denies that there is such a power exercised that way, a power for that event as such. (I argued for this connection between power and efficient cause in the first chapter.)

I had a power to go to the market, and so did my friend; but there was no single principle which explains why we *both* went at the same time as the other. That is why, for example, that meeting had no modal robustness to it: the fact that we met was "fragile" under counterfactual suppositions, compared to meeting as the result of planning to meet.

Now a person might get a lucky benefit of a sort that they couldn't get by exercise of their own powers. This seems to be what Aristotle is imagining when he says an unskilled person could do something skilled by chance (see footnote 29), say, someone luckily playing a song on the piano though they don't know what they are doing. Such a person doesn't have the power to play the piano, since they don't have the skill, and they are not potentially someone playing the piano. Still, by chance, it is a possibility. Thus we have another case here where possibility outstrips what is in potentiality: our hypothetical unskilled person is possibly, but not potentially, a player of the piano. Potentiality, unlike mere possibility, is sensitive in a direct and simple way to the presence or lack of sources of order as efficient cause; that is, to the presence or lack of abilities and skills, of powers.

[27] A common observation; see, e.g., Nielsen (2017, p. 313).

[28] As Allen (2015, p. 71) stresses, the lucky cause is itself a cause *for* the something that is an object of choice. Despite the interpretation's historical popularity, it does not appear to be Aristotle's point that the lucky cause is not for the sake of anything in itself but only coincident with some other cause which is for the sake of something. The strong contrast between causation for the sake of something and what happens by coincidence (drawn, e.g., by Nielsen (2017, pp. 308–9, 339)) therefore seems to oversimplify Aristotle's typology.

Incidentally, you might compare the perfectly natural sense of 'can' in which what you can do is more restrictive than what you might, in any way at all, accomplish.[29]

4.2.2 Potentiality and Parthood

4.2.2.1 PIP Can't Deal with Parts

There is another sense of potentiality. This is the sense in which my parts are my matter and are in potentiality. Aristotle says this in various places, but let us focus on *Meta*.Z.16.1040b5–10).[30] It is difficult to offer a satisfactory interpretation of this where 'potentiality' means 'possibly.'

> Φανερὸν δὲ ὅτι καὶ τῶν δοκουσῶν εἶναι οὐσιῶν αἱ πλεῖσται δυνάμεις[31] εἰσί, τά τε μόρια τῶν ζῴων (οὐθὲν γὰρ κεχωρισμένον αὐτῶν ἐστίν · ὅταν δὲ χωρισθῇ, καὶ τότε ὄντα ὡς ὕλη πάντα) καὶ γῆ καὶ πῦρ καὶ ἀήρ · οὐδὲν γὰρ αὐτῶν ἕν ἐστιν, ἀλλ´ οἷον σωρός, πρὶν ἢ πεφθῇ καὶ γένηταί τι ἐξ αὐτῶν ἕν.
>
> It is clear that of the things which are thought to be[32] substances, most of them are powers, both the parts of animals—for none of them exist having been separated, and whenever they are separated, then they are all as it were matter—and earth and fire and air. For none of them is a unity, but as it were a heap, until they are worked up and something comes to be a unity out of them. (*Meta*.Z.16.1040b5–10)

[29]Witt (2003, p. 31) tries to preserve the implication from possibility to potentiality by claiming that to luckily ϕ is not to (really) ϕ, so the person need not have the capacity to ϕ. This is intrinsically implausible, and it is hard to see how to extend this strategy to the other cases we have discussed: do I not really perish? Does the earth not really turn into a human?

And the proposal seems to be simply contradicted by Aristotle's assertion that "it is possible to do something scholarly both from chance and with another making suggestions. Thus you will know grammar, if you should do something scholarly and in the scholarly way, that is, in accordance with the scholarly knowledge in yourself" (*Nicomachean Ethics* B.4.1105a23–26). *Contra* Witt, Aristotle's doctrine is explicitly that it is possible to do something genuinely scholarly though not having the knowledge (which is an example of a power) oneself.

[30]Cf. *Meta*.1032a20–25, 104517–19, 1048a36–b6, 1050a15.

[31]He says at b5 that the parts are *powers*, not that they are in potentiality; but as he then switches to the claim that they exist in potentiality at 12 and 14, which usage seems more explicable in the context, we should not put too much weight on this. (Manuscript Γ does have δυνάμει, but it is more likely that some scribe in that tradition corrected the slight sloppiness than that Γ alone has it right.)

[32] Aristotle affirms that organic parts and elements are substances both before and after this passage. (E.g., *Meta*.Z.2.1028b8–13, *Meta*.H.1.1042a6–11.) Therefore we should not follow Ross (1958, p. 218), in thinking he is here denying substancehood to parts. It would be a mistake to put much weight on 'thought to be' as a subtle disavowal; he is liberal with such periphrasis.

To begin with, Aristotle does seem to mean that my parts are *merely* in potentiality.

Can the defender of PIP insist that Aristotle does not mean to deny that the parts exist in actuality? After all, what is actual is also possible. Perhaps here being δυνάμει is not meant to rule out being ἐνεργείᾳ.

Elsewhere Aristotle claims that being ἐνεργείᾳ is the being that is not being δυνάμει (*Meta*.Θ.6.1048a30–2). This at least can be read as saying that the two are mutually exclusive, though it doesn't seem compulsory. The usual interpretation appears to be that the two modes of being are *opposites*, which, on Aristotle's understanding of opposites, would suggest that they are mutually exclusive.[33] Then the defender of PIP should take being δυνάμει to be, in general, being *merely* possible.

However, it would be foolish to assume that Aristotle was always consistent with terminology, or always needed 'opposite' to carry a precise technical sense that entailed incompatibility. Furthermore, at least one commentator has argued that the usual view is mistaken, and that at least sometimes being ἐνεργείᾳ entails being δυνάμει. Sentesy (2018) interprets *Meta*.Θ.3 in a way that requires Aristotle to accept that entailment and points to *Meta*.Λ.6.1071b24.[34] I would point as well to *De Anima* B.5, where apparently Aristotle indicates that some changes but not others involve a thing being both active and in potential.[35]

Therefore I do not think this line of objection is the one to press.

I think I need to be very explicit here, so let me emphasize the upshot of the preceding remarks. I did not claim that activity and potentiality are always mutually incompatible. Some commentators, among whom I am not, do appear to be committed

[33]A block of citations indicating the popularity of the view can be found at Sentesy (2018, p. 240). One does wonder how literally people mean 'opposite,' though.

[34]δοκεῖ γὰρ τὸ μὲν ἐνεργοῦν πᾶν δύνασθαι τὸ δὲ δυνάμενον οὐ πᾶν ἐνεργεῖν …, "for it appears all that is active is capable, but it's not true that all that is capable is active." Although notice that this is not put in terms of being δυνάμει and ἐνεργείᾳ. This is put forward as an appearance in generating a puzzle, not asserted; but Aristotle's solution to the puzzle does not appear to involve rejecting this premise.

[35]

> οὐκ ἔστι δ' ἁπλοῦν οὐδὲ τὸ πάσχειν, ἀλλὰ τὸ μὲν φθορά τις ὑπὸ τοῦ ἐναντίου, τὸ δὲ σωτηρία μᾶλλον ὑπὸ τοῦ ἐντελεχείᾳ ὄντος τοῦ δυνάμει ὄντος καὶ ὁμοίου οὕτως ὡς δύναμις ἔχει πρὸς ἐντελέχειαν·
>
> The phrase 'be affected' is not simple either. Sometimes it is some destruction by an opposite, and sometimes instead a preservation of something in potentiality by something which is in activity, something which is like it as a power is to its activity. (*DA*.B.5.417a)

Some changes but not others involve the destruction of the state of the affected thing that allows it to be affected. In the case of a substantial change, for example, after the change the matter no longer has an ability to suffer a passive change that would result in the new object, so it is not in potentiality the resulting object. The resulting object is in activity and not in potentiality. But a person who is actively perceiving does not lose the capacity to perceive in so doing, so there is a perceiving person both δυνάμει and ἐντελεχείᾳ.

to that claim. But I do not think that is the right way to object to the imagined defense of PIP. One reason why is that there are several passages which seem to cut rather hard against that idea. Another reason why is that although one (*one*, not *me*) might try to lean hard on the word 'opposite,' I regard that as putting more weight on the terminology than it can bear. I am objecting to this line of argument *even though* it has a conclusion I am sympathetic to.

But *nonetheless* this is a dubious line of defense for the fan of PIP. We should not buy *in this case* and *over the assumptions of PIP* that parts are simultaneously active and potentiality.

First, on this understanding Aristotle would be generating a highly misleading implicature for no clear reason. We expect Aristotle to be saying something non-trivial about parts. But on this reading the defender of PIP has it that Aristotle spends a chapter patiently explaining that the parts of living things are both actual (in the English sense of 'actual') and possible objects. Well it is not much of a surprise that our parts are actual in that sense—I can touch and see my hands, for example, and I don't expect to be able to do that for merely possible objects. And given that it is hardly a surprise that they are in potentiality, under that understanding of in potentiality, as well. For what is actual is possible as well.

If this were the correct interpretation, at the very least we would expect some explanation for why this discussion is necessary, for it appears to belabor a obvious point.

Second, the passage on this interpretation appears to belabor a trivial point in the literal sense. *Everything* that is actual is both actual and possible. Why then are we getting part-specific arguments to show that this is true of parts as well?

Now it turns out, I think, that there are *also* textual reasons primarily in *Metaphysics* Z.13 and 16 to take it that Aristotle thinks parts are not in activity, and that these reasons do not depend on assuming PIP.[36] Indeed I will give an interpretation of being in

[36]The short version is that Aristotle claims in Z.16, and reaffirms in Z.13, that no substance is composed of substances. If we take this unqualifiedly it contradicts Aristotle's frequent claims that parts and elements are substances, including claims after this passage (see footnote 32). We should instead take him to mean that no active substance is composed of active substances (cf. Z.13.1039a3–9). But since my parts, as noted, are substances, and since presumably it follows from their being my parts that I am being composed of them, it follows that they are not in activity. For if they were then they would be actual substances that I am composed of.

We may have it broken apart a little more explicitly:

1. Umer is an actual substance. (premise)
2. For all x, if x is an organic part of Umer, then x (partially) composes Umer. (premise)
3. For all x, if x is an organic part of Umer, then x is a substance. (premise)
4. For all x, if x is actual and a substance, then x is an actual substance. (premise)

potentiality that should fit around that claim. But I will not defend it at length in this chapter. Here my focus will be on being in potentiality, and I think my claims about what being in potentiality for parts amounts to do not obviously entail that they are not in activity.

Before we continue with let us be clear about the dialectical position. It is enough to answer the above imagined defense of PIP if we cannot interpret Aristotle as saying parts are both actual and in potentiality on the reading of those words of the defender of PIP. Whether or not Aristotle thinks that parts do not exist in activity is not crucial for the central thrust of this chapter.

Anyway, say we grant PIP, and we have been convinced that on the assumption that

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5. For all x and all y, if x is an actual substance, and y (partially) composes x, then y is not an actual substance. (premise)
6. There is something that is an organic part of Umer and it is actual. (for reductio)
7. Party is an organic part of Umer and Party is actual. (quantifier elimination on 6)
8. Party is an actual substance. (quantifier elimination on 3, followed by modus ponens on the result with the first conjunct of 7; then conjoin the result with the second conjunct of 7, then modus ponens on the conjunction with the result of instantiating 4)
9. For all y, if Umer is an actual substance, then if y (partially) composes Umer, then y is not an actual substance. (quantifier elimination on 5)
10. If Umer is an actual substance, then if Party (partially) composes Umer, then Party is not an actual substance. (quantifier elimination on 9)
11. If Party (partially) composes Umer, then Party is not an actual substance. (modus ponens 1, 10)
12. Party is not an actual substance. (modus ponens on 2 instantiated with Party and first conjunct of 7, modus ponens with the result and 11)
13. $\perp$ (contradiction between 8 and 12)
14. $\perp$ (this time out of scope of assumption on 7, quantifier elimination on 7 and 13)
15. It is not the case that there is something that is a part of Umer and it is actual. (negation introduction, 6)

The long version is carefully working through *Metaphysics* Z.16 line by line and glancing at other texts (esp. Z.13, but also to the above-mentioned places to establish I and my parts are substances and at Δ.24–26 to establish that my parts make me up) as I do so. I would have to pull out textual support for each premise. I believe this is possible for each one except 4 (and I am not prepared to offer an objection to 4; maybe you are). Anyway I don't have the space or time for the long version.

I am told this conclusion contradicts *De Anima*; that doesn't tell us what went wrong with the argument though, and seems as likely to suggest to me that Aristotle failed to notice he was contradicting himself, did not notice the easy conclusion above followed from his claims in Z, or simply changed his mind. (That said I am unsure why it is meant to contradict *De Anima*; certainly it is not obvious that it contradicts the claim that the body *still exists* when the person does.)

I am told this must be rejected as an interpretation on the grounds that it is very unintuitive. I myself have no clear intuitions about how to correctly use a technical Greek term of art, and if I did I wouldn't think much of them as a guide to interpretation of Aristotle, let alone metaphysics. To be blunt I find it extremely difficult to believe that those who have strong intuitions about this are not letting intuitions about actuality, which of course we have in plentiful supply, influence their claims about being ἐνεργείᾳ.

PIP is correct, Aristotle holds that parts are merely in potentiality. Then the straightforwardly literal reading of this is that I, an actual object, have as parts merely possible objects. My form organizes and configures my proximate matter, my parts, to give rise to me. If we understand by my proximate matter's being in potentiality that it is merely a *possibile*, this makes it sound like my form configures possible organs in order to give rise to the actual structured object that is me.

I find this to be incredible, certainly in itself and only a little less as an interpretation of Aristotle. Indeed I think in any argument I have against it, I regard the view's falsity as more certain than the premises. (Of course I acknowledge that such remarks are unlikely move those who attempt to defend the view or similar views.)

Still we can say somethings more in the line of giving reasons. The claim that my parts are mere *possibilia* seems in conflict with the way Aristotle usually writes of organic parts: he writes as if parts can be touched and touch and as if they can convey motion and participate in actual causal processes. In general it seems the project of Aristotle's biological works, including *De Anima*, *Parts of Animals*, and *Generation of Animals*, is in large part to explain the behavior and nature of living things in terms of the causal contributions their parts make and in terms of how those contributions interact with each other. You can see, touch, and bite my eye. Aristotle says it is present in me, and has powers. It is in virtue of those causal powers that I can do the things I do (e.g., see). In general, matter is a part of the compound (*Meta*.Δ.25.1023b19–22). And it is a nature for the object, (*Meta*.Δ.4.1014b26–35, *Phys*.B.192b19–20, B.2.194a12; cf. Kelsey (2010, p. 109)), and so has real explanatory force.[37]

We might try to understand the passage in line with PIP instead by making it a claim about what could happen, rather than about merely possible objects. The point is not that I, an actual object, have some relation to my eye, a *possibile*. Rather the point is that it is possible that my eye exist. My parts might not actually exist, but still it is possible for them to exist by removing them from me, so they potentially exist.

I don't think this will work; but first, let us try to give it a fair shake by saying what the idea has going for it.

It might be thought to have some textual support in Aristotle's references to separability and continuity, further on in the chapter, in explaining why organic parts are not ἐνεργείᾳ. Our passage is similar to one earlier in book Z, at 13.1039a3–9.[38] There Aris-

[37]The observation that if a form is to configure something, then that thing had better be genuinely present in the compound, is essentially what K. Fine (1995) relies on his account of Aristotelian mixture.

[38]

> ἀδύνατον γὰρ οὐσίαν ἐξ οὐσιῶν εἶναι ἐνυπαρχουσῶν ὡς ἐντελεχείᾳ: τὰ γὰρ δύο οὕτως ἐντελεχείᾳ οὐδέποτε ἓν ἐντελεχείᾳ, ἀλλ' ἐὰν δυνάμει δύο ᾖ, ἔσται ἕν (οἷον ἡ διπλασία

totle tells us that an actual substance does not have actual parts[39]: and he seems clearly to be thinking of cutting a line in half to actualize the potential line segments in it (6–7). This seems very similar to two of Aristotle's examples of the new kind of δύναμις at *Meta*.Θ.6. Something novel can be made by separating it from the larger context it is in, e.g., carving a statue out of a hunk of wood (1048a32–33); and similarly the half in the whole is in potentiality (33). It is plausible that Aristotle is mentioning both cases later where he says that what is separated out of matter is to the matter as what is in actuality is to what is in potentiality (1048b3).

Therefore we might speculate that the point in Z.16 is that similarly, my parts can be separated out from my body, which would produce a new thing, the separated part. That is why they are in potentiality; but since as it is they are continuous with each other, like the statue in the wood or the two halves of the whole line, they are now only in potentiality. Aristotle is telling us in Z.16 that the actual existing object is the largest continuous thing present, but subsets of it don't exist; and one might adduce too the common-sensical intuition that arbitrary subsets of an object are not themselves objects.

Now I would not deny that sometimes things are in potentiality because they can be separated out: and in particular I do suspect that is the point of the examples of the statue in the wood and the halves in the whole line. But when it comes to Z.16 and organic parts, this cannot be what is going on. Organic parts are not in potentiality because they can be separated out. First, this reading must still answer awkward questions: do organic parts exist prior to separation, or not? And if they exist, do they exist actually, or only possibly? The only answer that respects the causal and explanatory roles they play says they exist actually. But then being δυνάμει cannot be understood as being merely possible, since organic parts will be both actual and δυνάμει; and being ἐνεργείᾳ cannot be understood as being actual, since over PIP we must take Aristotle to be denying

> ἐκ δύο ἡμίσεων δυνάμει γε: ἡ γὰρ ἐντελέχεια χωρίζει), ὥστ' εἰ ἡ οὐσία ἕν, οὐκ ἔσται ἐξ οὐσιῶν ἐνυπαρχουσῶν καὶ κατὰ τοῦτον τὸν τρόπον, ὃν λέγει Δημόκριτος ὀρθῶς …
>
> For it's impossible for a substance to be composed out of substances in actuality. This is because what is in actuality two is never one in actuality, but if there are two in potentiality, it'll be one (for example, the double is [composed] of two halves in potentiality; for actuality separates). The result is that if a substance is one, it won't be composed out of substances and in this way, which Democritus said correctly …. (*Meta*.Z.13.1039a3–9)

[39]Caston: but he does not use the word 'part.' No, he does not. But he appears to be saying that no actual substance is made of an actual substance (3–4, ἀδύνατον γὰρ οὐσίαν ἐξ οὐσιῶν εἶναι ἐνυπαρχουσῶν ὡς ἐντελεχείᾳ·). I am happy enough to take on the commitment that if something actual is not made of actual substances and something's parts are substances, then it is not made of actual parts. As noted in the body, organic parts and the elements (and this is what we ultimately care about, not line segments) are according to Aristotle substances both before and after Z.13–16.

organic parts this status, but we just said that they are actual.

Second, notoriously, Aristotle tells us that in the case of organic parts, it is *not* possible to separate them out—at least, not as such:

> …τά τε μόρια τῶν ζῴων (οὐθὲν γὰρ κεχωρισμένον αὐτῶν ἐστίν · ὅταν δὲ χωρισθῇ, καὶ τότε ὄντα ὡς ὕλη πάντα) …καὶ γῆ καὶ πῦρ καὶ ἀήρ · οὐδὲν γὰρ αὐτῶν ἕν ἐστιν, ἀλλ΄ οἷον σωρός ….
>
> …both the parts of animals—for none of them exist having been separated, and whenever they are separated, then they are all as it were matter—and earth and fire and air. For none of them is a unity, but as it were a heap …. (*Meta*.Z.16.1040b6–9)

This shows that it cannot be that organic parts are in potentiality because they can be separated out from the whole: Aristotle denies that they can be ('none of them exist separated'). For they will not be unified.[40]

This is the puzzle pointed out by Ackrill (1972) (see esp. 124–127). He points out that according to Aristotle, my organs, my eyes and arms and so on, essentially play the roles they play in my whole body.[41] When they are removed from my body, they no longer function in the appropriate way, and the sense in which they are eyes and arms changes. My eye, once plucked out, is like an eye in the way that a man in a painting is a man. He *is* a man, but only homonymously; only by extension, or by courtesy. This seems to be a situation peculiar to organic material (and not all organic material): what it is to be an eye is to be a seeing thing, while bronze, say, has more to it than the role it might play in a statue.[42] It is the eye's ability to fulfill its function in the whole organism that is its form, its source of unity so far as it has got one, and this is lost when it is plucked

[40]As Bostock (1994, p. 224) points out, "admittedly the text does not quite say" that the explanation in terms of unity is meant to apply to organic parts as well as to the elements. But given that the commitment can be independently constructed from other Aristotelian commitments, as we will do in a moment, I think it is a reasonable reading.

[41]E.g.,

> For the body is this head, these arms, *etc.* (or this flesh, these bones, *etc.*), but there was no such thing as this head before birth and there will not be a head, properly speaking, after death. In short—and I am of course only summarizing Aristotle—the material in this case is *not* capable of existing *except* as the material of an animal, as matter *so in-formed*. The body we are told to pick out as the material 'constituent' of the animal depends for its very identity on its being alive, in-formed by *psuche*. (Ackrill 1972, p. 126) (original emphasis)

[42]*DA*.B.1. Obviously this does not straightforwardly rule out the possibility that the essence of bronze might consist in its function in some more expansive sense, i.e., not just its role in relation to statues in particular, but in a larger system, e.g., the whole physical world (something like this seems to be broached at *Meteorologica* Δ.12).

out. But, according to Ackrill, it only makes sense to say that some x is potentially Y if it can be and can be not Y.[43] This modal requirement is not satisfied in the case of organic parts—they cannot fail to constitute the living thing that they constitute. Therefore, Aristotle's use of the matter-form and potentiality-actuality distinctions to understand the constitution of material objects, in particular living material objects, is, to use the phrase Ackrill borrows from Wiggins, not "logically hygenic" (119, 124).[44] In particular, organic parts cannot be separated out from the living body without perishing in the strict, non-homonymous sense.[45]

This helps us understand Aristotle's otherwise puzzling claim in the above quote from Z.16 that organs are 'as it were matter' when separated, immediately after saying that they don't exist if separated. Should my eye be plucked out, it loses its function and its form, but the stuff that had possessed that function and form (the eye-jelly and so on) is still there. In one sense it ceases to exist (the strictest sense, I suppose), but in some looser sense there is after all still an eye there. But it no longer has its function and its form—it is as it were mere matter.[46]

43

> Now in the statue matter and form can be distinguished, and it seems to Aristotle not unnatural to speak of the matter as potentiality …and the form as actuality …. Thus 'potentiality' and 'actuality' can come to be used not only for successive phases but also for aspects of the composite which are present simultaneously; but this is only because of reliance on the idea of the matter as it was before being in-formed. This notion of compresent potentiality and actuality involves the assumption that the material of the actual thing was not always, or at least need not have been, in-formed in this way …. (Ackrill 1972, p. 125)

44

> The problem with Aristotle's application of the matter-form distinction to living things is that the body that is here the matter is itself 'already' necessarily living. …the contrast of form and matter in a composite makes ready sense only where the matter can be picked out in such a way that it could be conceived as existing without that form …. There is a parallel difficulty with the notions of actuality and potentiality …no distinction can be drawn for organs and bodies between their being potentially alive and their being actually alive. They are necessarily actually alive. (Ackrill 1972, pp. 125–6) (original emphasis)

[45]Possibly a similar example is given at *De Anima* B.3.414b–28–32. A triangle is in potential in a quadrilateral, and in general a smaller figure in the larger that contains it; this is meant to elucidate the sense in which a more complex type of soul (e.g., sensitive) has in it in potential the less complex types (e.g., nutritive). But it is not very plausible that Aristotle is thinking that given a complex soul, one can extract one of the less complex souls, as if it were a spatial part of the complex soul. (Of course an animal might be wounded so as to lose its abilities to act in characteristically animal ways—and we sometimes say someone in such a situation "becomes a vegetable"—but we do not think that is literal!) They still have the essence of whatever type of animal, and for example are evaluated according to the norms of that type (that's why it's sad that they are in that state, after all).

[46]This is a good place to bring up Bostock's interpretation, since on his reading Aristotle's basic point in this passage is that the elements and the parts of animals are mere matter (Bostock 1994, pp. 224–227).

Consider the following: my eye—that is, my eye in the central, non-extended sense—it *is* in potential. But it is simply not possible for it to exist (in that sense) actually. Thus we have matter that is, and is essentially, contemporaneous with what it is the matter for.[47] This is why Aristotle says that I perish into flesh and blood (*Meta*.Z.1033a18–34), even though my proximate matter is eyes and arms.

This is supposed to be unacceptable. That is Ackrill's puzzle.

One aspect of the puzzle is that some matter is supposed to persist through my generation.[48] J. Whiting (1992) rightly explains how we can solve this if we distinguish proximate matter—my organs—from distal matter—the elements or prime matter. In the familiar hierarchical picture of material substances' innards,[49] my various constituents can be distinguished by the degree of relevance to my activities as a human and how low-level or not they are in my overall organization. My eyes contribute their powers to my life in a very direct way, while the contribution of this or that cell to my activities is mediated by its contribution to the tissue it is a part of. My *proximate*

> The explanation can only be this: when Aristotle says 'potentiality' what he means is just 'matter'. …So to call it a potentiality is to imply that it is matter, and so far as one can see it is to imply nothing more. …Aristotle has put in the word 'potentially' because he so constantly associates matter and potentiality, and he wishes to emphasize that the body is the matter, and the soul the form, of this form-in-matter compound. (Bostock 1994, pp. 225–226)

Aristotle does sometimes use 'matter' not to mean the matter of this or that thing, i.e., matter relative to some parameter form or compound, but in an "absolute" way; then he seems to be taking for granted that the parameter is fixed to be living things (see, e.g., *Meta*.Λ.3.1070a19–21).

All this seems fine as far as it goes, but it does not solve the central puzzle of the passage. On Bostock's reading of the beginning of the chapter, the point is that parts of animals are not substances. (And note that in neither the passage nor in Bostock's commentary is the possibility salient that they belong to some other category.) For Bostock, Aristotle infers from the fact that parts will exist only as matter when separated from the living thing that they are not substances. As Bostock puts it, "this inference is puzzling" (224); and it is not improved by insisting that by saying parts are in potentiality Aristotle means that they are matter.

Furthermore, it seems likely that Aristotle intends there to be some *contrast* between the parts as matter and the parts when they are incorporated into a whole. For he says that they do not exist having been separated; but, when they are separated, they are matter (1040b6–8). On Bostock's interpretation this is puzzling: they are matter in the absolute sense mentioned above in both cases; and we have seen many reasons to think that they do exist when incorporated. My interpretation makes sense of it: organic parts are not in activity when incorporated, and when separated they are not *per se*, but have turned into mere matter, no longer unified by their function.

[47]That proximate organic parts are as such contemporaneous with what they are matter for is not a one-off claim by Aristotle; for other relevant passages see *DA*.B.412b10–22, *PA*.A.1.640b30–641a7, *Mete*.Δ.12.389b29–390b2, *GA*.B.1.734b24–26, and *Pol*.A.2.19–25. For discussion see Ackrill (1972, pp. 125–128), J. Whiting (1992, p. 77), and F. Lewis (1994, pp. 250–3).

[48]There is a wide consensus, with which I agree, that matter persists through generations. E.g., see Waterlow (1982a), Code (2003), Code (1976b), Gill (1991), and Bostock (2006a). However there is a minority that thinks otherwise: see B. Jones (1974) and Charlton (1992), and perhaps Bogen (1995).

[49]A nice, concise treatment of this is Bogen (1995, pp. 370–372).

matter is the matter closest to the whole, as it were, the organs that are most directly configured by my substantial form, while my *distal* matter is the matter that is itself organized into the more proximate matter.

If no matter persisted through my generation, it may have seemed that there just was no explanation in terms of the matter I came from that explained how a *living* thing came to be from it (the moral Burnyeat (1992b) draws). But by appeal to distal matter, we can see that Aristotle is perfectly capable of explaining how a living being is generated from and built up out of non-organic parts.

It seems to me that Whiting's solution to *that* aspect of Ackrill's puzzle, and Burnyeat's elaboration of the puzzle, just works. But the question about modality remains. On the PIP interpretation we seem to have that my organic parts are merely in potentiality and yet it is not possible for them to actually exist. They do not exist actually while plugged into the whole animal, and they cannot be made to actually exist by cutting them out, either; what is left? Unless the supporter of PIP can find another way organic parts could become actual, the interpretation seems stuck finding this passage a counterexample.

4.2.2.2 Teleological Being in Potentiality of Parts

Now obviously *I* think that Aristotle has it my organic parts do exist actually, and are not merely possible. Perhaps it's more plausible that *arbitrary* subsets of me are not actual objects according to him; but my parts are organized and unified by a function, not arbitrary subsets. I do not understand Aristotle's insistence that organic parts are δυνάμει as meaning that they are merely possible.

A more satisfactory reading of the doctrine can be obtained by working through what Gill and Bogen say. Take Gill (1991, p. 155):

> But it would be improper to call a box "wood" because the original materials do not survive as the actual subject to which the structure of the box belongs. Those materials have been transformed into the box, and only the properties of the original materials survive to characterize the higher object. Thus one properly calls a box "wood*en*" to indicate that the properties rather than the definite material survive in the higher product.

Gill seems to say that the wood does not survive,[50] but only contributes its properties to the box. Since the wood is no longer around, I guess the properties now must belong

[50]See also Gill (1991, pp. 8, 148, 241).

to the box (what else?): so Gill's account ends up saying that the matter perishes but passes on some of its character to the thing it composes. But this is to similar to the views discussed last section—as we have seen, the matter had better not perish when it becomes the matter for something, or it can't do the explanatory work Aristotle desires of it.

Furthermore, on this account we have trouble distinguishing having something as matter and merely having somehow similar properties to that thing, which, *a priori*, does not require having gone through a causal process involving working on wood. That is to say: we ought to be able to distinguish working up some matter into something else and replacing one thing with another which happens to share some of its properties.

Bogen (1995) has it that all it is for something to be present in potentiality in me is for me to possess those sorts of powers, but to a lesser degree than the thing by itself: "the presence by ability of an element in a compound consists of (nothing more than) the possession by the compound of the relevant non-maximal abilities" (379).[51] Thus, as he acknowledges, we have no grounds to say that the fire that someone is destroyed into is numerically the same as what they are created out of (383). (As he puts it, he is a "non-realist" about merely potential components; 386, 388.)[52]

As noted, for Aristotle as on common sense, the power to see is present in a person because the organ is there, and because it interacts with the other organs in the correct way. Explaining the presence of the parts in terms of *only* the fact that the whole has a certain power threatens to make nonsense of the enterprise of giving explanations of the whole person's abilities in terms of their organs.[53]

[51]Here Bogen is speaking specifically of elements in a mixture, not parts like eyes and flesh; but I am not sure on what grounds he hopes to deny that the same thoughts apply to eyes and flesh.

(Caston: "Because they are not mixtures." Yes, obviously that is where Bogen would like to draw the line. But is there to be a reason that this distinction is relevant? If not, it seems to me either Bogen is incorrect in his denial, or he has failed to make explicit the reason this distinction is relevant—in the latter case the denial is unjustified even if correct—or we can convict Aristotle of drawing distinctions with unjustified and arbitrary payoffs. I don't think the last is likely. Thus I conclude the denial is false or unjustified. Furthermore I don't see what relevance could be supplied on Bogen's view, so I cannot even help him out.)

[52]Bogen's interpretation of Aristotle thus seems to clash with the usual reading of *Phys*.A.8 as requiring a material substrate (which, presumably, really exists) to persist through generation. There, I have already suggested, the idea is that such a substrate is needed to distinguish the generation of one thing out of another from sheer replacement. There is a corresponding concern about mixture versus replacement (cf. Code 1995, pp. 406–7, 416). Bogen suggests that Gill has shown us how to do without the prime matter (374). He then says that this means that the material substrate need not persist in general in the created object; thus the claim that the elements are present in potentiality is empirically motivated. I say rather: if he is right that Gill's account does away in general with the requirement of a material substrate, then A.8 gives us strong textual reason to think Gill's account is exegetically incorrect as an interpretation of Aristotle's settled and complete view. Note that Gill herself clearly does think that A.8 has it that a material substrate must persist.

[53]Consider a person who eats a (living) eye. (If you insist that, for Aristotle, this cannot happen because

Gill and Bogen are wrong to try to explain how my organic parts aren't really there, but they are right to focus on the abilities that my parts contribute to me as a whole. The sense in which my eye is in potentiality, I propose, has nothing to do with whether you can or cannot bring it into actuality by plucking it from me.

My organic parts, by playing their functional roles as proximate matter, give rise to me, are jointly realized as me. They contribute abilities to the organization that is me. And it is that contribution which is their essence; their being is functional and in terms of how they contribute to the whole they make up.

By contrast arbitrary subsets of a whole material substance, as such, contribute no abilities; if they are in potentiality it is because they can be separated out. If they were active, it would have to be because that potentiality was being realized: and so the cut would have been made, and the subsets separated out. Parts are either like the half line in the whole, in which case they can be separated out, and are in potentiality but not in actuality; or they cannot be separated out, in which case they are in potentiality as my organic parts. So either way the parts of a substance are in potentiality.

Here it is perhaps deceptive to translate δυνάμει with the customary 'in potentiality' (cf. Anagnostopoulos (2011, p. 404) and Beere (2010, pp. 26–27).). These parts are present in power, powerfully, since their unity is through the contribution of their powers to the whole organism.

Compare *De Anima* B.5, where we are told that the sense faculty is δυνάμει and not ἐνεργείᾳ (417a7–8). There is no hint that this has to do with ability to separate out the faculty (what would that even mean?). The justification for the claim is that were the faculty in actuality it would sense itself all the time. That is, Aristotle's point is that its very being is a power to be affected in a certain way. Their being is to be contrasted, not with actual objects as if they were merely *possibilia*, but with objects whose being and essence is independent and unified activity—the kind of activity that can lead to the object being sensed. Thus Aristotle is giving an explanation of how an organic part is less substantial than the whole it is part of, but not denying parts actual existence.

Although I cannot argue for it here, others have convincingly suggested that in

there are no plucked out living eyes, I respond that you are not imagining a grotesque enough situation.) On Bogen's view, if the person can see, then the eye is present in them in potentiality. If the person had their own eye gouged out as their stomach acid destroyed the other eye, then they would would no longer have an eye present in them in potentiality. But Bogen cannot explain why the gouging and not the dissolving is the cause of the lack of the power. For it is not the case, for his Aristotle, that the presence of the eye (in a healthy state) explains the power to see, such that its removal might explain the loss of that power. Even if he found some way to connect the whole person's power with the physical eyes at all, it is hard to see how he could connect it with the correct eye without talking about how there are two things, one of which has certain properties that the other lacks. (Similarly, what explains the difference between transplanting an organ and someone eating an organ, etc.)

Metaphysics Θ.6 Aristotle introduces a new sort of power, a power to *be* something.[54] If we accept this idea, we can go further with the previous paragraphs' observations. My organic parts don't just have any old powers: they have powers that are actually being configured now into a new being, since in an organized way they interact with each other homeostatically to give rise to me. They jointly have the power to *be* a human being. If the point is put this way, *of course* they must actually exist, for it is their actual activity which *is* me, which is a thing ἐνεργείᾳ. All this is just to attempt to explain why Aristotle identifies proximate matter and potentiality, and to try to explain Aristotle's remark that proximate matter and the form that informs it are one and the same (*Meta*.H.6, see esp. 1045b17–19).

At any rate, whatever it means to say that my eye is in potentiality, it cannot mean that it is, as such, a mere *possibile*, or that it is possible for it to actually exist. The price for rejecting this conclusion is to saddle Aristotle with some very surprising doctrines for, as far as I can tell, little compelling textual or theoretical reason. On the other hand, to claim that Aristotle's point is that my eye is a possible object without ruling out it's actual existence makes a mess of Z.16 if we interpret those words as PIP directs us. PIP does very badly with these passages in the latter part of *Metaphysics* Z about parts.

If this is right, not only do we have an argument against the coextensiveness of possibility and potentiality, but we have an indication that the potentiality concept is really about teleologically directed activity. That is the common thread that allows the sense tied to generation to be extended to the case of organic parts.

4.3 Conclusion

The thought that being in potentiality lines up with the content of corresponding powers is natural and common. But it fits together very poorly with PIP. The tight link between being in potentiality and the content of an actual power or ability is very plausible if we look across examples. But the idea that to be in potentiality is to be merely possible is not so confirmed. And the examples show what the problem is, show why this couldn't work. Powers are teleological: they aim at, are defined in terms of, and are metaphysically posterior to, their canonical results (*Meta*.Θ.8). But mere pseudo-processes, luck, destruction, and "heaps" of changes can result in new situations, situations that are thereby possible, even though the possible situation would not be the result of any particular power's teleologically governed activation.

Although possibility and potentiality come apart at various places, the alternate

[54]See footnote 12.

teleology-focused understanding of potentiality can still account for why there is overlap. Potentiality does have a link to possibility, through Aristotle's belief that what is possible is made so by what powers. I will defend and explore that claim in the next two chapters.

A loose end remains. One advantage given for PIP was its ability to explain the structure of *Metaphysics* Θ and Aristotle's own claims about that structure. What, if not possibility, is being introduced in *Metaphysics* Θ.6?

Here is a proposal. It is not quite the use of δυνάμει to mean being in potentiality that is the interesting innovation. Instead, the interesting innovation is meant to be that what is in potentiality includes not only new ways for existent substances to be but also new substances. That is, before we had that the boy can be potentially a man, the man potentially a general, the speaker potentially speaking, etc. The innovation is the idea that things can be *simpliciter* in potentiality: the house is in potentiality. The pair activity-potentiality, which finds its most intuitive home in the idea of an ability that can be inert or exercised, is extended to the idea that matter can by "doing" something constitute a new substance. What it does, the activity that it does to make the new thing, is the form.

On this reading, Θ.6 introduces a new kind of property, a new sort of potentiality, on analogy with the more familiar power for change. In introducing this new sort of potentiality, Aristotle is exploring the idea that being a substance has, in some important ways, a teleological structure similar to the structure of change. This, not the discovery of possibility, is the innovation of the latter part of Θ that can help with the puzzles of ZH.[55]

Defending these claims about power and substance would take us into a new topic, but I hope that is enough to indicate how the remarks in this chapter might fit into a larger story about Aristotle's metaphysics.

[55] I take the basic idea here to be very similar to if not the same as the main thesis of Anagnostopoulos (2011).

CHAPTER 5

The Foundation of Aristotelian Modality

5.1 Introduction

In this chapter I will argue that there is a tight link between powers and what is possible and necessary on Aristotle's view. In fact, powers ground Aristotelian modality. They are responsible for the possibility and necessity of states-of-affairs. If you like such ways of talking, you could say that powers (or the empowered objects) are the truthmakers for modal facts.[1] Powers are also the sources of changes.[2] Powers explain the nature and existence of actual changes. But they also explain possible changes: the fact that I could play the flute, even though I choose not to, is explained by the fact that I have a certain ability.

In this chapter I claim that Aristotle hopes to explain possibilities in general in such terms. Of situations that are possible but not actual, the explanation for why they are possible lies in actual powers. This is not a claim he explicitly makes, but the way he writes about the relationships between powers and possibilities suggests that he would accept such a doctrine.

Since powers explain and ground possible changes, they explain and ground the fact that certain situations that may result from their activations, even if those activations never actually take place. The power is responsible for the possibility of what exists in potentiality, whether it is a new substance altogether or only a newly qualified substance. But by considering how powers systematically interact with each other, we can see how it is reasonable to think that powers explain even possibilities that are not beings in potentiality. What can be reached by some change is in potentiality, but what

[1]So Bäck (1995, p. 90). I will not commit to any particular Aristotelian story about grounding in general, although in the next chapter I will spell out how to 'derive' a variety of modal propositions from powers.

[2]Changes are the activations of a power (*Phys*.Γ.1–3, esp. 1.201a9–16, 27–29, 201b4–5, 2.202b35–202a3, 202a7–9, 3.202a14–16, 202b25–29).

is reachable by some combination of changes is what is possible.[3]

This reading of Aristotelian possibility has been disputed. Commenting on *Meta*.Δ.12, Sir W.D. Ross suggests that possibility in the relevant sense is not meant to be so tightly connected to powers. C. Freeland (1986) embraces and expands on the idea.

I will begin the argument by laying out Ross' and Freeland's positions; they will serve as foils for my own position. We will then turn to a passage both authors rely on, *Meta*.Δ.12. Not only needn't the passage be read the way they suggest, but when we compare it to similar remarks in *Meta*.Θ.1, we find a more plausible interpretation is available. That is: the passage confirms that late Aristotle does distinguish the necessity and possibility of states of affairs (or propositions, or something of that sort) from both the powers of substances and the necessity or contingency of substances. That's a distinction I will be glad to find since I hope to show that Aristotle explains the former, the possibilities,[4] by appeal to the powers of substances.

I then turn to passages that suggest that powers do ground possibilities. I claim three relatively early texts already make this plausible: *De Interpretatione* 12–13, *Categories* 8, and *Physics* H (and, more broadly, Aristotle's mechanics across early texts). Jointly these passages make it very plausible that powers are meant by Aristotle to ground a wide array of metaphysical possibilities.

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[3]It's not a new idea that potentialities play a central explanatory role in Aristotle's modality. Manley (2012, p. 15) says that "the view that modality is grounded in the dispositions and powers of actual things has its source in Aristotle and Boethius." Pruss (2002) develops such a view (and then rejects it, sort of) under the label of Aristotelianism. Sir W.D. Ross says that, at least in the case of metaphysical or physical possibilities as opposed to logical possibilities, "the possibility is rooted in a real δύναμις" (Ross 1958, p. 245). (But see footnote 22 and the body at that location. Ross seems waver a bit as to his exact position in different places.) Witt (2003, p. 35) says that "Aristotle systematically connects what a substance can do, its powers, with what is possible for it." Menn (1994, p. 98) claims that what is possible (which he identifies with what is in potentiality) is what could come about were actual powers to be activated:

> For Aristotle, possibility is parasitic on actuality: *X* is possible, not because it is an eternally possible essence or an irreducible individual *possibile* (or an inhabitant of a separate possible world), but only through the actually existing powers of actually existing substances. *Possibilia* are not causally separated from actual things: the actual powers of actual substances cause the possible existence of *X*, as the exercise of these powers cause its actual existence.

Bäck (1995, p. 90) has it that it is "the actual existence of a substance that provides a truth-maker for the [modal] statement, be it a contingent or necessary one" (and this is a premise in an argument apparently meant to apply to modal statements generally). But the idea is more frequently simply asserted in passing than argued for. (Actually I know of no in-depth argument for the claim.)

[4]This way of putting it is a bit sloppy about just what is getting explained. If we think of the possibilities as propositions whose content is that something is possible, then powers explain their possibly being true. If we think of them as states-of-affairs, then powers explain their possibly obtaining. I won't be careful about the difference, since I hope to remain uncommitted anyway. While I think Aristotle works with something like propositions or states-of-affairs, I don't think he self-consciously develops the idea with much clarity, and I think it's far from obvious that we are forced to understand things one way or the other.

Perhaps the above texts still leave open that some facts about what is possible (and non-actual) are explained in some other way. But, I argue, *Meta*.Θ.3 shows that this is not right. There Aristotle argues that, were there to be no non-trivial capacities (if things were only capable of what they are actually doing), then there would be no change. So this is a concrete sense in which change is dependent on powers. Furthermore, in showing this he uses as a premise that if there were no non-trivial capabilities, then what is possible is only what is actual. This confirms that he thinks of the possible obtaining of non-actual situations as explained at least in part by the existence of (non-trivial) capabilities or powers.

5.2 The Competition

In *Meta*.Δ.12, a passage we will look at in some detail, Aristotle catalogs various senses of δύναμις: according to him the possible, τὸ δυνατόν, is not said in accordance with power (1019b34). According to Ross, Aristotle's point here is to distinguish a robust sort of possibility underwritten by a power from a merely logical sort of possibility.

Here is Ross on that passage:

> The difference between δυνατόν and ἐνδεχόμενον is, as Waitz (*Organon*, i. 376) says, that the former is opposed to ἐνεργοῦν, the latter to ὑπάρχον, or again that the former expresses real, the latter *logical possibility* or *the absence of self-contradiction*. But while ἐνδεχόμενον is never used in the former sense, δυνατόν is sometimes used in the latter. …In fact, τὸ ἐνδεχόμενον = τὸ δυνατὸν τὸ μὴ κατὰ δύναμιν (1019^b 34). (Ross 1958, p. 322) (my emphasis)[5]

The type of possibility to be contrasted with "real" possibility (or as Waitz puts it, "physical" possibility) is τὸ δυνατὸν τὸ μὴ κατὰ δύναμιν, possibility not in accordance with power. This is the sort of possibility Aristotle discusses it in the last part of Δ.12; apparently, the possibility of certain propositions or states-of-affairs as opposed to the capabilities of objects (see below). Thus, if Ross and Waitz are right, for Aristotle propositions stating something's possibility, in contrast to capability statements, merely capture logical possibility. In that case we will probably not expect them to be grounded in any robust sense in actual powers. Indeed the suggestion seems to be that Aristotle denies just this when he calls such possibility οὐ κατὰ δύναμιν.

[5]Compare the similar claims in C. Freeland (1986, pp. 84–85).

C. Freeland (1986) runs with and expands on this idea. She concedes that in various passages Aristotle moves fluidly between certain possibilities and powers and seems to act as if the former are explained by and entail the latter (84).

> We saw [in examining *De Interpretatione* 13] how readily he moved from considering senses of 'possible' (τὸ δυνατόν) to citing examples of natural capacities (δυνάμεις); and in other passages there are similar moves. …perhaps Aristotle means to propose a modal theory which licenses certain direct moves from possibility *de dicto* to possibility *de re*. Thus he might suppose that all possibility statements are 'really' ascriptions of capacities to substances, and are hence somehow grounded in claims about the natural capacities of things in our world. (C. Freeland 1986, p. 84)

But she thinks there is both textual and conceptual reason to think this is not meant as a general account of possibility. She points to the same passage as Ross. Further, she claims, Aristotle's definitions of possibility in terms of other modal concepts like impossibility or necessity (she directs us to compare *Prior Analytics* 32a18–20) show that Aristotle means to explain possibility in terms of a modal concept of 'compatibility' rather than in terms of powers:[6]

> If we accept this story, however, we will discover with some surprise that in his discussion of this topic in *Meta*. v 1 [clearly v 12 was meant], Aristotle denies that the possible (τὸ δυνατόν) is named or spoken of with reference to capacity (οὐ κατὰ δύναμιν—1019b34–35). Instead, in this chapter he defines possibility by reference to truth and necessity …Aristotle appears to invoke some intuitive idea of 'compatibility' with what is, must or will be the case; he presumes that necessary truth, in turn, is the subject of, and explicated by, scientific inquiry into things' natures or essences. (C. Freeland 1986, pp. 84–85)

She thinks this is wise on Aristotle's part, for while my possible walking may be simply explained by my ability to walk, the same sort of explanations will not be available in general. Many possibilities are not directly underwritten by powers:

[6]The idea that Aristotelian possibility relies on compatibility also appears to be in Waitz (1844a, p. 376). In section 6.9 in the next chapter, I discuss further the alleged distinction between metaphysical and logical possibility in Aristotle in general (i.e., without essential connection to *Metaphysics* Δ.12 or to the idea that such a contrast is one between capability facts and possibility in general facts.)

One might compare here the way that some contemporary metaphysicians might explain (not reduce) modality in general by relying on a primitive conception of consistency; see D. Lewis (1986, pp. 150–157) for exposition of a version of this approach in the context of linguistic ersatzism.

> …we will find no neat match between possibilities and Aristotelian capabilities more broadly construed. This is so because possibilities may concern quite complex conjunctions of natural objects, as well as merely chance events. In neither case should Aristotle seek to ground the possibility in some appropriate natural capacity, even though he writes in *D.I.* 12–13 as if this were an easy and natural thing to do. But while it may on the one hand be natural and helpful to say that the truth of the claim 'It is possible that fire heats' is somehow grounded in the fact that fire has a natural δύναμις for heating (cf. *D.I.* 13.22b29–39),[7] when we turn to sample statements involving conjunctions of substances, or merely chance events, matters are not so simple. (C. Freeland 1986, p. 85)

Freeland points out that Aristotle thinks it is possible for, say, a man to eat salty food, become thirsty, visit a well and get murdered (referring to his discussion of chance at *Meta*.E.3). But, she says, it is unlikely that Aristotle would ascribe to the man the complex power to eat food, get thirsty, go to the well, and be murdered (85).[8]

Freeland appears to be making two points. First, we should not think that Aristotle had a view where he licensed *directly* inferring from *de dicto* possibilities to a single corresponding *de re* possibility or a power. Certainly it seems correct that we cannot

[7] I briefly discuss *De Interpretatione* 12–13 in the Introduction, section 1.5.2.

[8] I agree that Aristotle would be unlikely to make such an ascription, and I hope the previous chapter convinced you that there are many examples of cases where something can happen to something despite no particular thing having a power for that event. But although I agree with Freeland's claim, I find her justification for it unconvincing. She rightly notes that in *Meta*.Θ.5, Aristotle tells us that the specification of a power "will specify certain circumstances in which *x*-ing *necessarily* occurs" (85). Of the sort of necessity at hand, she says,

> I suppose that it will be accounted for by some reference to a subject's essence or nature. In other words, Aristotle treats capacities in this chapter as necessary, albeit conditional or dispositional, features of their possessors. We can easily accommodate certain examples to this model, such as fire's natural δύναμις for heating. …To ascribe the requisite property to the murder victim …would stretch the crucial Aristotelian notion of 'nature' beyond the breaking point. (C. Freeland 1986, p. 86)

It seems reasonable enough to me to characterize the necessity at hand as natural. But it is an error to suppose that the capacities are necessary features of their possessors, conditional or otherwise. Aristotle's point is that, *given that I have such a capacity*, it is necessary that, if certain triggering conditions hold, then I act in a certain way (see next chapter, section 6.4). It does not follow that I necessarily have such a property, or that it must be a part of my essence or nature. Aristotle's examples of powers include properties that can be gained or lost, such as skills that can be forgotten, and indeed in the chapter Freeland is discussing Aristotle talks about acquiring powers by learning (*Meta*.Θ.5.1047b31–35). So although Freeland is right that the murdered man did not have a power to eat salty food, get thirsty …, it is not because that couldn't be a part of his nature. And in general it is mistaken to think that my powers are restricted to my natural and essential abilities, and thus that powers' explanatory force when it comes to possibility is restricted to possibility directly connected to essence.

infer such a power exists: Aristotle is simply not so generous in his ascriptions of powers. Likewise I know of no text that suggests that Aristotle thinks anything as strong as that all *de dicto* possibilities entail an exactly corresponding *de re* possibility, such that the possibility of a predicate applying to some thing means the thing has a power for that predicate.[9]

However, the jump from this to the second claim, that *de dicto* possibilities are not grounded in actual powers at all, is unjustified. For the first claim is compatible with the idea that the complex *de dicto* possibility that I build a house and walk to the market is explained by my possessing multiple powers—the power to build and the power to walk—despite the fact that I have no single power to built a house and walk (and while remaining completely silent about the logic of *de re* possibility ascriptions). Similarly, although the murdered man doesn't have the power to eat salty food and go to the well and get killed, he does have the power to eat, and the power to walk, and his murderers have powers to act in violent ways, all of which *together* may jointly work to explain the possibility.

In the next chapter I will try to give a kind of 'proof of concept' that shows that this objection is misplaced: it is not conceptually confused to think of *de dicto* possibility in this way. And I will try to give some textual evidence that Aristotle thought that powers can "work together" in the mentioned way. But in the remainder of this chapter I will focus on Aristotelian texts that give us some reason to think that Aristotle thought of powers as explaining possibilities in general.

5.3 *Metaphysics* Δ.12: Possibility Not Said in Accordance with Power

5.3.1 Introducing the Passage

To begin with, note that power is an explanatory principle or source in virtue of which we correctly say that something is capable. So far, this requires no commitment to possibilities as independent objects that are described or referred to in such statements. This sort of claim is a familiar Aristotelian way of speaking. Let us recall the aside at *Metaphysics*.Δ.12.1019a20–23:

> …καθ' ἣν γὰρ τὸ πάσχον πάσχει τι, ὁτὲ μὲν ἐὰν ὁτιοῦν, δυνατὸν αὐτό

[9]From the fact that it's possible a new house exists, it does not follow that there is a house which could exist (but doesn't yet); still less that there is a not yet existent house that has the power to exist. (This would be much stranger than claiming that there must be *something* which is possibly a house.)

> φαμεν εἶναι παθεῖν, ὁτὲ δ' οὐ κατὰ πᾶν πάθος ἀλλ' ἂν ἐπὶ τὸ βέλτιον.
>
> …for it is in virtue of it [i.e., that power], the one in virtue of which the patient undergoes something, that we say that it is capable of undergoing a change; sometimes should it undergo anything at all, other times not according to any effect but for the better.[10]

Here it appears that Aristotle means to explain the truth or appropriateness of certain utterances using modal language ('capable') by means of a certain kind of property, namely, powers. We don't yet have clear reference to things to be explained apart from utterances, say, to states of affairs or propositions—literally, Aristotle only tells us why we speak (φαμεν) the way we do. But it is probably not Aristotelian to cash out the claim that powers ground possibilities by insisting on talking only about the semantics of certain utterances and carefully refusing reification. We should expect to find reference to states of affairs or something of that sort.[11] And it seems we do find reference to "possibilities," τὰ δυνατά, which are spoken of not as if they are material objects like you and I but states of affairs or propositions.[12]

You might think that the above bit of chapter Δ.12 leaves some doubt about the generality of the modal claims intended. (After all, one of our central tasks is to figure out which modalities Aristotle is using where in Δ.12.) I translated δυνατὸν αὐτό φαμεν εἶναι παθεῖν as "that we say that it is able to undergo a change." That is, I took δυνατόν to refer to the object which is able, not to be merely indicating the operator 'it is possible

[10]This seems to be a special case of how, in general, qualities explain why we say that objects are qualified in corresponding ways (*Categories* 8.8b25).

[11]Robin Smith thought that making necessity modality primarily about statements or 'quasi-logical' states of affairs, as opposed to substances, is anachronistic (Bäck 1995, p. 103). And indeed it seems possible to me that propositions or even states of affairs are not a part of Aristotle's 'official' ontological and semantic picture. But all we need is that in practice, even in the late *Metaphysics* (i.e., well past the early *Organon*), Aristotle does use something like states of affairs or propositions in his analysis. In principle what I say is compatible with the idea that this use is ultimately to be explained away somehow (although the prospects for compatibility with a particular explaining away may well depend on the details.)

[12]When I claim that Aristotle uses or endorses such things, I do not mean that Aristotle thinks of them as beings in the sense of falling under a category. (Then we would face the problem of finding a category in which to put them.) But *Phys*.Γ.1.200b26–201a3 together with Γ 1–3 in general shows that Aristotle is happy to refer to things while supposing that they are not in any category. For although at Γ.1 he says that change does not fall under a category, throughout those three chapters he does not hesitate to quantify over changes, to define them, and to write of them there as external, mind-independent, objective things. In short, facially, he is committed to the existence of changes at the same time as he insists that they are not beings in a category. (In other texts Aristotle does say or suggest that change is in a category (see *Meta*.Z.4.1029b22–25, I.2.1054a4–6, Λ.1.1069a21–22, Λ.5.1071a1–2). But that doesn't change the fact that he is comfortable with their both not being in a category and being real, mind-independent, etc., in *Physics* Γ.)

that.'[13] So we will have to confront the worry that Aristotle is only talking about some rather limited subset of modal claims, capability claims. When we look further down in the chapter we will see that Aristotle does understand the difference between ascriptions of capability and statements of possibility. And perhaps there is even an indication that Aristotle means to contrast possibilities or possibility statements with statements of capability on the grounds that the former are not grounded in powers. Let us now look further down in Δ.12 to see that this is not the right way to read the passage.

> …τὰ δὲ ἄλλον τρόπον [scil. λέγεται from the preceding clause], οἷον δυνατόν τε καὶ ἀδύνατον, ἀδύνατον μὲν οὗ τὸ ἐναντίον ἐξ ἀνάγκης ἀληθές (οἷον τὸ τὴν διάμετρον σύμμετρον εἶναι ἀδύνατον ὅτι ψεῦδος τὸ τοιοῦτον οὗ τὸ ἐναντίον οὐ μόνον ἀληθὲς ἀλλὰ καὶ ἀνάγκη [ἀσύμμετρον εἶναι]· τὸ ἄρα σύμμετρον οὐ μόνον ψεῦδος ἀλλὰ καὶ ἐξ ἀνάγκης ψεῦδος)· τὸ δ' ἐναντίον τούτῳ, τὸ δυνατόν, ὅταν μὴ ἀναγκαῖον ᾖ τὸ ἐναντίον ψεῦδος εἶναι, οἷον τὸ καθῆσθαι ἄνθρωπον δυνατόν· οὐ γὰρ ἐξ ἀνάγκης τὸ μὴ καθῆσθαι ψεῦδος. τὸ μὲν οὖν δυνατὸν ἕνα μὲν τρόπον, ὥσπερ εἴρηται, τὸ μὴ ἐξ ἀνάγκης ψεῦδος σημαίνει, ἕνα δὲ τὸ ἀληθές [εἶναι], ἕνα δὲ τὸ ἐνδεχόμενον ἀληθὲς εἶναι. κατὰ μεταφορὰν δὲ ἡ ἐν γεωμετρίᾳ λέγεται δύναμις. ταῦτα μὲν οὖν τὰ δυνατὰ οὐ κατὰ δύναμιν· τὰ δὲ λεγόμενα κατὰ δύναμιν πάντα λέγεται πρὸς τὴν πρώτην [μίαν]· αὕτη δ' ἐστὶν ἀρχὴ μεταβολῆς ἐν ἄλλῳ ἢ ᾗ ἄλλο. (*Meta.*.Δ.12.1019b22–1020a6)

> …but other things are said to be so, that is, possible and impossible, in another sense. The impossible is that which is the opposite of something true of necessity. For example, that the diagonal is commensurable is impossible, since such a thing is false and its opposite is not only true but necessary: thus it being commensurable is not only false but also false from necessity. The opposite of this, the possible, is whenever the opposite is not necessarily false.[14]

[13]For this kind of use, see the second entry for the δυνατέω in Henry George Liddell and H. S. Jones (1996, p. 453).

[14]So the text! This definition secures only that the possible is not necessary; in order to also have that the possible does not include the impossible, we must take it as implicitly part of the definition that the possible is the opposite of the impossible (see Kirwan (1993, p. 159)). But then this line is in conflict with the definition further down, which does not rule out that the possible be necessary. (Aristotle uses both ways of speaking about possibility.)

Alternatively, we may think that Aristotle made an error in writing "the opposite" one too many times: he should have just written that the possible is that which is not necessarily false. Then these lines are no longer in conflict with the more familiar parsing further down: It is possible that *p* indicates that it is not

> For example, the man is able to sit: for that he does not sit is not false out of necessity. In one way, then, as was said, the possible indicates that which is not necessarily false; in another way, what is true; and in another, what admits of being true.[15]
>
> And it is by transference of meaning that power is said in geometry.[16]
>
> These, then, are possibilities not in accordance with power. But the things spoken of before are all said in accordance with power, in reference to the primary [power]. And this is the source of change in another or insofar as it is other.

We wish to note four things from this lengthy passage.

5.3.2 Possibilities, Not Capable Things

First, as mentioned, here Aristotle clearly has in mind possibilities, possible propositions, or something of this sort. Part of the movement to "another sense" of speaking of potentiality is talking of possibilities; before he described capabilities of objects and objects as capable of this or that.

Now, such a change is not guaranteed by Aristotle's word choice alone. Aristotle writes of what is δυνατόν τε καὶ ἀδύνατον. I have translated this as "possible and

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necessary that *p* is false (31–2). See Kirwan (1993, pp. 158–9) for discussion.

I proceed in the body of this text on the assumption that Aristotle (or a scribe) made a mistake and added an extra negation, which I find to be the more plausible account of the text—it is an easy enough mistake to make—but nothing I say should hang on that assumption.

[15]It is rather unclear what distinction this sentence means to draw. My suggestion is this: one sense of 'possibility' is possibility as the dual of necessity; another sense is where what is true *simpliciter*, possibly true, and necessarily true are the same, since it is what is true of eternal and changeless beings; and the last is what can be true or false, i.e., what is not necessarily true or false, which we might call "merely possible." The first and third senses are distinguished and discussed at *Prior Analytics* A.13 (see esp. 32a18–21) and throughout *De Interpretatione* 12–13.

From our perspective, it may seem strange to regard the second sense as another sense of the word, rather than as the application of the first sense. If something is possible in the second sense then it is necessarily true: but then does not already the first sense of 'possible,' not necessarily false, apply to it?

But Aristotle does distinguish this as another sense: as we will see in a moment, in *Meta*.Θ.1, and also in *De Interpretatione* A.13.23a6–21. It is perhaps helpful to keep in mind that necessary propositions for Aristotle are about a domain of things distinct from the changeable material objects around us. (That is, absolutely necessary propositions—see section 6.9 in the next chapter.) From the perspective of the language users the meanings may seem the same; but if distinct genuine kinds are picked out, with an externalist enough interpretation of meaning (or rather, of whatever σημαίνει corresponds to), the word may yet have different senses.

On the interpretation I will develop what it *amounts to* to say that something is possible is different in the cases of what is eternal and changeless and what is mutable and sublunary: in the latter but not the former case, those attributions hold in virtue of powers.

[16]This usage parallels how we speak of the "powers" of numbers.

impossible." It need not mean that: δυνατόν can refer to an object which is capable (then we could translate with "capable thing.") But it can also mean, essentially, "it is possible that."

The context demands that we must read Aristotle as talking about possibilities, not capable things. Aristotle says that these things have opposites, and it appears he means their contradictories, i.e., their negations. And he speaks of the truth and falsity of these things. But material things, be they capable or not, do not have negations and truth values; they are the wrong sort of thing for that. Statements have negations. Propositions have negations. Perhaps, in some sense, states of affairs do too. But tables and dry goods do not.[17] Similarly, it makes little sense to suggest that what is *capable*

[17]Citing primarily *Meta*.Δ.29 and *Meta*.Θ.10, Crivelli (2004, pp. 45–62) argues at some length that, for Aristotle, states of affairs are bearers of truth and falsity. (Indeed he thinks they are the primary bearers (46).)

Two remarks on the possibility of true and false objects.

First: at *Meta*.Θ.10.1051b22–25, Aristotle does appear to acknowledge a sense in which 'incomposites' (apparently, bare objects?) are true or false, depending on whether we make 'contact' with them or are ignorant of them. This is somewhat anomalous and seems to conflict with Aristotle's usual doctrine (e.g., *Meta*.E.4; see Makin (2006, pp. 247–248) for discussion), but let us put that aside. Could this be a sense in which dry goods are true and false?

Whatever the case, this is not the sense of truth meant here in Δ.12. First, even if we grant that an object can be true in this sense, it is still hard to make sense of the idea that it can be the argument for propositional functions: what is the negation of a true incomposite object? But that is how Aristotle writes in the passage we are concerned with. Second, Aristotle's examples in Δ.12 are not examples of incomposites; one example, that of the diagonal being commensurable or not, is even repeated at Θ.10.1051b20–21 as an example of how a *composite* is true or false.

Second: while Aristotle's usage suggests that Aristotle thinks of states of affairs as what is true or false, perhaps this is in conflict with his apparent explicit commitment to what is combined being in the mind? (The best text for this claim is probably *Meta*.E.4; e.g., "falsehood and truth are not in objects, for example with the good thing being true and the bad thing being straightaway false, but in thought, but not in thought when it comes to simples and essences …connection and division are in thought, not in objects." οὐ γάρ ἐστι τὸ ψεῦδος καὶ τὸ ἀληθὲς ἐν τοῖς πράγμασιν, οἷον τὸ μὲν ἀγαθὸν ἀληθὲς τὸ δὲ κακὸν εὐθὺς ψεῦδος, ἀλλ΄ ἐν διανοίᾳ, περὶ δὲ τὰ ἁπλᾶ καὶ τὰ τί ἐστιν οὐδ΄ ἐν διανοίᾳ· …ἡ συμπλοκή ἐστιν καὶ ἡ διαίρεσις ἐν διανοίᾳ, ἀλλ΄ οὐκ ἐν τοῖς πράγμασι …(1027b25–7).)

But: I do not mean to be using the phrase 'states of affairs' to rule out that these are meant to be mind-dependent or constructed; that is compatible with their being objectively true or false and that truth or falsity being explained in terms of mind-independent objects and their capacities. (Perhaps, if this is the right interpretation, 'proposition' would be a better word to use than 'states of affairs.') I also don't mean to commit to the claim that Aristotle had a worked out and explicit theory of states of affairs. It is interesting enough if he in practice attempts to offer explanations for the truth of some modal states of affairs, even if his considered views when he turns from modal metaphysics to the philosophy of language and of mind are in tension with those attempts.

On another note, in conversation David Manley pointed out to me that while dry goods may not have negations, properties do have complements, and this does seem like a reasonable enough thing to mean by 'opposite.' That's true. And, this interpretation seems in harmony with Smith's suggestion, mentioned in footnote 11, that it is in the first place substances that are possible or necessary, not propositions or states of affairs.

However, even if we assume it makes sense to talk about truth and falsity of the possible and necessary on this idea, it remains difficult to read the passage this way throughout. Take Aristotle's claim at the

is what admits of truth (τὸ μὲν οὖν δυνατὸν ἕνα μὲν τρόπον …ἕνα δὲ τὸ ἐνδεχόμενον ἀληθὲς εἶναι).

Note, too, that Aristotle gives a definition of possibility as the dual of necessity that makes little sense for capacities. As Makin (2006, pp. xxv–xxvii) stresses, we can see this because it follows from the fact that someone actually does something that it is possible for them to do something, but it does not follow that they are able to do it.[18] However, if something is actually true, then it isn't necessarily false. If we took the definition to be of capacity, someone who actually acted in a certain way must have the capacity to do the thing as well, which is wrong. To put it another way: it makes good sense to conclude that something is possible from the fact that it is not necessarily false. But it is not right to infer that someone is able to do something from the fact that the event does not necessarily not occur. It is easier for some result to be possible than it is for someone to have the ability to bring it about.

Similarly, I add, from the fact that it is possible that something is true it follows that it entails no contradiction or impossibility (holding fixed the sort and strength of possibility meant); but this is far less clear if it is only the case that someone is capable of doing something. To put the point in a less logical tone: one can have the capacity to do something which is not (any longer) a real possibility. Perhaps the necessary materials have been exhausted, for example, though skilled artisans remain. Perhaps one has an ability but no longer has the time required to exercise it: a man has the ability to sit, though the arrow about to penetrate his throat means he won't get another chance to use the ability (Beere 2010, p. 50).

The very start of this passage makes it clear that Aristotle distinguishes this sense of δύναμις (and its cognates) from the previous senses. Now we can say at least one way in which this sense is different: it is about, not material objects, but states of affairs or propositions.

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beginning of the quote that the impossible is the opposite of what is true of necessity. We could perhaps take what is true of necessity to be the necessarily existing things, or the property of existing necessarily; but the complement of this should not be the property of impossibly existing or the impossible things (!) but the things that exist merely possibly. Of course this doesn't mean that Aristotle doesn't elsewhere acknowledge necessary entities or the property of being necessary—just that it doesn't seem most natural to read this passage in that way.

[18]As Aristotle indicates at *EN*.II.1.1103a31–b13 and at II.4.1105a17–b18; for one gains an art or virtue by practicing the activity, though one does not have the capacity yet. He says, "for it is possible to do something scholarly both from chance and with another making suggestions; thus you will know grammar, if you should do something scholarly and in the scholarly way, that is, in accordance with (κατά) the scholarly knowledge in yourself" (1105a22–26). *Contra* Witt (2003, p. 31), Aristotle's doctrine is that you can do something which is genuinely scholarly, though not oneself knowing the art.

5.3.3 Apparent Synonymy of ἐνδέχομαι and δύναμις Words

Second, Aristotle talks about this sense of δύναμις using two word families: he uses the verb ἐνδέχομαι and cognates of δύναμις indifferently. There does not appear to be in this passage any distinction intended between the two families of words.[19] Any purported distinction between logical and physical modality that attaches to the differential use of those two words should not rely on this passage, which at the least suggests that Aristotle is not consistent or careful about such a terminological distinction. So the Waitz-Ross claim that there is a distinction being drawn between logical and physical modality in *Metaphysics* Δ.12 should not put weight on the presence of these two terms.

5.3.4 Reification of Possibilities

Third, once δυνατόν is translated as "possible," then it appears that we must have Aristotle referring to possibilities. For he proceeds to use δυνατόν as a noun, not just as an operator, and it does not seem it could here mean 'capable object.'[20] This use is admittedly unusual, but there appears to be consensus that it was intended.[21]

5.3.5 The Meaning of Claiming That Possibilities Are Not Said with Reference to Powers

This brings us to the fourth point, and the one that requires the most sustained comment. We wish to read this passage as showing that Aristotle is aware of possibilities,

[19]So too Kirwan (1993, p. 160).

[20]At 1019b23 (which I translated "The impossible is that which is the opposite of something true of necessity.") "the impossible," ἀδυνατόν, seems to be a noun and not an operator. At lines 28 and 30–31 τὸ δυνατόν (note the definite article τὸ) is a noun again, "the possible." At the end of the passage ταῦτα …τὰ δυνατὰ must mean "these …are the possibilities …" or "these possibilities …." Notice that the reference is not to only the powers in geometry, since if Aristotle meant to pick out only those, he would have used δυνάμεις. (Kirwan (1993, p. 160): "'These things' are not, of course, squared numbers but 'possible' things.")

[21]Kirwan (1993), in both translation (47–48) and commentary (158–160) moves from writing "capacities" and "incapacities" to "the possible" and "the impossible." He (without comment) analyzes the passage in terms of propositions (158). Ross (1958, p. 322) says "…it is τὸ δυνατόν as the possible, not as the capable, that the first definition [i.e., the one at 30–32] defined …." We have already mentioned the reading of Makin (2006, p. xxv), who writes

> It is just this latter distinction that translators of Δ typically mark by switching from 'capacity' and cognates to 'possibility' and cognates. But, since Aristotle does not have such distinct terms available, he summarizes the contrast in a different, though perfectly clear, way at 1019 b 34–5: it is the contrast between what is *dunaton* in accordance with a *dunamis* and what is *dunaton* not in accordance with a *dunamis*.

See also C. Freeland (1986, pp. 84–85).

in contrast to the capacities of objects, and at least does not rule out that the former are grounded in the latter. The passage shows the first point clearly. But the passage can and has been read as denying that the possibilities under consideration are even connected to the capacities of objects.

5.3.5.1 Ross' Reading

Let us recall W.D. Ross' comment on this passage:[22]

> The difference between δυνατὸν and ἐνδεχόμενον is, as Waitz (*Organon*, i. 376) says, that the former is opposed to ἐνεργοῦν, the latter to ὑπάρχον, or again that the former expresses real, the latter *logical possibility* or *the absence of self-contradiction*. But while ἐνδεχόμενον is never used in the former sense, δυνατόν is sometimes used in the latter. …In fact, τὸ ἐνδεχόμενον = τὸ δυνατὸν τὸ μὴ κατὰ δύναμιν (1019^b 34). (Ross 1958, p. 322) (my emphasis)[23]

[22] However, commenting on *Meta*.Θ.3.1047a26, Ross says:

> Maier rightly points out (*Syll. d. Ar.* i. 194) that Waitz's distinction between δυνατὸν and ἐνδεχόμενον as indicating respectively physical and logical possibility is inconsistent with the objectivity of Aristotle's thought. Aristotle gives the same criterion of ἐνδεχόμενον in *An.Pr.* ^{a} 18, *Phys.* 243^a 1, as he here gives for the δυνατόν, and in such passages as *An. Pr.* 19^a 10, 13, 15, 21, *An. Post.* 74^b 38 the two words are used as synonyms. The only difference is that δυνατόν brings out more clearly than ἐνδεχόμενον that the possibility is rooted in a real δύναμις; the passages cited by Waitz as indicating a difference between the two notions (Θ. 1047^a 20, 1049^b 13, 1050^b 13, N. 1088f^b 19, *An. Pr.* 31^b 8, *De Caelo* 274^b 13, *G. A.* 736^b 7) imply no more difference than this. (Ross 1958, p. 245)

This quotation makes it seem much more as if Ross is in broad sympathy with my reading than quotations given earlier in this chapter. I am not sure how to interpret all of Ross' remarks together, and they seem to me to be in some internal tension. Since I have meant to take him as a foil for my own purposes, I have put less stress on those comments which seem more sympathetic to my view.

[23] As mentioned, C. Freeland (1986, pp. 84–85) has a similar reading. So too does Hintikka (1973c, p. 57), who says

> …in *Met*.Δ12. There the senses of possible (δυνατόν) that involve a δύναμις are said to refer back to the idea of 'a source of change in the same thing *qua* other' (cf. *Met*.Θ1.1046a11–12). They are contrasted to a sense in which the possible is equated with what is not necessarily false. The latter is obviously what has been called 'possibility proper', the former my 'contingency'.

By 'possibility proper' Hintikka means possibility that does not exclude necessity, whereas 'contingency' does exclude it (49). But see footnote 15: arguably, the second part of the chapter includes both types of possibility as subtypes of what is under discussion.

Hintikka thinks that contingency is connected with powers for change in a way that possibility proper is not (58), so he like Ross must see the second part of Δ.12 as breaking away to another kind of possibility not grounded in powers. However he does not think the second sense is 'logical' but 'statistical:' what is possible is what in fact happens at some point in time (59; compare Hintikka (1973b).)

Perhaps it is right that Aristotle, at least sometimes, contrasts ἐνδεχόμενον and δυνατόν as indicating logical possibility as opposed to metaphysical or physical possibility. (I will comment on possibility of this distinction in general in Aristotle in the next chapter.) But our question now is whether he uses, in this passage, the word ἐνδεχόμενον to mean possibility in the sense we are interested in, metaphysical possibility. If the answer is yes or easily could be yes, then we have less reason to read Aristotle as indicating that possibilities which go beyond straightforward capability ascription involve merely logical possibility.

To begin, notice that nothing in this particular passage makes it explicit that Aristotle means to contrast logical and physical possibility. That is a hypothesis based on how Aristotle elsewhere (perhaps) uses ἐνδεχόμαι and its cognates. It is not explicitly indicated in the passage under consideration. In this context, the hypothesis may be prompted by the logical or even linguistic flavor of the definitions Aristotle gives, as opposed to the physical nature of the capacities discussed earlier in the chapter. But the references to the opposites of claims (i.e., negations) does not indicate that logical possibility is what is meant. And the logical "flavor" of the passage counts for less than it may seem at first.

Here, *contra* Ross, Aristotle does *not* say that a state of affairs is possible if and only if its description contains no internal contradiction. Instead, he says that a state of affairs is possible if it is not false by necessity. But that leaves open what sort of necessity is required: for all the passage says on this point, he could mean that it must be not false by logical necessity, i.e., not a self-contradiction, as Ross and Waitz say he means; but he could also mean that it be not false by physical necessity. The question is just left open by what he says. Since the equivalencies hold for both logical possibility/necessity and metaphysical possibility/necessity as long as one keeps to a single disambiguation throughout, the equivalencies do not help us settle what kind of possibility is meant.

This characterization of possibility, while substantive, is not a full definition in the strict sense. It gives a relationship between what is possible and what is necessarily false, a relationship that constrains the kind of modality. But it does not use independent, non-modal terms, and it under-determines what kind of modality is intended. In order to give a characterization of possibility that is not equally applicable to logical, metaphysical, and epistemic modalities, something more must be said to constrain the extension further. For example, if Aristotle wanted to characterize epistemic modality, it'd be appropriate to add information about how the operators relate to evidence.

Of course this is not what we see in *Metaphysics* Δ; we see instead discussion of causal powers. So I suggest that the Aristotelian way to add a constraint to the definition in

terms of Duality[24] is to relate the claim that something is possible to the characters of potentialities that actually exist.[25]

Another point suggests that the contrast Aristotle means to draw here is not that between logical and metaphysical possibility. He takes no care to use examples of a particular sort. The example regarding the commensurability of a square's diagonal suggests he is thinking of something more like logical necessity—at any rate, that he is thinking about what is eternal and abstract rather than about the abilities of physical objects.[26] The example of it being possible that a man sit suggests otherwise, that he is thinking of metaphysical possibilities. If the point of this passage were to contrast metaphysical with logical modalities, the choice of examples is deceptive at best. I conclude that this was not the point.[27]

[24]I capitalize 'Duality' as the name of the particular principle stating that possibility is the dual of necessity, i.e., that what is possible is not necessarily not the case. I take that duality to be a characteristic and important feature of modal logics.

[25]C. Freeland (1986, pp. 85–86) claims that possibility is defined in terms of "some intuitive idea of 'compatibility,'" which in turn is to be understood in terms of necessities due to the natures and essences of things. It is easy to believe (provided one thinks that speaking of natures and essences makes sense in the first place) that there is a useful modality based on permitting only what essences do not rule out. But such a modality doesn't tell us everything that we (and Aristotle) take to be possible. It is possible that I stand, that I write a sentence in Greek, and that I learn to write a sentence in French; for someone else with the very same essence, these things may not be possible.

This doesn't rule this approach out: perhaps the "content" of the human essence includes many conditionals about what is possible for objects of our type across various circumstances. But then the statements of essences will have to contain complex conditionals of a sort which Aristotle gives no indication he thinks are parts of essences. Indeed the usual approach seems to go another way: the statement of the essence of human gives a relatively sparse indication of the core of being human, while inhering qualities, relations, etc., fill in the rest. On the other hand, we will see when we turn to *Metaphysics* Θ.5 that Aristotle thinks of such conditionals as the content of powers. So I think it is better to try to explain such an essence-based modality in terms of powers, rather than the other way around; I try to do this in the next chapter.

[26]To my mind is not particularly plausible that Aristotle clearly and consistently means to contrast metaphysical and logical possibility as we think of it, that is, in the light of developed study of logical consequence. More plausibly the distinction might be that between possibility as it has to do with change and being in the sublunary realm of physical objects and possibility in the realm of logic and mathematics. (Again, more in the next chapter in section 6.9.) In the latter realm we say that things are possible or impossible when they are or aren't in that way; that is, something's being a certain way is enough to guarantee that it is that way necessarily (*Meta*.Θ.1.1046a6–9). This appears to be why Aristotle puts these sorts of possibilities aside as irrelevant at the beginning of *Metaphysics* Θ.

[27]Note that we might think that at *De Interpretatione* 13.23a6–13, Aristotle does discuss possibility as it applies to eternal and changeless objects using a deceptive example, that of a man walking. But the distinction there is not quite one that separates the eternal from the changing, sublunary objects into mutually exclusive categories. It is rather that the first type of possibility, something's being possible because it is actual, applies in both the cases of the sublunary and the eternal, while the other way in which something can be possible (where it is not actual, but "under the right conditions" it would come to pass) only belongs to the sublunary things.

5.3.5.2 Possible States of Affairs vs. Capable Objects

What, then, *is* the intended contrast between what is and what isn't said in accordance with δύναμις? Here is a hypothesis which I think is at least as good, and hopefully avoids the problems raised above. The contrast meant is between possible and necessary states of affairs and objects-*qua*-able to do something, or be affected in some way, or naturally act in some way. In the latter case, our uses of δύναμις entail our commitment to the referent being connected in some intimate way to a δύναμις in the primary, active sense: a source of change in something else or in itself *qua* other. In that case, Aristotle tells us that we name powerful objects in a way that indicates that they have such an active power, or are able to be passively affected by an active power, or don't have a power of another sort, or have one in a certain way.[28] So, for example, when we ascribe being burnable to paper, the usage refers back to the active capacity of fire to burn it; the account of being burnable is given in terms of the capacity to burn.[29]

By contrast, possibilities in the sense of the Δ passage are not said by reference to this primary type of capacity. They do not bear to power in the primary sense, active power, the same sort of relation that the other non-active powers do. This is the meaning of Aristotle's remark that ταῦτα μὲν οὖν τὰ δυνατὰ οὐ κατὰ δύναμιν (Δ.12.1019b34–35), that these possibilities "are not in accordance with capacity." At least this means, as Ross notes about this sort of possibility, "ἐνδεχόμενον never implies, as δυνατόν sometimes does, the presence of a positive power to be or do the thing in question" (Ross 1958, p. 322): as we saw in the last chapter, there are possible states of affairs that may come about although there is no particular power that aims at it. By contrast a passive power does seem to imply that there is a type of active power that empowers an object to act on the object with the passive power. But this should not suggest that possibilities in this sense do not bear any close connection to capacities or potentialities of objects, or that they are merely logical.

[28] *Meta*.Δ.12.1020a1–4; the examples of such classes of powers run from 1019a15–1019b21. As with Θ's typology of powers, I see no particular reason to think Aristotle held the list to be definitely complete.

[29] Aristotle surely holds some version of this doctrine: see *Metaphysics* Θ.1.1046a9–16. I find the doctrine rather obscure. What is the sense in which the passive sense depends on the active? (The remark about definitions, referred to in the body above, gives us a start to understanding this; but it is hardly a full answer.) Why pick the capacity to affect another as the primary sense of capacity, instead of another? There is some discussion and attempted justification of this point at Beere (2010, pp. 64–66), but I do not find the defense compelling. The crux seems to be that the active power determines and controls the nature and existence of the change. But I do not see why we should think it does so any *more* than the passive power. Furthermore, it is hazy what such control has to do with how various types of capacities are defined. But the text leaves no doubt that Aristotle did believe the doctrine.

5.3.5.3 Comparison with *Metaphysics* Θ.1

At this point I want to turn to *Metaphysics* Θ.1. I hope to make it more plausible that my rather than Ross' is the correct reading of Δ.12's distinction between what is said in accordance with power and what is not. For in Θ.1 Aristotle uses similar language to draw a distinction between senses of δύναμις. I suggest that if we follow up on what is going on in Θ.1, we have a valuable clue for how to read that language in Δ.12.

In Θ.1, Aristotle again gives a typology of powers and the relation among them. Aristotle tells us there that capable objects have a special relationship with a potentiality in the primary sense, i.e., an active power. He signals this by saying that they are "related to the same type," πρὸς τὸ αὐτὸ εἶδος, and "spoken of in relation to one which is first, which is a source of change in another or insofar as it is other [i.e., active power]" καὶ πρὸς πρώτην μίαν λέγονται, ἥ ἐστιν ἀρχὴ μεταβολῆς ἐν ἄλλῳ ἢ ᾗ ἄλλο (*Meta*.Θ.1.1046a9–11). This locution closely mimics the language from Δ.12, where the contrast was drawn between what is spoken of "in accordance with power" in the primary sense and what is not. The relation was there indicated with both the prepositions κατά and, as here in Θ.3, πρός.[30] The language is similar enough to motivate the hypothesis that Θ.1 is explaining in more depth what was covered in Δ.12.[31]

In Θ.1 Aristotle explains what it is for a power to be said in relation to primary power:

> …ὅσαι δὲ πρὸς τὸ αὐτὸ εἶδος, πᾶσαι ἀρχαί τινές εἰσι, καὶ πρὸς πρώτην μίαν λέγονται, ἥ ἐστιν ἀρχὴ μεταβολῆς ἐν ἄλλῳ ἢ ᾗ ἄλλο. ἡ μὲν γὰρ τοῦ παθεῖν ἐστὶ δύναμις, ἡ ἐν αὐτῷ τῷ πάσχοντι ἀρχὴ μεταβολῆς παθητικῆς ὑπ' ἄλλου ἢ ᾗ ἄλλο [the typology continues] …πάλιν δ' αὗται δυνάμεις λέγονται ἢ τοῦ μόνον ποιῆσαι ἢ [τοῦ] παθεῖν ἢ τοῦ καλῶς, ὥστε καὶ ἐν τοῖς τούτων λόγοις ἐνυπάρχουσί πως οἱ τῶν προτέρων δυνάμεων λόγοι. (*Meta*.Θ.1.1046a9–19)
>
> …but whichever are related to the same type, they are all some sort of

[30]To recall the lines from Δ.12:

> These, then, are possibilities not in accordance with power. But the things spoken of before are all said in accordance with power, in reference to the primary [power]. And this is the source of change in another or insofar as it is other.
>
> ταῦτα μὲν οὖν τὰ δυνατὰ οὐ κατὰ δύναμιν [sc. λέγεται]· τὰ δὲ λεγόμενα κατὰ δύναμιν πάντα λέγεται πρὸς τὴν πρώτην [μίαν]· αὕτη δ' ἐστὶν ἀρχὴ μεταβολῆς ἐν ἄλλῳ ἢ ᾗ ἄλλο. (*Meta*..Δ.12.1019b34–1020a6)

[31]*Metaphysics* Δ is a sort of glossary of important terms in the Aristotelian system. It is a common pattern to see material in Δ gone over in greater detail elsewhere in the corpus.

> source, and they are spoken of as related to the one primary source, which is a source of change in another or insofar as it is other. For there is a power of being affected, a source in the thing which is being affected, which is a source of a passive change by another or insofar as it is other …again, these powers are spoken of so either because of acting only,[32] or being affected, or acting or being affected well, so that in their accounts there is, in some way, the accounts of the prior powers.

Here we have a first indication of why certain sorts of properties are grouped together: they contain the account of a power in the primary sense, an active source of change in another (or insofar as it is other). Unfortunately this, by itself, is not of much guidance without a sharper understanding of how definition works for Aristotle: *why* should it be that the power to be affected contains the definition of another power in its account? If we want to know whether or not the account of possibilities (or this or that possibility) contains such a definition, how are we to pursue an answer?

I don't find these easy questions to answer, so I'm glad that Aristotle goes on to say something else suggestive. The fact that correlative powers are inter-defined in this way is supposed to make it clear (φανερὸν οὖν ὅτι …, 1046a19) that they are in some way one and in some other way distinct (*Meta*.Θ.1.1046b19–22). This is not explained in depth here, but it seems plausibly to be a reference to the doctrine of *Physics*.Γ.3.[33]

In *Physics* Γ we are told that, in a change, the activity of the active cause and of the thing affected are in one sense one and in another sense distinct.[34] They are one in num-

[32]I take the μόνον to modify the action, not to mean that these exhaust the senses of δύναμις, both because of its placement and because other senses of δύναμις are mentioned even in this chapter (the power to resist destruction or change for the worse at *Meta*.Θ.1.1046a13–15), in *Meta*.Δ.12 (the power to do something with choice at 1019a23–24), and later in Θ (nature at 8.1049b8–10). More likely the intended contrast is between the simple case of a power to act and the more complex case of a power to be affected (etc.) whose account contains the account of the active power and more besides.

[33]Note that the concern in this passage with *where* the powers are (1046a22–28) matches the concern in *Physics* Γ.3 (e.g., 202a25–36, 202b5–8) with where the change is, i.e., in what it inheres.

[34]Throughout *Physics*.Γ.3, but see the opening lines 3.202a13–21:

> Καὶ τὸ ἀπορούμενον δὲ φανερόν, ὅτι ἐστὶν ἡ κίνησις ἐν τῷ κινητῷ· ἐντελέχεια γάρ ἐστι τούτου [καὶ] ὑπὸ τοῦ κινητικοῦ. καὶ ἡ τοῦ κινητικοῦ δὲ ἐνέργεια οὐκ ἄλλη ἐστίν· δεῖ μὲν γὰρ εἶναι ἐντελέχειαν ἀμφοῖν· κινητικὸν μὲν γάρ ἐστιν τῷ δύνασθαι, κινοῦν δὲ τῷ ἐνεργεῖν, ἀλλ' ἔστιν ἐνεργητικὸν τοῦ κινητοῦ, ὥστε ὁμοίως μία ἡ ἀμφοῖν ἐνέργεια ὥσπερ τὸ αὐτὸ διάστημα ἓν πρὸς δύο καὶ δύο πρὸς ἕν, καὶ τὸ ἄναντες καὶ τὸ κάταντες· ταῦτα γὰρ ἓν μέν ἐστιν, ὁ μέντοι λόγος οὐχ εἷς· ὁμοίως δὲ καὶ ἐπὶ τοῦ κινοῦντος καὶ κινουμένου.
>
> The solution of the puzzle is clear: the motion is in the movable thing. For the actuality is of it by the thing able to move it. And the activity of the thing able to move it is not different. For it must be that the actuality is in both. For the thing able to move it is so by being able, and it is a mover by actively moving it; but it is able to work actively on the

ber but distinct in account (as he puts it, "For they are one, but the account is not one."). Distinct activations make for distinct powers (in being) (*Metaphysics* Θ.2.1046b4–7,[35] *Physics* Γ.1.201a34–201b2), but they may still be, and in the case of the active and passive power are, one in number (Γ.3.202a36–202b10).

We can think of this as follows. The *Physics* shows us that for Aristotle there is a single process that occurs. That process involves distinct objects (the cause and the thing affected) with distinct explanatorily relevant clusters of properties, i.e., different ἀρχαί. Those are the active and passive powers. Similarly powers to be affected well, or to resist destruction or change for the worse, are each explanatory clusters of properties in processes of their own, and they are similarly related to a primary active power in that process. So there is a clear way in which such powers are related, as parts of a whole complex of properties that jointly explain how the change unfolds.[36]

The identity of the passive power depends on the identity of the active power, since the definition of the former contains the definition of the latter, and since what it is to have such a passive ability depends on what the implementation of the active ability amounts to.[37] Therefore there is a reasonable motivation for claiming that active and

> thing that is able to be moved. The consequence is that there is one activity in both alike, just like one to two and two to one is the same ratio, and like the ascent and the descent. For they are one, but the account is not one. It is similar with the mover and the moved.

[35]This is somewhat complicated by the fact that rational powers *are* for opposites. But they still correspond in one-to-one fashion to a single form or account (also suggested by Θ.7, (Makin 2006, p. 166)), and that form is what they are more strictly speaking for—Aristotle says that is the *per se* end (1046b13), though as Makin (2006, p. 54) notes there is "some hesitancy about the appropriateness of the terminology." The explanation is that in the case of rational powers knowing that single form allows you to reproduce the form (e.g., of health) but also to impede the good result (*Metaphysics* Θ.2.1046b7–15). Therefore the passage seems consistent with the claim that a single power has a single more proper (perhaps, *per se*) end.

A similar response should be given for Aristotle's claim in *Meta.*Θ.9.1051a4–17 that every power is for two ends: one end is privileged, the good end in the case where the power is good, the bad end in the case where the power is bad. I discuss the difficulties this chapter raises a bit in the introduction in section 1.5.3.1. But, in short, I think at worst it forces us to qualify the one-end one-power principle, not abandon it altogether.

[36]This is perhaps somewhat like the suggestion in Beere (2010, p. 38) that active and passive powers are for the same end, and so in some sense the same ability, but the abilities are had in different ways. Here we are trying to put some flesh on the bones of the claim about ways: the idea is that to be able to φ is to be part of the complex agent-patient whole whose joint activity is φ-ing. But an object can be a part of the whole in different ways, as agent or patient. (Compare: you can be part of a group as a leader or a follower: the difference is not intrinsic to being a part of the group, but is a difference in the thing you are doing that makes you a part.) On the other hand to be able to do something other than φ is not to be a part of the φ group in a new way, but to be a part of a different sort of thing, and so a different capacity in number from an ability to φ.

[37]Though if this is right the active power seems to depend on the passive power just as much: the idea is that the indivisible (except in being) unit of causal explanation is all the relevant sources taken together. As noted in footnote 29, this is not Aristotle's doctrine, but his denial of it may have been

passive powers are not wholly distinct entities: it is much the same as the intuition that two distinct material objects must each be able to exist whether or not the other does.

The interpretation gets support, too, from how Aristotle puts *aside* certain senses of δύναμις as irrelevant to the purpose of *Metaphysics* Θ. Those are the sense used in mathematics and the sense in which we say that things are possible and impossible because they are or are not that way (*Meta*.Θ.1.1046a6–9). At first glance this looks very similar to the distinction Aristotle made at and around *Meta*.Δ.12.1019b34[38]—for example the case of the mathematical sense of δύναμις is repeated—but it is not the same distinction. For in *Metaphysics* Δ.12 Aristotle distinguishes powers from possibilities in general, including possibilities involving changeable things (like his example of a man standing or sitting). But in Θ.1 he does not mean to put aside possibility in general; on the contrary, possibility comes up repeatedly through the book, and is related to powers in several places.[39]

What he puts aside is possibility regarding eternal things, i.e., cases where the truth of p is sufficient for its necessity and the falsity of p is sufficient for its necessary falsity. In these cases the relevant objects are not subject to change (or not subject to changes of the sort that might affect the truth of p.[40] It is natural to surmise that their immunity to change is the explanation for their relationship to necessity: once something of this kind is a certain way, the situation cannot be changed, so if p is true at some moment, it is fixed that way and hence not possibly going to change.[41] Anyway the important point is that these things do not involve sources for affecting or being affected, and that is why it is appropriate to put them aside in the context of *Metaphysics* Θ.[42]

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ill-advised anyway.

[38]Ross reads Schwegler as identifying the distinctions (Ross 1958, p. 241).

[39]See the end of section 4.2.1.1 for a list of several of them.

[40]See, e.g., *De Interpretatione* 13.23a6–13, *Meta*.Θ.8.1050b6–29.

[41]It was very common (but not universal) in Greek thought to think of propositions as changing their truth values over time, that is, to think of propositions as temporally indefinite and true or false at a time rather than true or false *simpliciter*. The contemporary standard approach to such temporally indefinite sentences is to think that as time passes the context shifts and so the sentence means different (temporally definite and eternally true or false) propositions as time passes (Hintikka 1973d, pp. 63–65; Gaskin 1995, pp. 3–4).

[42]Compare the treatment in Beere (2010):

> a line has a power [to produce a certain square] simply in virtue of its being a certain way; it is neither the agent nor the patient of any change in virtue of its power. The construction of a square on a line is not a change in the line. (Beere 2010, p. 40)

So far it sounds like Beere and I agree. But then:

> This claim is independent of the general thesis that the objects of geometry are not subject to change. Even someone who held that the objects of geometry are subject to change should agree with Aristotle that being a power [in the mathematical sense] is not a matter

Now, what do we learn from this about *Metaphysics* Δ.12? My proposal is that there Aristotle tells us that possibilities are not said in accordance with potentiality, not because they have no important relationship with potentiality, but because it is not the case that a state of affairs *has* a power, or a passive capacity to be affected by a power, etc. The state of affairs does not have a cluster of properties that is explantorily relevant for some process it causes—it does not have a source for change. This is just the way that mathematical objects do not have powers for change, and why they were put aside as irrelevant to the concerns of *Metaphysics* Θ.1.

This is compatible with possible states of affairs being made possible *because* of potentialities. Still, they don't *have* potentialities, and aren't themselves capable of affecting or being affected by other objects.

The case of speaking in accordance with power, can be understood along the lines of quality in general. We say correctly that Jim is warm in virtue of some quality that Jim has; so too, when we say that Jim has the ability to run, it is correctly said in virtue of some power he has. In some sense, our utterance mirrors or represents that such a power inheres in Jim. We might say correctly that it is possible for, say, a man to eat salty food, become thirsty, visit a well and get murdered. This does not represent or mirror and particular object holding a particular power. The man does not have some

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> of being changed, or of causing change, or even of being able to be changed or to cause change. (Beere 2010, p. 40)

On Beere's reading, when Aristotle sets aside mathematical powers the point is not about the metaphysics of mathematical objects in general, but only about a particular mathematical object. According to Beere Aristotle is targeting line segments whose squares are not whole square numbers (4, 9, 16 …) (Beere 2010, pp. 39–40).

First, on the claim of independence in itself: Beere is right that it could be that the objects of geometry are subject to change and also that there is a sense of power in which a line is a power but not a power for a change. (Or rather, it is not obvious why not—we don't have a clear enough principled way to rule out candidate senses of power.) But it could not be that the objects of geometry are not subject to change and that the sense of power in which a line is a power *is* for change. So they're simply not independent claims: entailment in one direction is enough to negate independence.

Second, it also seems unlikely that Aristotle thinks of the claims as independent. It is hard to see how, in Aristotle's system, objects of geometry could be subject to change without having powers of any sort. (I'll argue in section 5.5 that Aristotle does not think this could happen, on the basis of *Metaphysics* Θ.3.) In other passages Aristotle makes a similar distinction between what is possible in the case of changeable objects on the one hand and what is possible in the case of eternal things on the other. In the latter case actually being so-and-so is sufficient and necessary for being possible (*De Interpretatione* A.13.23a6–21; perhaps *Metaphysics* Δ.12.1019b.31–35, see footnote 15). In those passages it's dubious that Aristotle is thinking of exponents or a particular sort of line in mathematics: mathematics isn't mentioned in the *De Interpretatione* passage and it seems to be a separate case (treated next) in the *Meta*.Δ.12 passage.

So the independence claim is unlikely to capture how Aristotle is thinking of the matter, either. The straightforward reading is that Aristotle thinks that mathematical objects neither have powers for change nor are subject to change, and these are closely related facts. The important fault line he returns to repeatedly is that between what is eternal and what is changeable, and it is very plausible that this is at the forefront of his mind in *Metaphysics* Θ.1, too.

complex power to eat salty food, then get thirsty, then .... Nor does the statement hold by mirroring that the state of affairs of the man-eating-salty-food-then-getting-thirsty-then-...has some power (the power to be? to be, but only in potentiality?).

But all this is compatible with the statement nonetheless being true because there are a host of powers in the various objects mentioned. Compare: Jim's being warm holds in virtue of his having a certain quality. In some sense the truth of the statement can also be traced back to, say, the ratio of fire and air to water and earth in Jim's body. But this isn't what the statement is representing—it's not what the statement that Jim is warm is about. And so this is not relevant in the context of the *Categories*. In the language of the *Categories*, it's not in virtue of that ratio that Jim is said to be warm. (We might too say that the truth of the statement is in part true because Jim took a hot bath—but still that is not what the statement is said in virtue of.)

Note that even statements of possibility that appear to be limited and only about one object still very frequently [43] depend in their truth value on other objects. If I say that Jim is able to make a basket, that is (on Aristotle's picture) true just because Jim has a certain power. But if I say it is possible for Jim to make a basket, I am already bringing in other objects, although I may not have mentioned them. If this is to be true, not only must Jim have the power, but there must be appropriate materials out there so he can exercise the power, it must be that there is enough oxygen left in the world so that he can finish exercising the power before choking to death, it must be that there is no vengeful basket-hating God that will burn up the materials should Jim begin to work on them ....

If this is right, then the crucial thing is that Aristotle is talking about some new thing, propositions or states of affairs, which move beyond the character of one object and its power and into how multiple objects and powers interact. That is what these lines about possibilities not being said in accordance with power mean; we need not find, as Ross and Freeland do, Aristotle unrooting possibility from powers.[44]

[43]Not always: I would like to say that in a special case, the case where we think of possibility in its least restricted sense, the existence of a power is sufficient for the possibility of its realization. But the bulk of our thinking with possibility is not like this.

[44]I was gratified to find that this may be, too, the interpretation of Alexander of Aphrodisias, though the remarks are compressed to the point of difficultly. In introducing the passage we have been discussing Alexander says (translations are from Dooley and Alexander of Aprodisias (1989)):

> But other things [are called *adunata*] in a sense different from those that have been mentioned, for something is called *dunaton* and *adunaton* not only because of the presence or absence of a capacity but in other ways as well; and he discussed each of these. (394,13–14; bracketed comments are Dooley's)

Further on Alexander says

Unlike the attribution of capability (of whatever sort) to an object, the existence of a possibility does not have such a simple connection to any particular single active capacity: it does not, in general, entail the existence of any particular capacity, active or otherwise. A possibility may be tightly tied to some particular single process, but that is not always the case. It is possible that 50 people all link arms at once, and it is possible, I think, because of the powers of people. But there is not any single particular capacity or process that directly underlies that fact, and arguably not even any 50 particular capacities, since many groups of people would do. It would take many processes to make this possibility happen. These processes do not have to be unified into a coherent over-arching process (consider a case where the whole event took place by luck), so the possibility is not intrinsically connected to a single type of process the way that a power is.

I wish to raise another positive reason to read this passage my way, and not Ross'. In *Metaphysics* Θ, Aristotle gives a "test" for the impossibility of claims that is very similar to the definition he gives in Δ. (We will look at the test in more detail in the next chapter, see section 6.2.) In that passage, as we will see, Aristotle is thinking of metaphysical possibilities based on the capacities of objects, not logical or mathematical possibilities.

Before turning to the relatively late *Metaphysics* Θ, though, let us see how some earlier passages link powers and possibility.

5.4 Other Texts Linking Powers and Possibility

5.4.1 *De Interpretatione*

In *De Interpretatione* 12–13, Aristotle fluidly moves from the point that certain contingencies obtain—certain things are possible without also being necessary—to the existence of an object capable of doing that thing. The passages make it easy to suppose that for Aristotle, in at least in the cases of possibilities that describe what a sublunary substance could bring about, the explanation for the possibility is the ability that the substance has.

> These things are of course (he says) not called *dunata* (possible) because they have a capacity for something, for possibility [is expressed] in propositions. (3951–3)

On that last phrase Dooley adds a note:

> *en gar protasesi ta dunata*, lit. 'for the possibles are in propositions'. This is Alexander's gloss on Aristotle's statement, *tauta men oun dunata ou kata dunamin*, 'these things are not *dunata* by reference to a power'. (155)

Let us consider some examples. Here, Aristotle wants to convince us that the negation of 'it is possible for a man to walk' is not 'it is possible for a man to not walk' but 'it is not possible for a man to walk.'[45]

> Δοκεῖ δὲ τὸ αὐτὸ δύνασθαι καὶ εἶναι καὶ μὴ εἶναι· πᾶν γὰρ τὸ δυνατὸν τέμνεσθαι ἢ βαδίζειν καὶ μὴ βαδίζειν καὶ μὴ τέμνεσθαι δυνατόν. λόγος δέ, ὅτι ἅπαν τὸ οὕτω δυνατὸν οὐκ ἀεὶ ἐνεργεῖ, ὥστε ὑπάρξει αὐτῷ καὶ ἡ ἀπόφασις· δύναται γὰρ καὶ μὴ βαδίζειν τὸ βαδιστικὸν καὶ μὴ ὁρᾶσθαι τὸ ὁρατόν.
>
> Ἀλλὰ μὴν ἀδύνατον κατὰ τοῦ αὐτοῦ ἀληθεύεσθαι τὰς ἀντικειμένας φάσεις· οὐκ ἄρα τοῦ δυνατὸν εἶναι ἀπόφασίς ἐστι τὸ δυνατὸν μὴ εἶναι. συμβαίνει γὰρ ἐκ τούτων ἢ τὸ ἀυτὸ φάναι καὶ ἀποφάναι ἅμα καὶ κατὰ τοῦ αὐτοῦ, ἢ μὴ κατὰ τὸ εἶναι καὶ μὴ εἶναι τὰ προστιθέμενα γίνεσθαι φάσεις καὶ ἀποφάσεις. εἰ οὖν ἐκεῖνο ἀδύνατον, τοῦτ' ἂν εἴη αἱρετόν. (*De Interpretatione* 12.21b14–24)
>
> It seems the same thing is able to be and not to be. For everything that is capable of being cut or of walking is also capable of not walking and not being cut. The reason is that everything capable in this way is not always acting, so that the denial will also hold of it; for the thing capable of walking is also able to not walk and the thing seen able to be not seen.
>
> But it is not possible for affirmations of contradictories to be true about the same thing. Thus the negation of 'it is possible to be' is not 'it is possible to be not.' For it follows from these that either the same thing is affirmed and denied at the same time and about the same thing, or affirmations and negations do not come to be by adding 'to be' and 'to not be.' If the former is impossible, then the latter is to be chosen.

I understand the argument like this:

1. Either the negation of 'it is possible that *Fa*' is 'it is possible that ¬*Fa*' or 'it is not possible that *Fa*'
2. Something (indeed, many things) are capable of doing an action and of not doing it.

[45] As Ackrill (1963, p. 149) points out, the question seems trivial, but may be less obvious in Aristotle's cramped Greek. I would add that Aristotle's pressing δυνατὸν and cognates into double duty for 'capable' and 'possible' does not help.

3. If the negation were 'it is possible that $\neg Fa$,' then in such cases both the affirmation and the negation would be true.

4. So the negation is instead 'it is not possible that Fa'

If this is to be valid, we must supply a further thought: that (at least in some cases) if something is capable of doing something and of not doing it, then it is possible that the thing happen and possible that it not happen.

Indeed it seems that Aristotle supposes that for some reason the reader will be more ready to accept that there are such objects with such pairs of capabilities than they will be to accept that there in some cases both a proposition and its negation are possible; otherwise the detour through the capabilities of objects is otiose. Though Aristotle does not say so explicitly, it is therefore easy to think that the explanation for the statements of possibility is the capabilities: in "normal" circumstances, we think that if something is capable of acting a certain way, then that ability explains why certain things actually happening is possible.

Later in the chapter, Aristotle discusses the question of whether 'possible to be' is compatible with 'necessary to be.'[46] What is interesting for us is that he lingers over the possibility that something is necessary and possible. Apparently he thinks one might worry that when ϕ is possible, so is $\neg\phi$, which of course is not compatible with the necessity of ϕ.

> Ἀπορήσειε δ' ἄν τις εἰ τῷ ἀναγκαῖον εἶναι τὸ δυνατὸν εἶναι ἕπεται. …ἀλλὰ μὴν πάλιν τὸ αὐτὸ εἶναι δοκεῖ δυνατὸν τέμνεσθαι καὶ μὴ τέμνεσθαι καὶ εἶναι καὶ μὴ εἶναι, ὥστε ἔσται τὸ ἀναγκαῖον εἶναι ἐνδεχόμενον μὴ εἶναι· τοῦτο δὲ ψεῦδος. (*De Interpretatione* 13.22b29–36)
>
> Someone might be puzzled as to whether the possible follows what is necessary. …On the other hand, it seems the same thing is possibly cut and not cut, and possibly is some way and not, with the result that the necessary admits of not being that way; but that is false.

The reason this interests us is because to solve the puzzle, Aristotle says that some things have a capacity that is not "double-sided," that does not entail more than one possibility.

[46]In construing ἀκολουθήσει and ἕπεται as expressing compatibility rather than implication I follow Hintikka (1973c) (see esp. 44, 55). But I do not think my current argument depends on this: either way, Aristotle's argument proceeds by considering two cases in turn, one where something is necessary but not possible or possibly not, and one where something is necessary and possible.

> φανερὸν δὴ ὅτι οὐ πᾶν τὸ δυνατὸν ἢ εἶναι ἢ βαδίζειν καὶ τὰ ἀντικείμενα δύναται, ἀλλ' ἔστιν ἐφ' ὧν οὐκ ἀληθές, πρῶτον μὲν ἐπὶ τῶν μὴ κατὰ λόγον δυνατῶν, οἷον τὸ πῦρ θερμαντικὸν καὶ ἔχει δύναμιν ἄλογον. αἱ μὲν οὖν μετὰ λόγου δυνάμεις αἱ αὐταὶ πλειόνων καὶ τῶν ἐναντίων, αἱ δ' ἄλογοι οὐ πᾶσαι, ἀλλ' ὥσπερ εἴρηται, τὸ πῦρ οὐ δυνατὸν θερμαίνειν καὶ μή, οὐδ' ὅσα ἄλλα ἐνεργεῖ ἀεί. (*De Interpretatione* 13.22b27–23a3)
>
> It's clear that not everything able to be a certain way or walk is also able to be in the opposite way. In some cases this isn't true. First, some things are capable but not in virtue of reason: for example, fire is able to heat and has an arational power. The powers with reason are for multiple things and for opposites, but the arational powers are not all like that, but (as was said) fire is not able both to heat and not, and so too with the other things which are always acting.

For us, the crucial point is that Aristotle means to point out that some possibilities are one-sided, and unambiguously does so by pointing out that some things have certain sorts of powers (ἔχει δύναμιν ἄλογον). The aim of the passage, remember, is to show that some things are necessary and possible. We might have thought that this cannot happen since if ϕ is possible then so is $\neg\phi$. Not so (or not so on every sense of 'possible'), says Aristotle, because some things have powers that are always acting. We must supply: if it were possible for fire to not heat, then it would have to have a power for not heating. Since it doesn't, that's not possible. So the coherence of something's being necessary and possible is saved.

Clearly some tight connection is imagined between powers and possibilities here, since such a possibility requires a corresponding power. As before, it seems likely that Aristotle is moving from the less well understood, what is being inquired into, to the better understood thing that underlies and explains it.

Finally, according to Aristotle in this chapter, both δυνάμεις and δυνατὸν are homonymous (23a7–8).

> Ἔνιαι δὲ δυνάμεις ὁμώνυμοί εἰσιν. τὸ γὰρ δυνατὸν οὐχ ἁπλῶς λέγεται, ἀλλὰ τὸ μὲν ὅτι ἀληθὲς ὡς ἐνεργείᾳ ὄν, οἷον δυνατὸν βαδίζειν ὅτι βαδίζει, καὶ ὅλως δυνατὸν εἶναι ὅτι ἤδη ἔστι κατ' ἐνέργειαν ὃ λέγεται εἶναι δυνατόν, τὸ δὲ ὅτι ἐνεργήσειεν ἄν, οἷον δυνατὸν εἶναι βαδίζειν ὅτι βαδίσειεν ἄν. καὶ αὕτη μὲν ἐπὶ τοῖς κινητοῖς ἐστι μόνοις ἡ δύναμις, ἐκείνη δὲ καὶ ἐπὶ τοῖς ἀκινήτοις. (*De Interpretatione* 13.23a8–12)

> Some powers are homonymous. For being capable is not said simply. In one way it is said because something is true as a being in actuality, for example a thing capable of walking since it walks, and generally something capable of being some way since it is already in actuality as it is said to be capable. In another way it is said because something may be actualized, for example something is capable of walking since it may walk. And this latter power is in the movable things only, but the former is also in the unmoved things.

This passage is difficult to draw an upshot from, because Aristotle is not careful about the distinctions we care about. What is it that he is saying is ambiguous, and why is it ambiguous? Well, clearly at least powers are homonymous, from 23a8. But when Aristotle says that δυνατόν is homonymous, does he mean that possibility is ambiguous, or that capability statements are homonymous, or both?

The context of the passage is to determine whether certain sorts of modal statements entail or are compatible with other sorts. The movement of thought is as follows. We want to know if necessity implies possibility. The answer will be: in one sense of 'possibility' yes, and in another, no (23a17–19). (The word used here is τὸ δύνασθαι.) The reasoning is that in some cases the underlying power is one-sided and always on, and in those cases necessity and possibility are compossible. Further, in one sense of 'power,' the actuality of some activity (which of course follows from its necessity) implies the possession of the power; in that sense possibility follows necessity.

In some cases, we say that something is able (δυνατὸν) because (ὅτι) it is already doing that thing actually. In other cases, we say that something is capable because it might be actualized (τὸ δὲ ὅτι ἐνεργήσειεν ἄν, 23a8–12). This kind of capacity (ἄυτη …ἡ δύναμις) applies to movable things, while the the other sort applies to both movable and immovable things. A natural way to read this is that the distinction between two types of powers is the distinction between powers as I have used the word so far, a disposition-like object that underwrites the possibility corresponding to its activation, and a looser sense in which we are able to do whatever we do actually do.[47] This way of reading the passage makes sense of what it is doing here: the point is that the necessity of ϕ entails that the power exists and the possibility obtains in one sense of those words, but not the other; and that appears to be the point Aristotle comes back to at 23a15–18.[48]

[47]This way of reading the passage means that I may simultaneously have in two distinct senses the power to walk .

[48]"For the latter way of being capable, it is not true to say simply that it holds of the necessary; but it's true in the other case."

On this reading the distinction at 23a between different types of powers is introduced by Aristotle because, by its connection to corresponding possibilities, it can solve a logical question about the implications between necessity and possibility. At the least the power-possibility connection is that powers correspond to possibilities, and so the distinction in powers is grounds to believe in such a distinction in possibilities. But it is also reasonable to think that in addition the powers explain the possibilities.

Multiple problems beset us, though. First, the examples of possibilities given are all of a simple type: it is possible for some one subject to do some one thing. So Cynthia Freeland objects that, despite the ease with which Aristotle makes these inferences to the existence of powers from the obtaining of possibilities, it goes beyond the examples given to claim that he thinks *all* contingencies will have such explanations (C. Freeland 1986, pp. 84–86). In the case of complex possibilities—possibilities that do not obviously correspond to the ability of some single object—it may seem far less clear that there needs to be a power of any sort to underwrite the possibility.

Indeed a similar worry already comes up for the simplest powers. It may seem reasonable enough to think that, were it possible for fire to heat, fire's power must have among its ends heating. But for more complex powers it seems the power may be frustrated or masked. The possibility that air may stay close to the ground doesn't seem to need air to have a power to remain near the center of the universe. It may simply be that its power to move toward the margins of the universe interacts with the solidity of the ceiling in such a way that the air's power does not manifest its proper end.

One moral to draw is Freeland's, that not every possibility implies at least some power, though perhaps every possibility in some limited subset of possibilities does.

But I think as likely is the following: Aristotle is not blasé about complex possibilities because he thinks they behave in some importantly different way. Indeed it is just the opposite: he seems to think that compound propositions involve no interesting new issues, at least as far as possibility and necessity goes. For they are merely, as it were, heaps of simple propositions consisting of a subject and a predicate connected in some mode.[49]

[49]Simple statements assert or deny that a single property holds of a single thing; composite statements may be compounded from simple statements, presumably by linking them with words like 'and' and 'but' (*De Interpretatione* 5.17a20–23). Apparently a composite sentence is to be thought of a bunch of simple statements rather than as a single statement in the most proper sense (11.20b14–17). (Obviously this is not a very good idea once modal operators become involved and can scope over complexes in sentential, let alone first order, logic; but it is an understandable impulse.)

At any rate, clearly Aristotle's focus in *De Interpretatione* is on the simple statements. This may well be of a piece with Aristotle's belief that all deductions can be represented as series of syllogisms in simple statements (*APr*.A.23).

Aristotle is assuming that statements of possibilities in general will take the form of, or at least be equivalent to, simple predications between subjects and universals. Obviously we will not be likely to agree. But the point is that when we see a lack of inferences from complex possibilities to corresponding powers, it may be this that is responsible: the choice of examples should not be read as a deliberate or even tacit indication that the relation between possibilities and powers is constrained.

We would like to show that this is what is going on, and that Freeland is not right: the interaction between powers and possibilities extends to more complex possibilities. We ought to point to places where Aristotle explains that something is possible because of the interactions of the powers of the things involved. And we will do this, in two sections, in examining the *Physics*.

Second, we need to say something to make it plausible that the connection between powers and possibilities is metaphysically asymmetrical. Not only are there systematic correspondences between powers and possibilities such that we are licensed to make inferences about the existence of powers given the possibility of certain states-of-affairs and *vice versa*. Those correspondences are dependencies, and the existence of the powers explain that the state-of-affairs is possible. We will deal with this in the next section.

5.4.2 Direction of Explanation: *Categories*

A prominent strand of contemporary metaphysics seeks to reduce objects to the truth of certain claims. In the case of possession or existence of dispositions, in particular, the hope has been to analyze claims about the dispositions by pointing to some true conditional (or some set of true conditionals).[50] Aristotle also sees a tight connection between potentialities and conditionals.

Therefore we might wonder: could this not be what is going on with Aristotle? Perhaps he thinks that a power's existence or possession is wholly explained by the truth of certain modal claims about the object that has it. Or perhaps he thinks that claims about things' powers and modal claims involving those things are simply on a par, and neither is more fundamental or explanatory.

These may be tempting interpretations, especially if we think these are philosophically more plausible than thinking the power explains the truth of the ability claim or

[50]For a representative example, consider Lewis' attempt to analyze disposition ascriptions in D. Lewis (1997). His is not the first: the project goes back at least to Carnap's empiricist work Carnap (1928); see (1936–7). A short survey of past attempts can be found at Choi (2012). Less well-trodden ground is the attempt to explain what a disposition *is* in terms of modal conditionals true of an object: see Manley (2012).

of certain conditionals. But there is good reason to think that Aristotle does not hold either of these views.

First: consider *Categories* 8, the chapter on quality. Aristotle opens the chapter saying: "I mean by 'quality' that in virtue of which things are said to be so-and-so."[51] To lean on a conventional interpretation: Aristotle means that when some qualitative way of being is predicated of a primary substance, then there is some being, the quality, which inheres in the primary substance.[52] In general, it is the presence or inherence of that quality that explains why the substance is that way. The primary substance is said to be generous or sweet or whatever by paronymously deriving the name from the quality in the substance (*Cat.*1a12–15).[53]

Note that Aristotle uses causal language to describe this relationship. The pale man is said to be pale *from* (ἀπό, 10a30) the paleness in him. Honey is sweet *by* its having sweetness (τῷ γλυκύτητα δεδέχθαι, 9a33). And so on; such uses are common throughout the chapter. So too, the claim that qualities are those things "in virtue of which" (καθ' ἣν) things are said to be so-and-so. The suggestion is strong that in some sense the presence of the quality of paleness or bravery or whatever in Socrates explains that he is pale or brave.

That the relation is one of causation or dependence is further confirmed by looking at a particular instance of quality, that of virtue. Aristotle says that virtue is a quality (the quality from which a good man is good) at *Cat.*8.10b7–10. (Cf. also 8.8b26–29,

[51]Ποιότητα δὲ λέγω καθ' ἣν ποιοί τινες εἶναι λέγονται. Edghill translates not "things" but "people are said to be …." I guess this is because Aristotle uses the masculine plural ποιοί instead of the neuter plural. While this admittedly does suggest people rather than things, Aristotle's examples include unambiguously non-human things (*Cat.*9a33–35). Whatever the right translation is (should we correct or not what appears to be the ancient equivalent of a typo?), I think there is little reason to take Aristotle's considered opinion to be that qualities inhere only in people.

[52]It is surely not right to simply identify the class of qualities with the class of qualitative properties (Furth 1988, p. 14), but the rough characterization is good enough for our purposes.

[53]I agree with the interpretation of this passage put forward by Furth (1988, pp. 17–18):

> These items that inhere, being individuals, have names that are nominal in form, like "bravery" or "the particular pallor"; and it is from being-inhered-in by these items that the individual substances get *their* names, like "brave" or "pale", by way of a transformation that Aristotle calls *paronymy*: *brave*$_a$ is predicated-of Socrates (i.e. Socrates *is* brave$_a$ paronymously, from the *bravery*$_m$ that's *in* him, and grammatical$_a$ from the grammar$_n$ that's in his mind. …"Paronymy" …is also to be understood as a relationship between things not linguistic expressions ….

Cf. Ackrill (1963, p. 72):

> He [i.e., Aristotle] is claiming rather that 'brave' *means* 'having bravery'; the brave is so called because of ('from') the bravery he has.

(However I would not cast things as an issue of the meanings of words—usually Ackrill is anxious to persuade us this is not Aristotle's focus in the *Categories*).

Meta.Δ.14.1020b18–21.) It is clear that virtue is meant to explain what is happening when a person acts virtuously—not when they merely do a virtuous act, but do it virtuously. And this is just to say that virtue is the explanation of the person's being virtuous.

Just what is the dependence claimed? It is instructive to consider the example of virtue in some more detail, since Aristotle has a lot to say on this point. Aristotle hopes to explain a certain kind of human life, the happy or well-off life, in terms of the presence of certain objects and properties. Those include the virtues.[54] This is part of the meaning of Aristotle's oft-repeated dictum that "happiness is an activity of the soul because of (κατ' ἀρετήν) virtue."[55] Much as a change is an activity of the object in virtue of a certain capacity, so happiness is an activity of the human (or of the human soul) in virtue of virtue.

Aristotle is quite clear that the behavior of the non-virtuous may be virtuous in the weaker sense of matching or fitting virtuous behavior. Non-virtuous behavior may even, so to speak, look identical to virtuous behavior "from the outside." Aristotle relies on just this possibility when he explains how the non-virtuous come to possess virtue. An activity of the soul that is in accordance with virtue in this weaker sense is not enough for happiness. Consider *NE*.II.4.1105a23–35, where Aristotle is discussing how it is possible for the unjust to become just by doing just actions:[56]

> Isn't it so in the case of the arts? For it is possible to do something literate either by chance or being counseled by another. Thus he will be literate if he both does something literate and does it in a literate way: and this is to say, in accordance with the literacy he has in himself.[57]

Here Aristotle equates ("τοῦτο δ' ἐστὶ") someone's doing something "in virtue of the literacy he has in himself" with doing it "in the literate way." The context makes it clear that doing something "in the literate way" is in contrast to doing the literate thing by chance or by external guidance: to do the action in accordance with literacy, then,

[54]We will not decide here whether they are exhausted by the virtues.

[55]See, e.g., *Nicomachean Ethics* 1098a16–7, 1099b26, 1102a5–6, and many other places in that work besides.

[56]Incidentally, Aristotle discusses the corresponding problem of acquiring an ability in a case unambiguously concerning capacities, at *Metaphysics* Θ.8.1049b29–1050a2. The solution there is different, though.

[57]ἢ οὐδ' ἐπὶ τῶν τεχνῶν οὕτως ἔχει; ἐνδέχεται γὰρ γραμματικόν τι ποιῆσαι καὶ ἀπὸ τύχης καὶ ἄλλου ὑποθεμένου. τότε οὖν ἔσται γραμματικός, ἐὰν καὶ γραμματικόν τι ποιήσῃ καὶ γραμματικῶς· τοῦτο δ΄ ἐστὶ τὸ κατὰ τὴν ἐν αὑτῷ γραμματικήν.

Aristotle's next line is "Furthermore (ἔτι), the case of the arts and the virtues are not the same." But in context it is clear that this sentence is referring forward to the difference he is about to introduce, not telling us that the quoted point about literacy does not apply to virtue. (Aristotle often starts a sentence with "ἔτι" to signal he is moving on to another piece of evidence or a new point.)

is to do the literate thing *in virtue of* one's own skill. So too, to live well is (in part) to do virtuous things *because of* one's own virtue.

In the *Categories*, virtue and its making a person virtuous is merely one more example of how a quality makes a substance qualified in the corresponding way. We would expect to have similar explanations in the other cases. If that is right, then it is in virtue of the possession of certain qualities, namely capacities, that a substance is in the state of being able to do this or that.

5.4.3 *Physics* and Aristotle's Mechanics

Aristotle explains the actual movement of objects in terms of the composition of forces on them.[58] I will argue that this is an example of what we wanted: the explanation of possible and actual changes (and resulting situations) in terms of the interactions of powers.

First, explaining a situation or a result in terms of the composition already means explaining it in terms of how several powers interact. As Drabkin (1938) repeatedly stresses, for Aristotle the fundamental unit of analysis is not a single force acting on a free body, but a mover exerting a force on a moved object in a resisting medium while experiencing friction (throughout, but see esp. 69, 75, 82).[59] It is a relatively concrete, non-idealized situation in which the powers of actual objects interact.

It is tempting to think that "interaction" is overselling what is happening here. Perhaps, for example, there are simply several forces exerted on an object, and the resulting motion is the sum of them or the resulting whole. Here we might look at one important statement of how forces interact:[60]

[58] I use 'force' to translate δύναμις, since it is a somewhat conventional translation; obviously it would be a mistake to conclude this is the same as force in Newtonian mechanics. As several authors have pointed out (Hussey 1993, pp. 188–189; Drabkin 1938, pp. 72–73), if the notion has any clean analog in modern mechanics, it is more likely to be momentum or work than force.

[59] We need not make a judgment on Drabkin's idea that this is the original sin in Aristotle's mechanics to grant the characterization.

[60] Several authors raise this part of *Physics* VII 5 as an important passage. According to Hussey (1993, p. 194), this is "the cornerstone of the ediface [of Aristotelian dynamics], much as is Newton's Second Law in Newtonian dynamics." In Carteron (1975, pp. 161–162) this is the first of six texts which together "form the essentials of what is sometimes called Aristotle's mechanics"; and similarly, in Drabkin (1938, p. 62) it is the first of four "typical examples" of "a law of proportionality connecting the force applied, the weight moved, and the time required for the force to move the weight a given distance." It seems to be a special case of what Duhem thought of as the basic principle in Peripatetic dynamics (Duhem 1914, pp. 192, 351).

There are many other passages which give examples or rules pertaining to the composition of forces and the composition of force and resistance. A long list of relevant passages are given at Hussey (1993, p. 187). Particularly relevant for our purposes are the passages under heading B, which are meant to give examples of mathematical laws of motion relating "the amount of interacting agents (in 'pow-

εἰ δὴ τὸ μὲν Α τὸ κινοῦν, τὸ δὲ Β τὸ κινούμενον, ὅσον δὲ κεκίνηται μῆκος τὸ Γ, ἐν ὅσῳ δέ, ὁ χρόνος, ἐφ' οὗ τὸ Δ, ἐν δὴ τῷ ἴσῳ χρόνῳ ἡ ἴση δύναμις ἡ ἐφ' οὗ τὸ Α τὸ ἥμισυ τοῦ Β διπλασίαν τῆς Γ κινήσει, τὴν δὲ τὸ Γ ἐν τῷ ἡμίσει τοῦ Δ· οὕτω γὰρ ἀνάλογον ἔσται.

…

εἰ δὴ τὸ Α τὴν τὸ Β κινεῖ ἐν τῷ Δ ὅσην ἡ τὸ Γ, τὸ ἥμισυ τοῦ Α τὸ ἐφ' ᾧ Ε τὴν τὸ Β οὐ κινήσει ἐν τῷ χρόνῳ ἐφ' ᾧ τὸ Δ οὐδ' ἕν τινι τοῦ Δ τι τῆς Γ ἀνάλογον πρὸς τὴν ὅλην τὴν Γ ὡς τὸ Α πρὸς τὸ Ε · ὅλως γὰρ εἰ ἔτυχεν οὐ κινήσει οὐδέν · οὐ γὰρ εἰ ἡ ὅλη ἰσχὺς τοσήνδε ἐκίνησεν, ἡ ἡμίσεια οὐ κινήσει οὔτε ποσὴν οὔτ' ἐν ὁποσῳοῦν · εἷς γὰρ ἂν κινοίη τὸ πλοῖον, εἴπερ ἥ τε τῶν νεωλκῶν τέμνεται ἰσχὺς εἰς τὸν ἀριθμὸν καὶ τὸ μῆκος ὃ μάντες ἐκίνησαν. (*Phys.*VII.5.249b30–250a19)

Say A is the mover, B the moved thing, C the distance moved, and D the time. Then in an equal time the same force A will move B twice C, and in half the time will move it C. For it will be proportional. [other cases where proportionality is preserved are given]

…

If A moves B a distance G in a time D, it will not follow that E, being half of A, will in the time D or in some part of it cause B to move a part of G proportional to the whole of G as A is to E. For it may turn out that it won't move it at all. For it is not the case that, if the whole power moved so much weight, then half of it will move either some particular weight or in some particular amount of time: for one man could move a ship, if the power of the ship-haulers and the length can be divided into that number which all together moved the ship.

The length of time a given quantity of force can move an object is a function of the amount of force and the weight of the object. But it is not a simple linear function, so that halving the amount of force or doubling the weight doubles the length of time. If such changes bring the force applied too low in comparison to the weight, there may be no movement at all. Obviously this does match our perceptions: when I push

ers' or 'strengths' or 'motions') and the result of the interaction." They are: *Physics* III.5.204b13–19, 205a1–7, VII.2.244a7–11; *De Caelo* I.4.271a22–30, II.1.284a24–26, II.10.291a32–b10, IV.5.312b7–14, IV.6.313b16–21; *De Generatione et Corruptione* I.10.328a23–b14, II.4.331a20–b36, II.7.334b20–30; *Meterologica* I.3.340a13–17, I.4.342a22–28; *De Motu Animalium* 3.699a32–b11, 4.699b14–26. Also see *Mechanica* 31, *Physics* IV.8.215a24–216a11, and *De Caelo* IV.6.

against a building, I do not seem to budge it even a tiny bit. The force is too small to even start it moving, to overcome the initial resistance.[61] In Aristotle's example, many men working together can move a heavy ship that one of them could not budge at all. Similarly, we might add, the group could move an object when they could not budge at all a much heavier object.

When ten men work together to move a ship, then, it is crucial that they are working together. It is not very plausible to think of the movement as a simple sum of ten smaller independent movement. Even in the case of simple additive interactions this seems implausible: an object suspended at rest is not at rest because it is both moving up and moving down simultaneously; an object that is not accelerating at all is not doing so because it is accelerating down and up to the same extent. In general an effect is not composed of "partial effects" due to the agents that interact to bring it about (see Cartwright (1984, pp. 54–73) for more discussion).

Anyway it is not particularly plausible as an interpretation of Aristotle. It reifies items which Aristotle uses casually but has no real place[62] for in his ontology—following Hussey (1993, p. 197), I will call them "virtual changes." These are the component forces which combine to determine how the larger object moves. On this interpretation such component forces may not move the object at all until they are combined with other actors.

Furthermore, the forces Aristotle uses in his mechanics are clearly meant to be the *expression* of powers in the sense of 'power' that has dominated the dissertation up to

[61]The idea that things at rest have an initial resistance that must be overcome before the force rises to a level sufficient to move the resting object is also expressed at *De Motu Animalium* 3.699a32–b10 and 4.699b14–17.

[62]No "real place"—Hussey (1993, p. 197) suggests Aristotle may have thought of them as a "useful fiction."

this discussion.[63] Now this is a problem for us, since it threatens to show that δύναμις in the mechanics is not really the same thing as the δύναμις we have been discussing; let us return to this in a moment.

It is a problem too for the idea that real component forces move objects by summing together. We would be positing on that idea that there is some expression of a power that is the ship not moving, when the forces sum to 0. But obviously this is *not* the expression of the power to move an object and it does not count as a change in the way change is defined in *Physics* Γ 1–3: it is not the activity, both active and passive, of the patient being affected and the agent affecting it. For no change is taking place, and no power is being activated: the power is a power to move, and nothing is moving—the agent is attempting to activate the power, but they are failing.

In a way this is really no new problem beside that of an object not moving because of multiple forces applied to it so as to "cancel out." It is as if the resting object's resistance may also be thought of as "canceling" the applied force (and indeed it is called a force at *MA* 3.699a32–33, 699b8).

But the example of the ship makes plausible it that Aristotle noticed the tension between the ways he uses δύναμις. For, as Carteron notes, it seems to be his point that the individual men's powers are not expressed until they work together, at which point they can do something new, which is not the expression of any one power alone.[64]

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[63]Hussey (1993, p. 188):

> 'Power' is the same word (in Greek) as 'potentiality' and it is clear that the 'power' exerted by the agent is thought of as the expression of its potentiality for bringing about change."

This is portrayed as a mistake by Carteron:

> Aristotle's mind oscillates, without reaching a decision, between force as a principle of movement and force as a quantity of energy corresponding to the power of the movement of a given mover" (168).

Later:

> …the confusion at the basis of his theory between the quantity of energy and the principle that causes motion is a confusion inherent in common sense. It definitely depends on the ambiguity of the word 'force.' (171)

I will suggest that, though at worst it may have been a confusion or an oversight, it was really a harmless one; and at best Aristotle may well have realized that it was a harmless way of speaking.

[64]

> …Aristotle has no intention of treating force as a continuous magnitude, with an effect, visible or invisible, corresponding to it by definition. In this passage [i.e., the lines about the ship], his intention is actually to deny the existence of these hidden movements by means of which the atomists maintained the universality of movement. …In order for a force to produce its effect on a *mobile* of this kind, it must go beyond a certain threshold, short of which it is as if it did not exist. An efficacious force is not divisible, then, into

In other words, despite the way it seems he sometimes treats δυνάμεις as if they were component vector forces, that is not what he really wants to say is going on.

All this may seem dreadfully confused, as if Aristotle wants to have things both ways. But I think there is a straightforward way to vindicate Aristotle's approach. We may understand talk of the composition and interaction of forces, of virtual motions, as a way of talking about how powers interact with one another.[65] To say that two virtual motions "cancel out" by pushing in opposing directions on one object is a way of seeing that in that situation, the powerful objects act so as to interfere with each other's successfully moving the object. So we have an explanation for what virtual motions are, where they are not the actual activations of powers but a way of thinking about how they interact.[66]

Talk of how the "virtual motions" interact is a kind of long way around talking how the powers themselves might stymie, mask, or support each others' activations in different circumstances. Ideally, if somewhat optimistically, this makes Aristotle's double use of δύναμις less a confusion than a natural extension of the usual, non-virtual motion way of talking of powers. Compare a fictionalist about numbers who talks about (what they take to be) fictional abstract quantities in order to think about real concrete quantities (groups of real objects); the one style of speaking grows out of the other as a way of getting around the deficiencies of trying to do everything with the more constrained domain.

The double use of δύναμις is portrayed by Carteron (1975, p. 171) as a confusion and a mistake. But the above shows how it need not be. The above at least gives us a way to understand what is going on so that the theory is not vitiated by the alleged confusion. But it is not implausible to my mind that this is how Aristotle understood himself, too. For Aristotle is characteristically alive to the difference between an inert power and its actively expressing itself.[67] It would therefore be surprising if he made a

> forces which are proportionally efficacious, but is an irreducible whole. (Carteron 1975, p. 168)

[65]Cf. Cartwright (1984, pp. 61–62).

[66]But notice that some of the information about the situation really depends on the details of the powers involved. Powers can frustrate each other by doing *something*, but interfering with each other to head of their proper expressions, or by inhibiting each other's actions altogether. You aren't in a position to tell until you know about how the powers interact. Probably this is part of the reason why for some physical processes we do proceed with analysis by using intermediary "virtual motions," while for others it obscures more than it helps.

[67]For Carteron, part of the problem is that Aristotle thinks of force as tied essentially to a substance: it is "like an emanation from the extended body" (Carteron 1975, p. 165). Similarly

> Thus the Aristotelian concept of force lacks an essential item which would have made it into a fruitful concept, comparable with our own. Force remains an emanation from

pervasive and consistent error on that very point at the basis of his own mechanics. It is more reasonable to suppose that, perhaps dimly, Aristotle thought that treating "virtual motions" was a roundabout way of talking about powers themselves.

If this interpretation of Aristotelian mechanics is correct, then Aristotle explains actual events—the motions of actual objects through resisting mediums—by appealing to how the powers of movers, moved objects, and media interact. Furthermore, he does so by invoking general mathematical laws. Such laws tell us not only how objects do in fact move, but how they must and would move. It is the fact that powers to move or resist motion behave in certain ways that explains why this or that actual event happens and why this other event cannot happen. The character of these powers explains not just how things do happen, but how they might or would happen.

However, this way of seeing Aristotle's mechanics does not show that he thinks of what is going on in modal terms. Perhaps he does not realize that his law-like generalities have anything to do with possibility. But it is still interesting to see a feature of the system, even if Aristotle did not consciously realize it is a feature of the system. Furthermore, when we see this in the light of other passages that do seem more aware of the power-possibility link, it is becomes more plausible that the relation in the mechanics is not wholly hidden to Aristotle.

We will next turn to *Metaphysics* Θ.3 and see that Aristotle thinks that, if there are not powers, then neither will actual change exist nor non-actual possibilities obtain.

First, that passage suggests that the powers explain or ground the non-actual possibilities.

Second, the passage suggests that actual changes and non-obtaining possibilities are in some sense very similar in their relation to powers. There is a straightforward hypothesis: inert powers explain non-actual possibilities' obtaining; when those powers activate, that explains the change that results in the possibility actually obtaining. Aris-

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> substances …it is consequently a substantial force, analogous to the opposing force whose necessity has been established, which plays the role of mass. (Carteron 1975, p. 167)

Such a view of force, where forces cannot be cut loose from a substance, seems necessary when force is seen as the expression or virtual expression of a substance's power. So even if we understand Aristotle as the body suggests, it seems we must understand Aristotle as committed to the impossibility of forces floating free of any substance.

So the situation is this: if Carteron is right that Aristotle confuses power and power's activation, that may give Aristotle a reason to hold the crucially mistaken view that forces must be tied to substances. If I am right, Aristotle may well not have been confused in that way. Nonetheless I think it unlikely at best that Aristotle would allow forces (or properties in general) that are "cut loose" from any substance, that inhere in nothing, in his considered metaphysics; if his mechanics commits him to that, then he is inconsistent. So I am inclined to think that Carteron is wrong about Aristotle's reasons for holding that forces are tied to substances, but right that Aristotle held it.

totle gives just that sort of conditional in *Metaphysics* Θ.5, and we will look at that in the next chapter, after Θ.3.

5.5 Powers and Possibilities in *Metaphysics* Θ.3

Aristotle appears to assume that non-trivial possibilities (i.e., the possibility of non-actual states-of-affairs) require the possession by actual objects of non-activated powers. Given what we have seen so far and since the test for possibility later in Θ.3 tells us that the existence of powers in certain situations is sufficient for such possibilities, it is natural to surmise that Aristotle holds this assumption because he imagines that such powers are what explain the non-trivial possibilities. Furthermore, it would seem there is no residue of non-trivial possible states-of-affairs the possibility of which can be explained some other way. Together with that actual states of affairs are explained by the actual activity of actual powers, the text supports the idea that powers explain not only the possibility of some states-of-affairs, but all possible states-of-affairs.

5.5.1 Aristotle Against the Megarians

Much of Θ.3 is occupied in arguing against the Megarian position and explaining why it is wrong. The Megarians claim that what is capable of doing something is capable of doing that thing when, and only when, it is actually doing it (*Meta*.Θ.3.1046b29–32).[68] The position is in terms of what actions things are able to do, not in terms of what is possible or impossible.[69]

Aristotle believes that this means that change is impossible. Regardless of the problems with his argument, he reveals his presuppositions regarding the connections between change, power, and possibility.

> ἔτι εἰ ἀδύνατον τὸ ἐστερημένον δυνάμεως, τὸ μὴ γιγνόμενον ἀδύνατον ἔσται γενέσθαι· τὸ δ' ἀδύνατον γενέσθαι ὁ λέγων ἢ εἶναι ἢ ἔσεσθαι

[68]We don't know what the Megarians' thought process was. As Calvert (1976) reconstructs it, the argument was meant to show that there is no change (Calvert makes much of the fact that the Megarians were influenced by Parmenides). But this mistakes the structure of the chapter: the Megarians' thesis is given at 1046b29–32 ("there are some who say, for example the Megarians ...."). The line Calvert points to, 1047a14, "as a result these speeches get rid of change and generation" is not the conclusion of the Megarian argument and part of the content of their view, but one of the unintuitive consequences of their view (ὥστε, "as a result"), and what Aristotle points out in the spirit of *reductio*.

[69]As Burnyeat et. al. (1984, pp. 61–63) point out, while this is the direction the example most naturally pushes, there is ambiguity in the thesis; and, in particular, there is some question about whether Aristotle is interpreting the thesis in a less charitable way than he ought.

> ψεύσεται…ὥστε οὗτοι οἱ λόγοι ἐξαιροῦσι καὶ κίνησιν καὶ γένεσιν. ἀεὶ γὰρ τό τε ἑστηκὸς ἑστήξεται καὶ τὸ καθήμενον καθεδεῖται · οὐ γὰρ ἀναστήσεται ἂν καθέζηται · ἀδύνατον γὰρ ἔσται ἀναστῆναι ὅ γε μὴ δύναται ἀναστῆναι. (*Meta*.Θ.3.1047a10–17)
>
> Again, if what is deprived of power is impossible, it will be impossible for what is not happening to happen; but someone who says, of what cannot happen that it either is or will be, says something false …so that these views do away with change and coming to be. For what is standing will always stand, and what is seated will always sit; for should it sit, it will not stand, since it is impossible for something not capable of getting up to get up.[70]

Aristotle assumes, without argument or consideration of another way of accounting for possibilities, that the possibility of someone standing requires that powers exist. For Aristotle, powers and (non-trivial) possibility are so intertwined that this isn't a premise he needs to defend.

We wished to show that Aristotle thinks that powers explain possibilities. Here we have that Aristotle thinks that the obtaining of non-trivial possibilities presupposes non-trivial powers. Admittedly this is not yet quite what we wanted: such a presupposition is not guaranteed to be a matter of the one thing explaining the other. But: we already have some evidence for this explanatory link, we don't have a better hypothesis for why Aristotle would make the presupposition, and we can tell a plausible story using Aristotelian commitments for why he would hold such a presupposition if he did think there was an explanatory link. In the circumstances it is a reasonable hypothesis for why Aristotle would hold that presupposition.

Aristotle's charge is that a person sitting will not have the power to stand, on the Megarian view, so it is impossible for them to stand. But then it is obviously false to say that they stand, or that they will stand; so the Megarians are committed to the idea that the person sitting is stuck that way. For Aristotle, because the Megarians deny the existence of non-trivial capabilities, they deny the obtaining of non-actual possibilities: and so, absurdly, they must deny too the existence of actual change.

[70]"Deprived of power," not, as in Makin's translation, "deprived of a power" (Makin 2006, p. 4). They who lack the power to stand may nonetheless possibly stand, if they are moved bodily to do so: but this still requires their passive powers to be moved in various ways. "Deprived of potentiality," as in Barnes (1984b, p. 1653), is better. The example further down (16–17) does home in on a particular power, the power to stand, but it is easy enough to read it as a simplification for the sake of the example. *Contra* Beere (2010, p. 114) and Witt (2003, p. 30), we should not read Aristotle as committed to the idea that it is impossible for what lacks the power to φ (now) to φ (now). As we've noted, Aristotle is clear-eyed that events are possible without there being a single object with the ability to bring it about, so, so it would be gratuitous to insist on an error here.

This is not a particularly promising line of attack. The Megarian ought to insist that Aristotle is oversimplifying by leaving out references to times at which the possibilities hold and at which they are realized.[71] While sitting, the Megarian should say, the person has the power to sit, and it is possible for them to sit; when they stand, they have the power to stand, and it is possible for them to stand. For his argument to work, Aristotle has to assume that if it is impossible for some person to stand at some moment when they are in fact sitting, it is also impossible for them to stand a moment later: "it will be impossible for what is not happening to happen." But the Megarian is committed only to the impossibility of standing for the in-fact sitting person *at that very moment*. So Aristotle misconstrues the resources of his opponent's position.

This is a natural way for Aristotle in particular to think of the situation, I claim, because of the way he thinks of powers' responsibility for change. He thinks that a possible situation is the result of standing at the end of a change that could happen, and he thinks that such changes, in general, require powers to explain them. The change must take some amount of time before the end state can be reached, some time during which the power is being activated—for changes are continuous and over time (*Phys.*Γ.1.200b16–17, Z.4.235a11–24). So the power must exist prior to the end state: the power to stand must exist before the thing is standing, *contra* the Megarian position, because it is the power that brings the thing from the state of not-standing into the state of standing.

Often the power is enough, as we will see in a moment when we look at the test for possibility, to show that it is possible at the time the power exists for the end state to obtain.

It is strongly suggested that my having a power to stand at time *t*, even if I am not standing at *t*, is what explains the fact that I could be standing. And it is very natural, given this overall metaphysical picture, to think that if all such powers were removed, nothing would be left to explain such possibilities and to allow for changes.

Of course the Megarian is not likely at all to buy into this line of thought, and has plenty of premises to contest. But Aristotle's whole way of proceeding in this chapter suggests he is ready to argue from Aristotelian assumptions (cf. 1046b33–1047a3) and isn't trying to convince a Megarian, but giving explanations *for Aristotelians* for why the Megarian position is wrong. (Still, I worry that Aristotelian assumptions about how changes produce and explain changes come perilously close to begging the question

[71] My reading of this passage is essentially an elaboration of the suggestion given at Burnyeat et. al. (1984, p. 66). See Burnyeat et. al. (1984, p. 59) for some treatment of the ambiguity of what the temporal indices indicate across various passages.

against the Megarian.)

As Calvert (1976) convincingly argues, the Megarians likely thought of themselves as paradox-mongers. It is not much help in stopping a paradox-monger to point out that the paradox has unintuitive consequences—that's what they like about it! But this is one of Aristotle's major strategies. So it is likely that Aristotle's aim was not to convince Megarians to abandon their position, but to persuade non-Megarians to stay that way—the cost of switching in terms of paradoxical consequences is too high—and to defuse the paradox and remove the threat—though that may well consist in *explaining* how the position could be false rather than *proving* from uncontested premises that it is false.[72]

5.6 Conclusion

In this chapter I have aimed to make it plausible, by looking at *Metaphysics* Δ.12 and Θ.3, that Aristotle thought of the obtaining of possibilities as explained by the existence of actual powers. In discussing *Metaphysics* Δ.12 we were primarily concerned to show on the one hand that Aristotle does distinguish possibilities from powers, so that it may be reasonable to suppose that for him the one explains the other; and to show on the other hand that the distinction is not so strong that possibility should be taken as being merely logical or as otherwise unrooted from the facts about actual physical existents. In discussing *Metaphysics* Θ.3 I hoped to show that Aristotle assumes that change relies on the obtaining of non-trivial possibilities and those possibilities rely on the existence of actual powers.

Next I will try to spell out further how such an explanation of non-trivial possibilities should go. In other words, I will try to show unfounded Freeland's complaint that there are complex possibilities which therefore cannot be grounded in the existence of powers. We will continue to look at *Metaphysics* Θ.3 and then at *Metaphysics* Θ.5, another passage where Aristotle connects the existence of powers to the truth of certain modal propositions.

[72]The reader might compare how contemporary epistemologists tend to deal with Cartesian skepticism—not with the hope of proving to the skeptics themselves that they must be wrong so much as with the goal of vindicating the appearance that we know about the external world.

CHAPTER 6

Getting Possibilities from Powers

6.1 Introduction

I hope to have shown in the prior chapter that, in some relatively abstract way, Aristotle thinks what is possible is explained by what powers exist.[1] In this chapter I will try to spell out the nature of that dependence more clearly. In this way I hope both simply to clarify what would otherwise remain an obscure gap in the account, but also to give a kind of proof of concept for this idea. I'll finish by discussing some of the consequences of a view of this sort. These consequences cohere well with other Aristotelian commitments, thus offering an indirect confirmation that we are on the right track.

This is the picture I see in late Aristotle on possibility. There exist some powers. If, by some series of activations, those powers may bring us into a situation, then that situation is possible. If there is no series of activations that get us to that situation, then it is not possible.[2]

The powers in that sequence may not *all* actually exist now. It is sufficient if there are powers now that could bring them into being in time for them to play the required role in the sequence. That is, a situation is possible if it is the result of a bunch of actual powers activating, or if it is the result of a bunch of powers in a possible situation activating.

Picturesquely, we can imagine possible situations laid out on a tree with the trunk at the current moment. To say a situation is possible is[3] quantificational in a similar way as the conventional account—but what is checked is not possible worlds discon-

[1]And, perhaps, have existed; we needn't settle this question now.

[2]For the moment I will leave open the question of what to do about states of affairs (if they can be called such) that are not of a type relevant to the above; we'll return to those below at section 6.8.1. E.g., states that do not obtain at a moment or a finite interval of time are not the right sort of state to be reached by a series of changes.

[3]Again, leaving aside "situations" that are not about any particular moment on the tree, e.g., that require quantifying over whole branches (see discussion of plenitude below).

nected from this one, but states of affairs on the tree. These states of affairs are potential evolutions of the current actual moment.

The construction can be given a metaphysically explanatory reading, especially given the contentions of the previous chapter, where the overall structure is meant to explain what makes those situations possible. On this way of seeing the situation the construction gives content to the claim that what is possible is, for Aristotle, grounded in what powers exist.

We can also see this construction as merely structuring a set of possible worlds, if we wish. The states of affairs can then be represented by possible worlds which represent a possibility that is identical with its sibling possibilities up to some moment of divergence. Then structuring the possible worlds this way encodes information that is usually swept into the context parameter in contemporary thought about possibilities. For example: the structure reveals a difference between worlds that are on the tree and so the kinds of possibilities that reasonably figure into practical deliberations, as opposed to worlds we might consider possible but not practically possible. Or: it is reasonable that given a tree, a situation reached through a series of changes is at least as "close" as a situation reached through a series of changes that extends the first series.[4] Similarly, if you are planning actions with the intention of bringing about some state, it is unreasonable all else equal to aim for a state of affairs on the tree that has that state when there is another state of affairs on the same branch and closer to the current moment that has that state. Obviously associating a "cost" to each transition gives us even more structure with which to think of "closeness" of states.

None of these latter applications require the metaphysical commitment that one representation is metaphysically prior—which shows that even if we cannot accept the Aristotelian claim about what grounds the possibility of certain states of affairs, there is much of interest in the view.

I start by discussing the "test" for what is possible in *Metaphysics* Θ.3. This test gives us another indication that possibilities are meant to depend on powers. But more than that, it gives us a more concrete picture of *what* that dependence consists in. I turn to a similar passage in *Metaphysics* Θ.5. These will allow us to get clearer on how to think about the "branching" that corresponds to given powers. I will then compare my account to related ideas found in the work of Allan Bäck and Sarah Waterlow—both with an eye to showing how our ideas are similar and noting places where we diverge. Finally, I will consider some consequences of the account. If I am right Aristotle should

[4]It would still be possible for a situation identical to the second one except for being produced a different way to be closer, of course.

not consider possible some of the things we do take as possible; and, I think, we find independent confirmation of this. I also consider Aristotle's notorious commitment to a principle of plenitude, whereby what is possible must happen at some point in time, and argue that this is explicable if we take Aristotle to be committed to a conception of modality that is a natural extension of the modality explained here.

6.2 The Test for Possibility

Aristotle's test for possibility at the end of *Meta*.Θ.3 gives us a concrete relation between powers and possibility. When saying what is possible, Aristotle finds the situations that powers open up as possibilities, by thinking about what would result if a causal power were to activate.

> ἔστι δὲ δυνατὸν τοῦτο ᾧ ἐὰν ὑπάρξῃ ἡ ἐνέργεια οὗ λέγεται ἔχειν τὴν δύναμιν, οὐθὲν ἔσται ἀδύνατον. λέγω δὲ οἷον, εἰ δυνατὸν καθῆσθαι καὶ ἐνδέχεται καθῆσθαι, τούτῳ ἐὰν ὑπάρξῃ τὸ καθῆσθαι, οὐδὲν ἔσται ἀδύνατον· καὶ εἰ κινηθῆναι ἢ κινῆσαι ἢ στῆναι ἢ στῆσαι ἢ εἶναι ἢ γίγνεσθαι ἢ μὴ εἶναι ἢ μὴ γίγνεσθαι, ὁμοίως. (*Meta*.Θ.3.1047a24–29)
>
> And this is what is possible (δυνατόν),[5] that for which, should the actuality of that which is said to have the power come about, nothing impossible will be the case. I mean, for example, if something can sit and it is possible to sit, then, if sitting happens for it, nothing impossible will be the case. And similarly if something can be moved, move, stand, make something stand, be, become, not be, or not become.

A rough first pass: if we want to see whether some proposition p is possible, we assume it is true. Then we see if anything impossible follows from it. If nothing impossible follows, then p is possible.[6]

[5]The test is one for possibility, not for capacity possession, despite the ambiguity in the Greek. For otherwise I would be capable of whatever, supposing I do it, would not produce an impossibility: and that is absurd, since there are many things it is possible I do (and so which do not produce an impossibility) without having the ability to do them, e.g., things I might do by luck or under the guidance of someone else. Indeed there are things I *actually* do of this sort, and surely nothing impossible follows from the fact I did them (cf. Makin 2006, p. 72).

[6]Notice that this follows, over reasonable assumptions, from the the usual interpretation of $\Box$ and $\Diamond$—a good reason to suspect the rough pass is not the end of the story.

I gloss the test as

$$\Diamond p \Leftrightarrow p \nvdash q$$

To do this, Aristotle imagines that we assume that some power is activated, and then see what follows. The proposition p to be tested is not *any* proposition, but the "actuality of that which is said to have the power." And it seems he doubles down when he explains himself ("I mean, for example …"): we see of something that *can* sit whether something impossible will be the case "if sitting happens for it"; if it is possible, no such impossibility will be the case.

It is plausible that if an object is capable of something, then it is possible, in the very widest sense of possibility, for that something to come about. It is strange to say that I can do something that could never, no matter what, actually happen.[7] But this

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where q is any impossible claim against some set of relevant possibilities Γ (i.e., $[\![q]\!] \cap \Gamma = \{\}$).

Left-to-right:

Since $\diamond p$ is possible (in some set of relevant possibilities Γ), then some point in Γ has p true. Therefore $\Gamma \cap [\![p]\!] \neq \{\}$. Since $p \Vdash q$ would require every point (in Γ) that satisfies p to satisfy q, and no point in Γ satisfies q, it cannot be that $p \Vdash q$.

Right-to-left:

Say $p \nVdash q$, where $q \cap \Gamma = \{\}$. Then $[\![p]\!] \neq \{\}$. So there is some world in $\Gamma \cap [\![p]\!]$ that satisfies p, which is to say, $\diamond p$.

The right-to-left direction of the test can also be approached without the semantic framework used above. Say p is impossible, i.e., that p is such that $\neg \diamond p$. Also $p \Vdash p$. So it is not the case that for every impossible q, $p \nVdash q$; in particular q set to p falsifies that claim. So $p \nVdash q$ for all impossible $q \Rightarrow \diamond p$; p entails no impossibility, and it entails itself, so it must be possible.

This line of thought does not rely in any essential way on the perhaps un-Aristotelian assumption that a proposition entails itself, as long as we can find *some* distinct proposition that is equivalent to the given proposition to be tested.

(For non-reflexivity of consequence, see *Prior Analytics* A.1.24b18–20. But it is not at all clear that in our passage Aristotle means to invoke this technical relation of syllogistic consequence; he talks simply of what will be the case if something else is the case.)

What did we assume to make the left-to-right direction work? It seems to me we assumed: 1) something like a standard account of the semantics of $\Box$ and $\diamond$ is correct—in particular, it makes sense to say that if something is possible, then there "is a possibility" that includes it and that if something is impossible, then every point fails to satisfy it; 2) $p \Vdash q$ iff every point in the possibility space that satisfies p also satisfies q. (We may assume there is a "real" possibility space, as philosophers seem wont to do, or relativize to choice of space.)

An alternate proof of the left-to-right direction proceeds without appeal to semantic notions as above; in this case the connection with Duality is a bit clearer. Take the statement of Duality from *Metaphysics* Δ.12: "that of which the contrary is true of necessity is impossible" 11019b23–24. Using I to mean 'impossible,' I take it this means at least, for all sentences α, $\Box\neg\alpha \Rightarrow I\alpha$ (and probably also $\Box\neg\alpha \Leftarrow I\alpha$). Assume (which I take to be a very lightweight assumption) that if $p \Vdash q$ and q is impossible, then $\Vdash \neg p$. (In the case where q is a logical contradiction, and if $p \vDash q$, then also $p \vDash \bot$, which is a traditional way to *define* $\neg p$. But perhaps since q may not be logically impossible, or only impossible against some background assumptions, we cannot help ourselves to that.) If $\Vdash \neg p$, then $\Vdash \Box\neg p$ by the Necessitation rule. By our version of Duality, $\Box\neg p \Rightarrow Ip$, so Ip. A final assumption is that for all α $I\alpha \Rightarrow \neg\diamond\alpha$. So on the assumption that $p \Vdash q$ for some impossible q, $\neg \diamond p$; thus $\diamond p \Rightarrow p \nVdash q$.

[7]What could it be to have a power to do something that was literally, no matter what, impossible to do? And why would you ever conclude something had such a power?

Let us say that, for some reason, we do come to believe that there are such powers that have impossible triggering conditions, that can never possibly be activated. In this case I suspect that many of the claims I will make about powers may be saved by revising them to be about only on a restricted subset of the powers, those with possible triggering conditions. In this case the very fact that the claims I will make

observation threatens to reduce the test to triviality, since then the activation of a capacity can never result in an outright impossibility. To save the test from non-triviality we can imagine that we do the test against the background of certain background assumptions—the test is not trivial if we hold fixed, for example, facts about the past, or facts about the past before some chosen point of divergence.

On the other hand, if we add to the stock of background assumptions all actual facts and refuse to drop any, then there rises the threat of the Megarian-esque position that only what is actual is what is possible (cf. Makin 2006, p. 75). For adding every truth to the background assumptions will make anything false impossible, since the negation of something false is true, and therefore in the background set, and therefore productive of an impossibility together with the falsehood. (Threatens, not guarantees, for e.g. if there are truth-value gaps then what is false will be impossible, but it won't follow that what is true is necessary.)

Therefore, if we are not to trivialize the test in either direction, we should hold fixed some but not all of the actually true facts. We should understand that Aristotle tells us to imagine the activation of the power against the backdrop of some set of background assumptions.

A striking example of this is that Aristotle consistently asserts that the past is necessary.[8] In the context of this test, the way to understand this is that Aristotle takes the past as fixed and puts facts about the past into the set of background assumptions. But, of course, not all facts about the future are likewise in that set.

Now, I call this a test for possibility[9] instead of a definition for two reasons. First, if it were a definition, it would define possibility in terms of impossibility, which seems perilously close to circularity and certainly doesn't manage to define the modal in non-modal terms.

Second, this could be a partial definition at best. For it tells us not what is possible in general, but what is possible out of the things that are activations of a power. What we are told is that, when there is a power, that power's existence is sufficient for the possibility of its resulting state just in case the relevant background assumptions do not rule it out. Given what we have seen so far, including Aristotle's claim that powers are in virtue of what we say things are capable, we have good grounds to extrapolate that the reason for that sufficiency is that the existence of the power explains the possibility.

carve out that subset should suggest that this is a reasonable category of powers to focus on, not an *ad hoc* gerrymandered kind: in many contexts it is only the sort of powers with possible triggering conditions that are worth worrying about.

[8]For example, see *NE*.VI.2.1139b7–9, *De Caelo* I.12.283b13ff., and *Rhetoric* III.17.1418a3–5.

[9]Following the nomenclature of Makin (2006, pp. 72–79).

This hypothesis explains why Aristotle focuses on the case where p states the activation of a power. If we thought the central point was to posit a test for possibility, i.e., to give a relation between possibility, impossibility, and derivation,[10] then we would be at a loss as to why Aristotle qualifies his thesis in an unmotivated way.[11] But it is not an unmotivated qualification at all if we read the test continuously with the refutation of the Megarians: then the point is a more "formal" way of explaining again how powers make true non-trivial possibilities.

6.3 Variability

The suggestion in the previous section is that what is possible is, for Aristotle, possible relative to some set of background assumptions. (Perhaps a more faithful way to think of this, as we will see, is that for Aristotle there are various sorts of possibility corresponding to various choices of background assumptions. That is, modality is not relative, but there are various types; and there are strong constraints on what sets of background assumptions are counted as corresponding to a genuine modality.) This is what is meant to save the test for possibility from triviality.

I want to spend some time considering the following idea. One might think instead that there is a single determinate set of background assumptions intended. Perhaps we are meant to hold fixed all that is true *now*. On this idea, there is still space for non-actual possibilities in the future. This is because of Aristotle's acceptance of an open future: some things are neither true nor false *yet*, though perhaps they will be; so they do not enter into the set of background assumptions when considering now what is possible. Then we may hold fixed all actual facts (now) without being lead into the Megarian-esque position. Of course our demurrer is likely to point to a familiar reading of *De Interpretatione* 9 to bolster their claim.[12]

[10]It seems to me Makin (2006, pp. 72–79) reads the passage so.

[11]Objection: perhaps Aristotle does not realize that the test holds even before this qualification, i.e., does not realize the caveat is unnecessary? But nothing he says indicates how the qualification would be used to secure the truth of the test. Note too that elsewhere Aristotle does acknowledge that impossibilities follow from impossibilities, without any restriction of the premise to capability claims (*De Caelo* A.12.281b15).

[12]By the "familiar reading" I mean the reading that denies truth values and bivalence for future contingents. (For more detailed descriptions of the position, see e.g., see Sorabji (1983, pp. 91–93), Gaskin (1995, pp. 12–14); the latter also cites many defenders of some version of the view.)

Something close to the idea in the body is defended by Bäck (1995, p. 105) and Bäck (1992): according to him, "Aristotle indeed does hold that whatever is true is necessary, *in some sense or other* …But …Aristotle holds that future contingent singular statements do not have any (assertoric) truth value)." In Bäck (1992), Aristotle is read as responding to an argument that assumes that what is true is necessary (137) by denying that future contingents must have a determinate truth value—for Bäck's Aristotle uttering a

The idea is that all truths go into the set of background assumptions, but non-trivial possibilities remain because not all propositions have a truth value (yet).

I want to suggest several things about this idea. First of all, much of what I claim is not in conflict with the idea. The idea leaves open in virtue of what the facts about the current moment and the past rule in or out future situations. So a very conciliatory reply is to simply accept this idea, and add that the relevant facts are ones about powers.

However, I think there are some reasons to be suspicious. There are philosophical problems with the view when we combine it with other things Aristotle says. As we will see, the idea does best as an interpretation of a particular text in *De Caelo*. (I will suggest that there are some reasons to be suspicious of it even there.) But the tension with other things Aristotle says outside of that text give us some reason to not try to read this as the single type of modality in operation across his texts—at best, this idea limns the type of modality active in that part of *De Caelo* (and, perhaps, in *De Interpretatione* 9).

Possibility, on the simplest way of fleshing out this sort of thinking, effectively amounts to a third truth value in addition to truth (which is always necessary truth) and falsity (which is always necessary falsity).[13] But Aristotle is emphatic that the false and the impossible are not the same thing:

> Ἀρχὴ δ' ἔστω ἐντεῦθεν· τὸ γὰρ ἀδύνατον καὶ τὸ ψεῦδος οὐ ταὐτὸ σημαίνει. ἔστι δὲ τὸ ἀδύνατον καὶ τὸ δυνατὸν καὶ τὸ ψεῦδος καὶ τὸ ἀληθὲς τὸ μὲν ἐξ ὑποθέσεως (λέγω δ', οἷον τὸ τρίγωνον ἀδύνατον δύο ὀρθὰς ἔχειν, εἰ τάδε, καὶ ἡ διάμετρος σύμμετρος, εἰ τάδε), ἔστι δ' ἁπλῶς καὶ δυνατὰ καὶ ἀδύνατα καὶ ψευδῆ καὶ ἀληθῆ. οὐ δὴ ταὐτόν ἐστι ψεῦδός τέ τι εἶναι ἁπλῶς καὶ ἀδύνατον ἁπλῶς. τὸ γάρ σε μὴ ἑστῶτα φάναι ἑστάναι ψεῦδος μέν, οὐκ ἀδύνατον δέ. ...τὸ δ' ἅμα ἑστάναι καὶ καθῆσθαι, καὶ τὴν διάμετρον σύμμετρον εἶναι, οὐ μόνον ψεῦδος ἀλλὰ καὶ ἀδύνατον. οὐ δὴ ταὐτόν

future contingent is more expressing a wish than asserting something about the way the world will be (134, 142).

Bäck also repeatedly claims that to say "there will be a sea battle tomorrow" asserts that it is contingent that a sea battle happens tomorrow (e.g., 134, 143). I don't really understand why he says this, and it seems to me dubious: $Cp \leftrightarrow C\neg p$ but $\neg(Fp \leftrightarrow F\neg p)$. (Perhaps he means that contingency is only a part of the content—maybe e.g. one also expresses a wish? Then I still worry that the account predicts that "there will be a sea battle" and "there will not be a sea battle" do not contradict each other, and that "there will be either a sea battle or no sea battle" comes out as contingent.)

[13]White (1979) gives a way to fill out the truth tables for this suggestion.

Bäck explicitly denies that Aristotle accepts a third truth value (Bäck 1995, pp. 133, 137), instead claiming that Aristotle only thinks that some propositions have a truth value "not yet determined, as it is merely contingent." I'm less than perfectly clear on why "undetermined" should not count as a truth value, but I also see little value in insisting on the issue.

> ἐστιν ὑποθέσθαι ψεῦδος καὶ ἀδύνατον· ...τοῦ μὲν οὖν καθῆσθαι καὶ ἑστάναι ἅμα ἔχει τὴν δύναμιν, ὅτι ὅτε ἔχει ἐκείνην, καὶ τὴν ἑτέραν· ἀλλ' οὐχ ὥστε ἅμα καθῆσθαι καὶ ἑστάναι, ἀλλ' ἐν ἄλλῳ χρόνῳ. (*De Caelo* A.12.281b3–20)
>
> Let us begin from here. The impossible and the false do not indicate the same thing. The impossible, the possible, the false, and the true are on the one hand by a hypothesis. I mean, for example, it's impossible for the triangle to have two right angles, if these things hold, and for the diameter to be commensurable, if these things hold. On the other hand things are simply possible, impossible, false and true. Saying you stand when you're not standing is to say something false, but not impossible. ...But to say that you stand and sit at the same time, and that the diagonal is commensurate, is to say something not only false but also impossible. ...Someone has at the same time the power to sit and stand, since when he has one, he has the other. But it's not a result that he has the power to sit and stand at the same time; rather, at another time.

Someone who is sitting has at that very time the power to stand. This is despite the fact that, of course, the facts of the present moment rule out their standing. That is, that is despite the fact that it is *false* that the person is standing, it is still not ruled out. The straightforward conclusion is that while some things must be taken as fixed and immutable for the purposes of calculating what is possible, those things need not include all truths, and while some things must be taken as ruled out of the realm of possibility, those should not include all the things which are false.

If Aristotle did in general think that what is actually true at a moment is necessarily true by that time, it would be an error to think that facts about the present are not necessary, since they are true. But Aristotle indicates that the falseness of your standing now is compatible with its possibility (*Meta.*Θ.4.1047b13–14; and again see *De Caelo* A.12.281b3–15).

The necessity of the present is something Aristotle admittedly wavers on; he seems to like it at *De Interpretatione* A.9.19a23–26 and perhaps *Rhetoric* Γ.17.1418a1–5. But on our demurrer's interpretation he should be committed in one direction, to its truth. If we reject that interpretation the wavering is explicable: there is a substantive question about what truths to include in our background assumptions, and how they might shift across shifting situations. What we are seeing is that Aristotle, quite reasonably, is not quite sure how to answer that question.

The interpretation I am objecting to plausibly looks better if it changes by borrowing from the reading of the above *De Caelo* passage in Waterlow (1982b, pp. 16–30).[14] According to her, Aristotle's idea is that

> Even though 'p' is false at t, 'p' is possible if and only if for all q, if 'q' follows from ' "p" is true at some time $t' \neq t$', then 'q' is not impossible. (Waterlow 1982b, p. 22)

(Indeed she adds further on that $t' > t$, since "there are no unfulfilled possibilities now of earlier happenings" (28).)

As Waterlow notes, if this is not to be a "pointless" qualification, then some information about t must be kept in the background (24). (This information, I suppose, is the "hypothesis" relative to which something is necessary or not.) She has a proposal for what it is: the assumption in the background is a description of the world at t, including that p is false (at t). Say p states that some power is activated. As Waterlow sees, this means that when it is possible at some time t that p, the time of activation t' must be at some time other than t (26–27).

Note that *De Caelo* A.12's reference to "another time" at 281b20 (at the end of the above blockquote) is not mirrored in the similar passage in *Metaphysics* Θ.3. Also note that although Waterlow makes a great deal of this phrase as showing us the right way to understand the conditions under which something is possible, at first blush the lines make a much more constrained point. Facially they say merely that my capacities for incompatible results are not vitiated by the fact that I cannot exercise them all at once, for it is still possible that I can exercise them at different times from one another. Waterlow's claim that "there is more to it than this" requires us to "follow [Aristotle] into his proof that what is always the case is so of necessity" (20): i.e., her understanding of those lines rests on her interpretation of the whole passage.

In short, the idea is that at some moment t it is true that $\diamond p$ "when things at t are such as not to rule out its ever later being the case that p" (34). The facts at t rule out p when together, by the rules of logic, they lead to something "impossible in principle," to an "outright self-contradiction" (38). This means that the demurrer can explain how it is that possible now that p, despite the falsity of p now. So her reading makes sense of Aristotle's insistence that the false and the impossible are not the same, and that the present is not necessary.

[14] A substantially similar interpretation of A.12 is in Broadie (2009). Since in the later text Waterlow focuses on a different part of the chapter (the topics of our concern here are treated quickly from 33–35) I will focus on the earlier, longer treatment.

However, the new view seems to be incorrect about what is possible when and to be wrong about what we are doing when we talk about possibilities.[15] Lying near death at Agincourt a soldier bemoans his fate: "What have I done; I could be at home in London in bed now. I wish I had not signed up for this!" We may stipulate that the facts of the moment rule out his ever making it back. That is irrelevant to what he claims, and is simply not what he is imagining: he thinks of revising his mistakes in the past. He may be *wrong*: we can imagine soldier #2, a died-in-the-wool Aristotelian about possibility, correcting his friend: "No, the die is cast, the past cannot be changed; you made your choices, now you must bear them out." What is perverse is for the correction to come on the basis that there is no longer time to beat Death to London. The soldier is just not talking about what is compatible in the *future* with current facts: he means to say that he could be at home instead of here, now, in the muck.[16] The Waterlow version of Aristotelian modality is revisionary in a surprising way, a way that we nowhere have a clear textual indication Aristotle would accept.

The most natural way to construe the necessity of the past is that it claims that at a moment t all facts about all moments t' such that $t' < t$ are necessarily true. If we understand the necessity of the present correspondingly, the claim is that at t all the facts about what is realized at t are necessarily true—nothing about t is, at t, *merely* possible. This seems to be, perhaps not required, but a very natural interpretation of the passages where Aristotle is sympathetic to the necessity of the present:

> Τὸ μὲν οὖν εἶναι τὸ ὂν ὅταν ᾖ, καὶ τὸ μὴ ὂν μὴ εἶναι ὅταν μὴ ᾖ, ἀνάγκη · οὐ μὴν οὔτε τὸ ὂν ἅπαν ἀνάγκη εἶναι οὔτε τὸ μὴ ὂν μὴ εἶναι. (*De Inter-*

[15]If I understand Waterlow correctly, the sort of example that follows trades on the "intuition" which she calls part of "the usual modern understanding" at Waterlow (1982b, p. 34). She thinks these must be put aside to understand *DC* A.12.

Aristotelian physical modality is not the way philosophers tend to think of modality. But I strongly suspect it is a concept of modality we use naturally in non-philosophical discourse and which comes easily enough even to philosophers. For example, I have never seen a student struggle with the suggestion that the past is fixed in the context of the discussion of determinism and free will (Inwagen 2008)—if anything, I see students struggle to grasp the contemporary philosopher's expansive notion of necessity, including how it goes beyond Van Inwagen's "untouchable" truths. All this is to say that we should not give up on the idea that Aristotelian modality answers to at least some of our intuitive judgments too quickly, especially since once we do we give up a significant constraint on interpretation.

[16]It also seems like the soldier could correctly say 'I could have run to Germany.' Does this show that it is possible that the past be different, namely, with regards to his not having run to Germany?

Perhaps, but I don't think there's any straightforward and clear argument that shows the possibility obtains now. Most aggressively, I would tentatively like to understand the statement this way: the soldier is correctly saying that, in the past, he could run away to Germany. This is well accounted for with the branching time picture of modality. Adding the 'could have' is how we "modalize" the past tense statement 'I ran to Germany.' It asks us to rewind to some moment in the past and to see if, at that moment, the branching possibilities model makes it possible then that the state obtain. (I take this to be similar to the suggestion of Bennett (1988, p. 522), at least as far as the remarks about tense go.)

pretatione 9.19a23–26)

> Whatever is true, when it is true, is necessarily true; and whatever is not true, when it is not true, necessarily is not true. However, neither is everything true necessarily true nor is everything not true necessarily not true.

> …ἡ μὲν γὰρ περὶ τὸ μέλλον, ὥστ᾽ ἐκ τῶν γενομένων ἀνάγκη παραδείγματα λέγειν, ἡ δὲ περὶ ὄντων ἢ μὴ ὄντων, οὗ μᾶλλον ἀπόδειξίς ἐστι καὶ ἀνάγκη: ἔχει γὰρ τὸ γεγονὸς ἀνάγκην. (*Rhetoric* Γ.17.1418a1–5)[17]

> …for the one [political oratory] is about the future, so that it is necessary to provide examples from the past, while the latter is about what is and what is not, which is necessary and more open to demonstration. For what has happened has necessity.

It is natural to read these passages as saying that if at a certain time t some present tense thing is true, then it is necessarily true at that time t, since it is by that time fixed; still, some things are true but not necessary (things about the future?). This reading seems unavailable to Waterlow. For her to say that something is possible is to say that it is not yet ruled out for some time *in the future*; the possibility of something at t does not depend on whether it could be realized at t or is fixed by that point.

Possibly closer examination of the passages where Aristotle wavers on the necessity of the present will reveal that sometimes he uses Waterlow's interpretation of temporally relative possibility, sometimes another. But it is worth pointing out that since *De Interpretatione* 9 is a key passage for a picture of Aristotelian modality as turning on branching time and an open future, if that is what we see happening in *De Caelo*, ideally we would want a unified interpretation of those two passages.[18]

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[17]This passage seems to me to somewhat ambiguously support the necessity of the present. It puzzles me that the justification of the necessity of what is true now is that what has happened in the past is necessary. One possibility is that Aristotle imagines that the necessity of the past, including arbitrarily close to the present moment, is sufficient to guarantee the character of the present. Or he may be thinking of the past as including the present as an endpoint (cf. *Phys*.222a10–23).

[18]A full treatment of *De Interpretatione* 9 here is out of the question—it is too big a question to pursue. But it is worth pointing out that a traditional construal of the fatalist's argument fails both if the future is open and what is possible is identified with what is not yet true or false; and if the future is determinate, but what is possible and necessary is relative to moments of evaluation and is a matter of which branches are not yet ruled out.

(The construal I have in mind, with P for a past operator, F for future, and p for 'there is a sea-battle': $PFp \vee \neg PFp$; say PFp, then since the past is necessary $\Box PFp$; same reasoning to get $\Box\neg PFp$ on the assumption that $\neg PFp$; disjunctive syllogism to conclude $\Box PFp \vee \Box\neg PFp$.)

On what I claim is Aristotle's view it is true that yesterday it was true that in two days there will not be a sea battle, but it is not right to infer that because of this and the necessity of the past it is true that it is necessary that yesterday it was true that in two days there will not be a sea battle ($\Box PF\neg p$). For there

A final reservation: the distinction between the two indices t and t', the time of the possibility obtaining and of its being realized, is not made carefully or consistently by Aristotle. In *De Caelo* A.12, as I've mentioned, it is not punched with as much force as one would expect on Waterlow's interpretation: she puts great weight on the phrase "another time," the importance of which Aristotle does not stress or explicitly spell out with Waterlow's interpretation. As noted in the section of the last chapter on the Megarians, it is tempting think lack of clarity about that distinction caused confusion in Aristotle's argument against the Megarians. If this is right, it is not tempting to make the distinction a foundational plank in Aristotle's whole theory of the interaction between time and modality.

Here's what I take away from these remarks. They are reasons to hesitate in accepting Waterlow's reading of *De Caelo* A.12: that reading puts a great deal of weight on a short phrase that is not obviously doing what Waterlow claims, and the view it attributes to Aristotle may have problems of substance. Really seeing our way clear of the interpretation of *De Caelo* means grappling with that text at length. But even without doing that, these remarks give us some reason not to find in this interpretation Aristotle's general interpretation of modality and time. An explicit, strongly endorsed claim is the kind of thing one is happy to read other texts in the light of. Here the text is obscure, and even if Waterlow's interpretation of the key phrase "another time" is right, the lack of emphasis and care around it suggests Aristotle may well not realize the implications of the claim and how substantive it is.[19]

If one accepts an idea like Waterlow's or Bäck's, one need not reject the claims about powers made here. Such a view amounts to making a definite and static decision about which facts to keep fixed as background assumptions against which we judge something's possibility. It is that all the things that are true (by now) are kept as background assumptions when determining what is possible now. And it may be that what it is about the present and past that rules in or rules out facts about the future is which powers actually now exist and their characters.

There may be some reason to think varying the background assumptions to produce

remain, looking forward in the branching item structure from yesterday, branches both where there is a sea battle and where there are not. When necessity of the past is correctly understood it is not that any sentence that starts with an in-the-past operator (or a negation and then an in-the-past operator) is necessarily true or necessarily false, but that the intrinsic character of past moments are fixed. (Logically, it is the atomic propositions at each moment that are necessary—of course does not answer the substantive metaphysical question of what those are, but does help with logical puzzles).

[19]This is not to suggest that Waterlow thinks the interpretation should be freely "exported" out of *De Caelo* A.12; indeed she cancels any implicature to that effect at Broadie (2009, 33n8). On the other hand she clearly *does* think that this modality operates in *De Interpretatione* 9 in particular (Waterlow 1982b, p. 83).

new modalities is not un-Aristotelian.

First, as Makin (2006, p. 75) points out, if we add to the stock of background assumptions all actual facts and refuse to drop any, then there is the threat that we will be led to a Megarian-esque position that only what is actual is possible.[20] It's possible that this is *why* Aristotle moves from talking about the Megarian position to talking about the test for possibility (he gives no explicit explanatory transition). Having explained all the absurdities that follow from the Megarian position, he is now giving a positive proposal designed to clear space for non-trivial possibilities and capabilities. The positive proposal would be that the possible situations are the activations of a power that do not result in an impossibility due to the other fixed background assumptions.

Second, we have seen that apparently in *De Caelo* Aristotle thinks of the sort of physical necessity he is concerned with as a kind of hypothetical or conditional necessity (in contrast to absolute necessity). Perhaps, if Waterlow is right, the condition assumed is the character of the past or the present.

We *do* see Aristotle also invoke necessity on a hypothesis with a very different sort of condition in mind. In a very different context hypothetical necessity is thought of as the sort of necessity that holds in a demonstration that gives a teleological explanation (*PA*.I.1.639b19–640a5). There what is held fixed is the *telos* the process is aimed at; then what must be the case in order to attain that end is thought of as being hypothetically necessary.

So Aristotle's language of conditional necessity may well be meant to indicate exactly what we are talking about, necessity in the light of background assumptions, and the different forms conditional necessity takes indicates different sorts of modalities obtained with different choice of assumptions.[21]

Below, in 6.9 I will suggest that absolute necessity can be assimilated into this picture as well. Considering what is necessary no matter what the conditions assumed will give us the absolute necessities.[22] We can think of this "formally" in terms of derivations from assumptions. But we can also ask what is true of every node in a tree where no paring has taken place (e.g., allowing branches that diverge from the actual world history before the current moment).

[20]All actual facts, that is, including facts about the future; alternatively facts about the future may be redundant if we are determinists.

[21]Cf. *Meta*.Λ.7.1072b11–13, where both hypothetical necessity and necessity in the sense of one thing forcing something to be are contrasted with absolute necessity.

[22]I take it this way of unifying the two sorts of necessity is also what Bäck (1995) suggests.

6.4 Powers and Counterfactuals in *Metaphysics* Θ.5

Aristotle claims that each power has a canonical conditional at the beginning of *Meta*.Θ.5. Here, Aristotle tells us that a full specification[23] of a pair of active and passive powers is sufficient for a necessary counterfactual to hold. As we will see, the specification appears to at least state what the triggering conditions for the powers are, including what external hindrances need to be absent for the activation to occur, and what the resulting activation is.

This gives us more reason to think that, in the case of an actual change, it is the character of the powers together with their contact that explains the presence of the change; and in the case where the contact remains contrary-to-fact, it is the character of the powers that explains the possibility of the change and the state it could result in. Furthermore, looking at that passage in more detail can show how to leverage these explanatory relations to explain possibilities and conditionals that do not neatly correspond to a single power's activation. That is, we see how to use Aristotelian resources to construct the tree of possible situations.

6.4.1 The Conditional Relating Powers and Counterfactuals

Aristotle begins the chapter with a typology of powers (*Meta*.Θ.5.1047b31–35). This is important for Aristotle's purposes in this chapter. He wants to make sure that the existence of two-sided powers, powers for both a certain result and its opposite, do not conflict with his account of how empowered objects act. That is: powers necessarily are activated once they come into their triggering conditions, and each power has a canonical end for which it acts. So we might worry that two-sided powers will act to simultaneously bring about opposites in the affected object, which is an impossibility (1048a8–10). Aristotle points out that such two-sided powers are rational powers and therefore their triggering conditions include the choice of the actor (10–15).

This material is contextual, not crucial, for our topic here. I am not now interested in the problem and its resolution. But I am interested in the premises about the nature of powers in general that generate the problem, especially the idea that powers will necessarily act when brought into their triggering conditions:

[23]The word διορισμός (1048a2, a20) could well effectively mean a definition. (See *Metaphysics* Z.4.1030a17–a26 for the suggestion that qualities may have an essence—though, it seems, in a qualified sense in comparison to the essence of a substance.) The specification is at least a canonical way of identifying and describing the power. Note that the definition (λόγος) of a power appears to contain a statement of the activation it aims for at *Metaphysics* Θ.8.1049b13–18.

> ἐπεὶ δὲ τὸ δυνατὸν τὶ δυνατὸν καὶ ποτὲ καὶ πῶς καὶ ὅσα ἄλλα ἀνάγκη προσεῖναι ἐν τῷ διορισμῷ, καὶ τὰ μὲν κατὰ λόγον δύναται κινεῖν καὶ αἱ δυνάμεις αὐτῶν μετὰ λόγου, τὰ δὲ ἄλογα καὶ αἱ δυνάμεις ἄλογοι, κἀκείνας μὲν ἀνάγκη ἐν ἐμψύχῳ εἶναι ταύτας δὲ ἐν ἀμφοῖν, τὰς μὲν τοιαύτας δυνάμεις ἀνάγκη, ὅταν ὡς δύνανται τὸ ποιητικὸν καὶ τὸ παθητικὸν πλησιάζωσι, τὸ μὲν ποιεῖν τὸ δὲ πάσχειν, ἐκείνας δ' οὐκ ἀνάγκη · (*Meta.*Θ.5.1047b35–1048a7)
>
> Since what is capable (1) is both capable of something, and (2) at some time, and (3) in some way, and (4) with however many other factors it is necessary to add to the specification, and (5) since some capable things affect things in accordance with reason and their capacities are with reason, but others are without reason and their capacities are without reason (and it is necessary for the former to be in an ensouled thing but for the latter to be in either an ensouled thing or not), (6) it is necessary that for these sorts of capacities, whenever the agent and patient should approach each other in accordance with their capacity,[24] the one act and the other be affected, but (7) for the other sort it is not necessary.

The sentence is long and difficult to parse. I have understood its overarching form to be a large "since …then" sentence, with several subsidiary clauses in both its "since" and its "then" part. The idea is that because of the following facts

1. what is capable is capable of something
2. what is capable is capable at some time
3. what is capable is capable in some way
4. what is capable is capable (with however other many factors need to be added)
5. some of the capacities are rational and some are not[25]

[24]ὅταν ὡς δύνανται τὸ ποιητικὸν καὶ τὸ παθητικὸν πλησιάζωσι. I.e., when they approach each other in the way specified by the capacity. Tredennick translates "when the agent and the patient meet in accordance with the potency in question" (Tredennick 1933, p. 443); Makin "so as to be capable." The latter may misleadingly suggest Aristotle could have said "when they approach each other in such a way so as to *become* capable." The text does not suggest that the agent and patient are not capable before they come together.

[25]I have left out as parenthetical the remark "and it is necessary for the former [i.e., rational capacities] to be in an ensouled thing but for the latter [i.e., non-rational capacities] to be in either an ensouled thing or not." Grammatically, this remark is as much a part of the antecedent (the "since" part of the sentence) as the other subsidiary clauses I listed, and there is no syntactic indicator that it is parenthetical.

the following things are true

6. it is necessary for non-rational capacities, whenever agent and patient approach each other in accordance with their capacity, that the one act and the other be affected

7. it is not so necessary for rational capacities

More carefully, I doubt that (1)–(5) are supposed to imply (7). Rather, Aristotle means that they do not imply the negation of (7), that is, that in the case of rational capacities (1)–(5) do not suffice for the corresponding result. While (1)–(5) explain the necessity activation of non-rational powers, they don't yet secure the same sort of necessity in the case of rational capacities.[26]

Aristotle says that what the capacity is for, the result of the capacity, will necessarily come about when the agent and the patient come together. So we have a conditional that states that, in general, if the agent and patient should come together (in the right way), then the result would obtain.[27]

However, I cannot make much sense of it as part of the explanation of the consequent. I believe it is instead a remark about the difference between rational and non-rational capacities, shoe-horned in while making the larger point.

[26]I've made a decision in making the sentence's antecedent (1)–(5) and the consequent (6)–(7). I suppose syntactically it is possible that the consequent begins with the second instance in the passage of ἀνάγκη, which I have relegated to a parenthetical remark. But my way of proceeding both makes more sense of the implication and is confirmed if we look further down in the text, at the corresponding claim for the case of rational capacities. In that case, when choice is added as an additional factor into the antecedent, then the result necessarily follows: that result is this time explicitly marked off with ὥστε, "as a result," and gives a consequent that corresponds to what we treated as the consequent in the large quotation before. This parsing is also made clearer by comparison with the simpler but very similar conditional at *Generation of Animals* B.4.740b22–25:

> …διὰ ταύτην τὴν αἰτίαν γίνεται ἕκαστον αὐτῶν, καὶ ὅτι τὸ ποιητικὸν καὶ τὸ παθητικόν, ὅταν θίγωσιν, ὃν τρόπον ἐστὶ τὸ μὲν ποιητικὸν τὸ δὲ παθητικόν (τὸν δὲ τρόπον λέγω τὸ ὡς καὶ οὗ καὶ ὅτε), εὐθὺς τὸ μὲν ποιεῖ τὸ δὲ πάσχει.
>
> For this reason each of these [parts of the fetus] comes to be, and also since an agent and a patient, whenever they touch in the way where the agent and the patient are such (I mean by 'the way' the manner and the place and time), then straightaway the one acts and the other is affected.

For similar conditionals see *Phys.*Θ.1.251b1–5, *Phys.*Θ.4.255a34–35, and *On the Length and Shortness of Life* Γ.465b16–7.

[27]I have wavered on whether to understand this conditional as grammatically a counterfactual or not. Part of the problem is that the counterfactual-indicative distinction is not part of the traditional philological classification of Greek conditionals, which rather distinguishes conditionals based on how likely the speaker thinks the antecedent is to hold or how real or unreal the situation is supposed to be (see Smyth and Messing (1984, s. 2297ff.), Goodwin (1900, s. 402ff.), Wakker (1994, pp. 35–36), and Willmot (2009, pp. 209–214).) So it's not easy to straightforwardly rely on philological expertise here.

This may suggest that capacities are extraordinarily finely individuated, that there is a separate capacity for every slightly different way a fragile object might shatter. But the impression is not exactly correct. The capacity *may* need to be specified with a very precise manner or time or whatever, but the information in those slots may instead be

However, I think we have good reason to read it as being used, in this context, in a way which has metaphysical (rather than epistemic) clout. I will argue that Aristotle embeds this conditional in the scope of a necessity operator. A necessity operator followed by any conditional that supports *modus ponens* is logically equivalent to a necessary material conditional (using standard Stalnaker-esque semantics for the conditional) over whatever domain of possible worlds is contextually salient. In some respects this makes the precise interpretation of the conditional less relevant. But we need to show that we should not hear the conditional as restricted to situations that are compatible with what we know.

On the traditional classification, the conditional is a "present general" conditional; it tells us how things will habitually and generally go (Smyth and Messing 1984, sec. 2335; Goodwin 1900, sec. 395; Wakker 1994, p. 36). (I suppose this is the force of the ὅταν, 'whenever.') A 'habitual' conditional, at least in English, can be a counterfactual or an indicative conditional. Contrast 'Whenever she opens with d4, I try for the Queen's Gambit,' which seems to state a policy and a plan for how to proceed, and so, to claim a kind of disposition; and 'Whenever he responds with d5, then he's trying for the Queen's Gambit,' which at least can be heard as telling us that in general a certain inference is permissible. (Notice that if there's a syntactic difference here, it is some subtle thing about the tenses involved; maybe the Greek construction is ambiguous?)

In the context of the chapter, I think Aristotle is explaining how (e.g.) a power can give a person an ability that will be exercised in the appropriate circumstances, which seems to me more like the former conditional than the latter. The conditional is not used as a reflection of the speaker's (or perhaps the conversants') epistemic states. Aristotle's points are not epistemic, but about the metaphysics of capacities.

If we read this conditional as picking up the test for possibility in Θ.3, we should read it as accepting contrary-to-fact cases, since there clearly Aristotle is imagining testing for contrary-to-fact possibilities (e.g., that it is possible for me to stand though I am in fact sitting). But it is usually pragmatically strange to assert indicative conditionals where it is accepted by the interlocutors that the antecedent is false. So we should read the conditional in *Meta*.Θ.3 as a counterfactual.

However, the conditional in Θ.3 is, on the usual classification, a future more vivid conditional; as Willmot (2009, pp. 212–213) points out, if we are to project the counterfactual-indicative distinction onto the traditional philological one in the most straightforward way, it looks like this is an indicative conditional (her corresponding English example is 'If it rains, I will take an umbrella'). This looks very similar to the kind of conditional in Θ.5, which has the same antecedent but with ὅταν and with the consequent in the present rather than the future (but Wilmott offers no advice for the general version.) Muddying the waters further, it is a minority opinion (with which I admit sympathy) in the philosophical literature that English correlate of the grammatical construction of the Θ.3 conditional is better thought of as a counterfactual than an indicative conditional (V. H. Dudman 1984; Bennett 1988).

Consider the familiar sort of example (1) 'If Oswald hadn't shot Kennedy, then Kennedy would have died of old age' and (2) 'If Oswald didn't shoot Kennedy, then there was a massive conspiracy to frame Oswald.' When we consider the antecedent of (2), we (roughly) consider what happens by abandoning our belief that Oswald shot Kennedy for its opposite, but we "hold fixed" our belief in the events that we thought were downstream causal effects of Oswald's shooting. In considering whether the hypothetical situation satisfies the consequent of (2), we try to 'repair' the dissimilarity of our world to the hypothetical situation by explaining those causal effects some other way. By contrast when we evaluate (1), we let the causal effects of Oswald not shooting Kennedy vary according not to what we know about how events actually played out, but according to the "normal" causal progression of the hypothetical event.

Now: which thing could Aristotle be asking us to do here? It seems to me it must be the second. If we suppose that agent and patient come together in the way to affect each other, the causally normal thing for them to do is activate their powers, as Aristotle's conditional indicates they will. On the other hand, say we suppose that agent and patient come together at some instant when (we believe) they in fact do not or did not come together, and we hold fixed our beliefs that caused us to think they did not come

extremely general. The way we can tell how capacities are individuated is by looking at how the processes to which they give rise are individuated. That is to say, we tell by looking at the teleological structure of those changes. This will lead to more or less information going into those positions, as needed to get a single capacity giving rise to a single change.

Similarly, the conclusion will state what will or would result if the capacities are activated. But this need not indicate a precise result. The capacity to burn something might deterministically result in the patient's burning without it deterministically resulting in the patient's burning at a specific temperature or for a specific duration, for example. This is one reason why the truth and necessity of causal conditional facts is compatible with indeterminism (and with determinism). Perhaps it is reasonable to say that the effect of burning is a *per se* effect while the over-specific effect of burning at this exact temperature is a *per accidens* effect (*that* temperature rather than another is not the result or reflection of a form or structure in the cause).[28] If this is right, then the claim that *per se* effects but not *per accidens* effects are necessitated may be saved.

There has been a lot of controversy about whether Aristotle was a determinist, and even the suggestion that interpreting Aristotle as positing a necessary connection between cause and effect goes some distance to making him one. [29] But this just overstates what we find in this passage. The current reading is compatible with determinism and with its negation, and antecedent commitment in either direction is not a reason to reject it.[30]

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together, e.g., the apparent *absence* of the agent's activity on the patient. Then the consequent should not state how they activate their powers, but how they either did not or appeared to not activate them (e.g., something interfered with the normal run of things). Facially a 'whenever' conditional holds of the past as well as of the future, so we ought to be able to find cases where neither the antecedent nor the consequent in fact obtained (or will obtain). About those Aristotle tells us that things would have gone differently or would go differently if the agent and patient were brought together, not that on the supposition that the agent and patient were brought together (which we may think very unlikely) we must revise our beliefs that they did not act (on the contrary, we may well hold that fixed, just as we hold fixed in the Oswald case that JFK did in fact die).

[28]If Nielsen (e.g. 2017, pp. 307–8) is right, Aristotle in *Meta.* E.3 wants to avoid the result that all events have *per se* causes. Perhaps this is a concrete case where that is plausible.

[29]The introduction of Sorabji (1983) tallies up commentators on both sides. Hintikka seemed to think idea that determinism in Aristotle has some close connection to necessity between cause and effect, but is a bit vague about what the connection is (Hintikka 1973a, p. 201). See Sorabji (1983, pp. 51–6, 135–7) and Makin (2006, pp. 101–3) for more discussion of the alleged connection between necessitation of the effect and determinism.

[30]There are a variety of further sources of indeterminism which are compatible with the above reading.

I find it very plausible that Aristotle would hold all events are the activation of a power or coincidental with such an activation. If not, there is another source of indeterminacy compatible with the necessity of the effect given the cause.

But I suppose that such a claim about all events being a power activation or coincident with an activation is part of the overall picture of possibility I am suggesting. Plausibly this is pictured at *De Anima*

In any case, we have very good reason to think that capacities are not maximally finely specified. First, Aristotle's examples are things like the power to perceive, to create houses, to play an oboe, etc., and not things like the power to perceive exactly this shade of red, create a Tudor house, play just this tune. His examples are naturally construed as abilities or skills, and abilities and skills let one do more than exactly one maximally specific thing. Second, Aristotle tells us that what powers are "maximal" in the sense that they are for their most extreme or encompassing manifestations (*De Caelo* A.11.281a7–27). If you can lift a hundred talents, then you can also lift two talents; those aren't two separate powers, but two things you can do because of your power to lift a hundred talents. Actually it is not clear what this means for the specificity of the canonical end the power aims at, but it is clear that there is quite a bit of range in what the power lets you do.[31]

6.4.2 Necessity Connecting Cause and Effect

Aristotle does not state a mere bare counterfactual conditional. He embeds the counterfactual conditional within a necessity operator. We should take the necessity operator seriously as invoking metaphysical necessity. It may tempt the reader to understand the necessity operator as epistemic. (Compare the use of "must" in "it must be raining" on hearing the pitter-patter of water drops on the roof.) The sentence does begin with

Γ.12.434a32–34, where we are told that what happens by nature is this way. If we add that what does not happen in nature is the result of some intentional action, either *per se* or *per accidens*, we seem to have the desired result. NB Aristotle must be thinking that what happens systematically in the realm of nature is by nature in the relevant sense, or the claim will not do the argumentative work desired. Perhaps he supposes that there are spontaneous non-systematic accidents not coincident with anything that has happened for a purpose, but no text I know of clearly suggests this.

That a cause necessitates its effects does not rule out uncaused causes. (But probably other texts rule this out, in the mundane sublunary world anyway.)

Łukasiewicz (1967, pp. 30–31) rightly observes that even if causes necessitate effects and there are no uncaused causes, determinism may be false since an infinite chain of causes reaching backward in time from some event may terminate in a finite amount of time. Then nothing before the chain starts fixes whether it the event will happen or not. But I think it is unlikely at best that Aristotle had this in his mind.

Finally, perhaps in *Metaphysics* Θ.5 we see Aristotle finding some special place for choice such that it is exempted from the normal connections between cause and effect: so that it is not merely another condition in the triggering conditions for a power, and itself the conditionally necessary activation of a faculty to choose in certain conditions. But in my opinion there are plenty of texts that strongly suggest that, at least, this is not something Aristotle thought consistently. And probably the stronger claim that this is just a misreading of Aristotle's purpose in *Metaphysics* Θ.5 is right.

In the body above I have stuck with the reason to reject determinism on the basis of Θ.5 which I think is most Aristotelian and most likely to have been something he may have had in mind.

[31]While Aristotle focuses on a 'canonical' counterfactual conditional for each power in *Metaphysics* Θ.5, this seems like a good reason to think that in the context of explaining why things are possible, we should take it that a single power may make true a range of counterfactuals.

"since" (ἐπεί), and what comes before the "it is necessary" gives grounds for thinking the conditional holds.

However, much of the rest of Θ.5 makes sense best in the light of Aristotle's trying to support the claim that the conditional is not only true, but necessarily so. Aristotle spends some space in the chapter making sure we understand that the antecedent of the conditional will be elaborately spelled out in order to take care of any potential confounding factors (1048a1–2, 12, 16–21). The capacity is not for the result in any situation, but for the result in the correct circumstances, in which external interference is ruled out (18–20). For example, the capacity to burn, if we are to be pedantic, is not for burning, but for burning in the presence of oxygen, while not in the ocean …with "however many other factors need to be added" to ensure that no external hindering factors are a problem.

Systematically ruling out confounding factors by strengthening the antecedent like this makes sure that a progressively greater portion of the possible worlds that satisfy the antecedent do not fail to satisfy the consequent. That is, stipulating that such confounding factors don't hold makes sure that nothing gets in the way of the consequent holding. The more such factors are ruled out, the closer the conditional gets to being necessarily true, not just true at the actual world; at the limit, where the truth of the antecedent rules out anything that could get in the way of the expected result, the conditional is necessary. Aristotle piles on the qualifications that rule out confounding factors to ensure that the counterfactual is a necessary one.[32]

Furthermore, taking the ἀνάγκη seriously as an indication of metaphysical necessity makes good doctrinal sense. Bäck (1995, pp. 94–95) argues that there is good textual reason to think that Aristotle acknowledges a variety of necessity in the realm of changing objects that connects cause and effect. It's very sensible to think that this kind of necessity would appear in a conditional that linked cause and effect.[33]

Does the claim that the antecedent and consequent of our conditional are bound together by physical necessity conflict with the claim that Aristotle believes in so-called "fresh starts" which might have some close connection to free choice (Ross 1958, p. lxxxi; Ross 1963, pp. 196–197; D. M. Balme 1939, pp. 132–4; D. Balme 1992, pp. 76–84)? No, because the antecedent contains in it already that the agent has chosen, if it is a power that admits of choice.

Sorabji (1983, pp. 26–30) protests that an indeterministic process may have a causal

[32]The reader who desires more detail on this point should look to the similar remarks in Makin (2006, pp. 147–150).

[33]The ἀνάγκη is assumed to be not merely epistemic necessity by G. E. M. Anscombe (1993, p. 88) and Sorabji (1983, pp. 51–6, 135–7) and, I think, Makin (2006, pp. 97–103).

result: a particle's decay may be the cause of a bomb going off (if the trigger is sensitive to an electron thrown off by the particle). Here Sorabji claims that the electron's arrival at the trigger is caused but not necessitated. But the arrival is caused by the decay and it is necessitated by the decay together with stipulations that external interferences are absent. Better to say that the explosion is caused but not necessitated by the lab assistant's sloppily leaving the radioactive material out (since the chain from the leaving out to the exploding has a probabilistic link). But this is a causal relation between two events, and the cause is not an agent and a patient coming into proximity in the right triggering circumstances. If we insist that we can find a cause in such a case that can be regarded that way, still it is open to Aristotle to say that just as the qualifications in the antecedent must rule out various ways in which the process may go off the rails, they may too rule out a wholly probabilistic failure in the process. (The thought is very unlikely to have crossed Aristotle's mind, but then there is no clear acknowledgment of fundamentally non-deterministic causal processes of the sort Sorabji is imagining, either.)

6.4.3 An Analysis of Power Possession?

Consider the two conditionals. For non-rational capacities, Aristotle says that "it is necessary that for these sorts of capacities [i.e., non-rational capacities], whenever the agent and patient should approach each other in accordance with their capacity, the one act and the other is affected" (1048a6–8). For rational capacities, Aristotle says "…it is necessary that for every thing capable in accordance with reason, whenever it should desire that for which it has the capacity and in the way it has it, it does this" (1048a13–15).

Notice that neither conditional is a biconditional. We have a large outer conditional in which is embedded a conditional under the scope of a necessity operator. So, (putting aside the complications with rational capacities) Aristotle tells us that the presence of the active and passive capacities are sufficient for the necessary truth of the inner conditional, telling us how objects with those capacities behave. But he does not say that the truth, or even the necessary truth, of the inner conditional is sufficient for the presence of either capacity (or both capacities).

It is worth stressing that the outer conditional is not a biconditional. The whole sentence bears some similarity to contemporary attempts to analyze disposition possession in terms of counterfactual behavior. Consider, for example a simple first stab, discussed in Manley and Wasserman (2008, p. 60):

Simple conditional analysis *N* is disposed to *M* when *C* iff *N* would *M* if *C*.

Or a much more complex example, from D. Lewis (1997, p. 157), intended to deal with the inevitable counterexamples raised against the simple conditional analysis:

Lewis' analysis Something x is disposed at time t to give response r to stimulus s iff, for some intrinsic property B that x has at t, for some time t' after t, if x were to undergo stimulus s at time t and retain property B until t', s and x's having of B would jointly be an x-complete cause of x's giving response r.

In general, there has been a broad consensus that there is some tight connection between disposition possession and the truth of a kind of canonical counterfactual (or a set of canonical counterfactuals) that describes how the thing behaves under triggering conditions (Prior 1985, p. 5; Manley and Wasserman 2008, p. 59). Aristotle obviously shares that intuition: recall that the conditional's truth is supposed to be necessarily true because of the powers' canonical specification, and states the *telos* for the powers involved. Since some authors have wished to infer that there is an analysis of disposition ascriptions to the truth of counterfactuals, one may be ready to think that Aristotle is an early example of this analytical project.

But this thought is the result of taking superficial similarities too seriously and not paying attention to the details of the text. When contemporary philosophers attempted to establish a reduction or analysis, they usually sought biconditionals linking the reduction base and that to be reduced.

Those who have attempted to analyze disposition possession have proceeded in a similar manner: they have hoped to show that an object has a particular disposition if and only if a certain corresponding subjunctive conditional is true. Here we see that Aristotle does *not* give a biconditional linking the possession of a capacity and the truth of the conditional. In Aristotle's text, it is the capacities and not the counterfactual behavior that appear in the conditionals' antecedent. This suggests that the modern project that hopes to reduce or analyze disposition possession into counterfactual behavior does not share its goal with Aristotle's project.

It's probably worth pointing out that, in general, Aristotle is not very prone to try to reduce the existence of objects or properties to the truth of some proposition. If anything, he appears inclined to do the opposite, to explain why we find certain locutions appropriate in terms of some thing or property.[34]

[34]For example, in *Categories* 8, the chapter on quality, Aristotle opens the chapter saying: "I mean by 'quality' that in virtue of which things are said to be so-and-so." Note that Aristotle uses

So the other direction for reduction looks more promising. Powers are sufficient for the truth of certain true necessary conditionals because they explain why those conditionals, which give a canonical specification for the power, are true. Since powers make true *necessary* conditionals, they carry a great deal of modal information. Picturesquely, they tell you not just about 'nearby' possible worlds in modal space, but about the whole space.

6.4.4 The Conditional as a Way to Tell What Is Possible

The power-possibility connection asserted in this passage is very similar to that in the "test" from *Meta*.Θ.3. Our description of the test was that, to see if p is possible (against some background assumptions—since p stated what happens given the activation of a power, it seemed safe to assume that it is possible in the widest sense), we see if $|p| \cap |\Gamma|$ is non-empty, where Γ is some set of background assumptions modified by being considered in the light of p.

In Θ.5 we also know already that the powers describe something possible (if we consider what is possible in the widest sense) and we are noting that, necessarily, if the triggering conditions τ hold, then the activation α occurs.

Now, assume that it is possible for the triggering conditions to hold, $\diamond\tau$. Since $\Box(\tau \mathrel{\Box\!\!\rightarrow} \alpha)$, also $\Box(\tau \rightarrow \alpha)$. So $\diamond\alpha$.

This gives us another way to see if something is possible. We can check if, against whatever background assumptions we have, the triggering conditions are possible. If they are, then the activation is possible. Even when we are considering possibility in the weakest, most generous sense (with no operative background assumptions), when we seem to be safe assuming that the power's triggering conditions and activations are possible, this gives us an interesting way to relate powers: the possibility for some powers can function as an explanation for the possibility of other powers.

The picturesque way of putting this is: powers forge a path from possibilities to further, novel possibilities. It is silly to think that Aristotle thought of what he was saying in terms of the formal notation we have been using. But that is just a way of saying the picturesque thing in more familiar (to analytic philosophers) terms. It is not

causal/explanatory language to describe this relationship. Socrates is said to be brave *from* the bravery in him. Honey is sweet *by* its having sweetness (9a33). And so on through the chapter (cf. Ackrill 1963, p. 72).

Similarly Aristotle says that virtue is a quality (the quality from which a good man is good) at *Cat*.8.10b7–10. Cf. also 8.8b26–29, *Meta*.Δ.14.1020b18–21. It is clear that virtue is meant to explain what is happening when a person acts virtuously—not when they merely do a virtuous act, but do it virtuously. And this is just to say that virtue is the explanation of the person's being virtuous.

silly to think that Aristotle saw actual powers as responsible for the possibility of the situations that are their activations. And if that activation situation is the triggering of another power (that persists through the first change), it makes sense given what Aristotle says that the two existent powers jointly make possible the further resulting situation.

I want to go a little more slowly over why this works, and in particular, over how the necessity of the conditional is used in this line of thought. The reason is this. I am trying to uncover the intuitions driving what Aristotle was saying. When we sharpen what he says and put it into a formal register, it confirms that we are on the right track when it works and when it actually uses the features he has claimed powers and possibility have. So I think it is confirmatory that the necessity of the conditional plays an important role in the construction of possibilities. Or, to put the point the other way around: the way that our construction makes use of the necessity of the conditional shows something important about what that necessity amounts to, and about how it is different to think about powers in Aristotle's way than to think about them as dispositions or tendencies. Unlike dispositions, it might be appropriate to think of powers as "brute possibilities," the primitives that open up complex possibilities and determine the structure (e.g., closeness relations) among them.

6.4.5 Stacking Potentialities

Consider a counterfactual like:

If I were to learn French and be asked a question in French, I would reply in French. (6.1)

It seems right to say that this is because I indeed am able to learn French, and if I did, then I would have dispositions to respond in French to questions asked in French. In Aristotelian language, I have a capacity to learn French; and if I did learn French, then I would have a capacity to speak in French, which would be activated under circumstances including being asked questions in the language.

However, there is no existent power whose canonical counterfactual is 6.1. For a power is for one change, as we saw when looking at *Metaphysics* Θ.7 and *De Anima* B.5.

Speaking French (exercising the power to speak it) may be one change, and learning French another; but counterfactuals that correspond to my ability to learn and subsequently speak French don't describe the result of a single change.

In such cases, the counterfactual is made true by the existence of one or more capacities. Those capacities, when activated, produce further capacities, and eventually produce capacities whose activation results in the consequent of the counterfactual. Picturesquely, we can think (in a simple case) of a chain of capacities that "collapses" into a single mega-ability; the ability corresponds to a counterfactual which is then made true by the first capacity.

Contrast this situation with that of dispositions. Say a vase v is materially weak, in the sense that it does not resist warping due to the application of force: let the toy analysis be that were it to be struck with sufficient force, it would bend.

$$\text{weak}(v) \leftrightarrow (\text{struck}(v) \mathrel{\Box\!\!\rightarrow} \text{bend}(v)) \tag{6.2}$$

Now say in addition that the vase is brittle: let the toy analysis be that were it to bend (enough), it would break.

$$\text{brittle}(v) \leftrightarrow (\text{bend}(v) \mathrel{\Box\!\!\rightarrow} \text{break}(v)) \tag{6.3}$$

The vase is both weak and brittle, so

$$\text{weak}(v) \wedge \text{brittle}(v) \tag{6.4}$$

We would like to be able to conclude that the vase is fragile, i.e., that were it to be struck with sufficient force, it would break

$$\text{struck}(v) \mathrel{\Box\!\!\rightarrow} \text{break}(v) \tag{6.5}$$

But the argument does not establish 6.5. This pattern of reasoning works fine with material conditionals but does not in general work with counterfactuals. For it might be that when force is applied to the vase, the result of that application interferes with the actual brittleness. Brittleness tells us that the vase will break in nearby worlds where it is bent, but tells us nothing about strange enough possibilities where it is bent.[35]

Here is a natural language example of this form of argument where the conclusion

[35]To put things in terms of the familiar Lewis-Stalnaker semantics: it might be the case that, although the vase breaks in the closest world where it bends enough, that is not identical with the closest world in which sufficient force is applied and the vase bends enough.

Notice, by the way, that the hypothetical syllogism pattern also fails for indicative conditionals. Take the pair of sentences "If Oswald didn't kill Kennedy, then there was a massive conspiracy surrounding Kennedy's death" and "If there was a massive conspiracy surrounding Kennedy's death, then Oswald didn't act alone." Of course is it not true that "If Oswald didn't kill Kennedy, then Oswald didn't act alone."

does not intuitively follow. Imagine that I am sitting on the bank of a frozen over lake and considering walking out onto it. I decide not to, because I rightly realize that

If I were to walk on the ice, then the ice would break and I would die. (6.6)

I also think to myself, let us say again rightly, that

If the ice were clearly much thicker, then I would walk out on the ice. (6.7)

This time it is very clear that we cannot combine the conditionals to get a single larger conditional. From these two claims it does not follow that

If the ice were clearly much thicker, then the ice would break and I would die.[36] (6.8)

The problem can be fixed in the vase case if we make the vase's disposition of brittleness stronger: not only does it break in the closest world where it bends, but it breaks in many other worlds besides. The minimum that is needed (with plausible assumptions about modality in the background) is that it breaks in the closest world where it bends *and* sufficient force is applied. In this case the inference above is okay—assuming the triggering conditions for the weakness and brittleness are cotenable (the two dispositions can coexist and be triggered at the same time and world).[37]

(Notice that the corresponding strengthened version of equation 6.6 is not true: it is not true that if I were to walk on the ice *and* the ice were clearly thicker, then the ice would break and I would die. These strengthenings are not trivial.)

That is, the following inferences *do* seem okay:

$$\alpha \mathrel{\Box\!\!\rightarrow} \beta \tag{6.9}$$

$$(\alpha \wedge \beta) \mathrel{\Box\!\!\rightarrow} \gamma \tag{6.10}$$

[36]Similar examples, but focusing on the failure of antecedent strengthening for counterfactuals instead of transitivity (a so-called Sobel sequence), are discussed in Bennett (2003, p. 160) and D. Lewis (1973, pp. 10–13).

[37]To address it informally in the Lewis-Stalnaker framework, the first counterfactual conditional $\alpha \mathrel{\Box\!\!\rightarrow} \beta$ says that the closest world where α is satisfied is also the closest world where $(\alpha \wedge \beta)$ is satisfied, and the second counterfactual conditional $(\alpha \wedge \beta) \mathrel{\Box\!\!\rightarrow} \gamma$ says that at that world γ is also true, getting us our conclusion.

So,

$$\alpha \mathrel{\Box\!\!\rightarrow} \gamma \tag{6.11}$$

Intuitively, the problem with the first inference is that the vase's brittleness might be interfered with by the activation of the material weakness. The strengthened antecedent in the second formula above ensures that this doesn't happen.

Powers have a kind of modal stability or strength that dispositions lack. As mentioned, when something has a capacity, it is *necessary* that if its triggering conditions are appropriately met, the capacity actualizes. We do not usually think of dispositions as having this kind of strength. This suggests that capacities support counterfactuals in a stronger way than dispositions.

Consider the fragile vase example above. Say that material weakness and brittleness are both powers and not dispositions. The example doesn't show that the vase has an additional capacity of fragility, for there's no guarantee that a complex ability built out of capacities will be for a single change (like my ability to learn and subsequently speak French). But with powers rather than dispositions in hand, our above chain of reasoning does work without having to appeal to extra information about brittleness. The powers do support the counterfactual struck(v) $\Box\!\!\rightarrow$ break(v). This does *not* require the further stipulation that

$$(\text{struck}(v) \wedge \text{bend}(v)) \mathrel{\Box\!\!\rightarrow} \text{break}(v) \tag{6.12}$$

For the strong modal stability of capacities gives this result even for brittleness without this additional stipulation. If the the vases being brittle licenses the counterfactual

$$\beta \mathrel{\Box\!\!\rightarrow} \gamma \tag{6.13}$$

Then it also gives the counterfactual

$$(\beta \wedge \delta) \mathrel{\Box\!\!\rightarrow} \gamma \tag{6.14}$$

for arbitrary δ.

To use the jargon: antecedent strengthening holds for counterfactuals that are directly supported by the possession of powers. This is because powers, unlike dispositions, correspond to necessary counterfactuals.[38]

[38]Under plausible assumptions Antecedent Strengthening—the counterfactual $p \mathrel{\Box\!\!\rightarrow} q$, if true, cannot go from true to false by addition of a conjunct r to the antecedent—is true for a counterfactual if and only if the counterfactual is necessarily true.

Right to left: assume all worlds are accessible to all worlds. Then $\Box s \Leftrightarrow \forall w(s \text{ at } w)$. In particular

We see that while capacities do not "stack" to produce more capacities, chaining together several capacities may explain the truth of counterfactuals quite distant in modal space. As a special case of this sort of thing, a capacity may explain the truth of a counterfactual whose consequent describes the existence of new additional capacities. So the existence of a capacity may make it possible that another capacity exists. Since that other capacity underwrites further possibilities, the original capacity shows that it is possible that the state that results from the activation of the second capacity is possible. And what is possibly possible is simply possible. Thus, the original capacity underwrites the existence of possibilities and the truth of counterfactuals that are not *directly* about the results of its activation. Thus the existence and possession of capacities grounds a very wide class of objects' abilities and modal characteristics.

6.5 Branching Time

Aristotle can think some situations to be possible because they are the situations that actual powers result in. In a more complex case, he can think other situations to be possible because they are the situations that possible powers result in, where those possible powers existence or triggering is possible because it is the result of a possible power …until grounding out in actual powers.

To put this another way, Aristotle thinks of the possible situations as ones that are generated by one or more changes—where change is meant in Aristotle's sense of a teleologically unified process—diverging from the actual world history.

Possible situations are in the first place, then, situated in time. We might be willing to countenance that it is possible that I stand *simpliciter*, without reference to any time. As already noted, Aristotle certainly is willing to write this way, even when the relation between time and possibility is not a distant concern; this suggests that the unqualified assertion is not merely elliptical. I suggest that the reason for the unqualified possibility is that there are definite times such that we can tell a story about I might activate certain

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$\Box(p \mathrel{\Box\!\!\rightarrow} q) \Leftrightarrow \forall w(p \mathrel{\Box\!\!\rightarrow} q \text{ at } w)$. Now assume that $\forall w(p \text{ at } w \vee \neg p \text{ at } w)$. Consider the set $P = \{w \mid p \text{ at } w\}$. (Throughout I assume that the antecedents of our counterfactuals are not necessarily false, so $P \neq \varnothing$.) Let there be a distance ranking between pairs of worlds and assume that a world is always (strictly) closest to itself. Let $P \supseteq Q = \{w \mid (p \wedge r \text{ at } w\}$. Now $(\forall w \in Q)((p \wedge r) \mathrel{\Box\!\!\rightarrow} q \text{ at } w)$, since p, q, and r are all true at all those w. Now we have shown that $\forall w(((p \wedge r) \text{ at } w) \Rightarrow q \text{ at } w)$ and, because we have assumed S5, all those worlds are accessible from all worlds. So at every world, all the closest $p \wedge r$ worlds to it will also be q worlds, so $(\forall w)((p \wedge r) \mathrel{\Box\!\!\rightarrow} q \text{ at } w)$, and so $\Box((p \wedge r) \mathrel{\Box\!\!\rightarrow} q)$, which is what was to be shown.

Left to right: I show the contrapositive. The counterfactual is false at at least one world iff there is a world at which p and $\neg q$. Let it be w_1. By hypothesis the counterfactual is actually true. Then the counterexample to AS is $p \wedge \{w_1\} \mathrel{\Box\!\!\rightarrow} q$.

powers so as to end up standing.[39]

This way of thinking of possibilities gives ready sense, too, to Aristotle's tendency to write as if possibilities are not only realized but also obtain at times: what is possible at one moment might cease being possible a moment later. Already mentioned is the striking case of the necessity of the past. All but one possible way things can play out drop away as the present moves past the times those ways could be realized at (cf. White 1979, pp. 91–93).

It is easy to see that this counts as impossible some of the situations most philosophers today wouldn't hesitate to count as possible, even putting aside the fixity of the past. For example, there is no way of branching off of the actual history of the world to explain how there might have never been anything at all. Or, say that there is some physical invariant through all time, like the number of some primitive indestructible and uncreatable type of atom. Aristotle cannot accept the intuition that there could have been, from forever, more or less of this thing.

Aristotle is, of course, not an atomist. But it's just an example. *Any* invariant over the course of the actual history which cannot be changed through the activations of some number of powers will be a similar counterexample. It is very dubious that an *ad hoc* strategy based on noting that Aristotle denies atomism, etc. will rule out all cases where the necessity of such an invariant holds strikes us as unintuitive. Notably, the sorts of things we think of as "physical constants" will be cases like this: contingent parameters in the description of the world's laws, but parameters that hold universally through time and space and cannot be changed (or which only vary within certain bounds). Possibly we should think of the laws of nature themselves like this, too. It is very likely that Aristotle's world, too, has *some* constants like this: some way to measure how much elemental matter there is in the world, or its spatial magnitude, for example, even if it's a substantive problem about his physics to find exactly what quantity would serve the purpose.

At any rate I do not want to answer the worry by insisting that there are no such quantities for Aristotle; if the reader thinks there are not, so much the better for me.

[39]Hintikka (1993, p. 109), says, in the course of defending the claim that Aristotle accepted a version of the principle of plenitude, "Aristotle's view is probably motivated by the idea that the only way in which we can think of a possibility to be realized is at some moment of time in our actual 'history of the world'." See also Hintikka (1979, p. 78) for a longer statement of a similar idea, in the course of contrasting Aristotle and Leibniz's conceptions of possibility. I especially like "This [i.e., the non-temporal nature of Leibniz's notion of modality] is particularly obvious when Leibniz speaks of 'possible worlds' alternative to the actual one, for these 'possibilities' cannot conceivably be realised at any moment in time." The picture of modality being spelled out here can be usefully compared with the formal theory spelled out in Thomason (1970).

The interpretive problem will be solved twice over.

Anyway, I'll proceed while granting that there are at least some such invariants in Aristotle's picture of the physical world. One way to react is to simply bite the bullet: to claim that after all global invariants are necessary. The branching time picture captures well the intuition that possibilities require us to be able to tell a story about how they could come about, and no such story is available for these purported counterexamples.

There is some reason to think that Aristotle would have responded this way, too. Aristotle apparently accepts the so-called principle of plenitude, stating that something is possible if and only if it actually occurs at some point in time. (I will have much more to say about plenitude below, in section 6.8.) If some invariant could be different, according to plenitude, at some time it will be different; this never happens (because it is an invariant). So Aristotle's commitment to the principle of plenitude already commits him to denying that the physical constants could be other than they are.

But I think many philosophers are unlikely to be willing to abandon their intuitions that such things are possible. Is there anything we can say to prevent the appearance that the view of modality we have uncovered is a mere historical curiosity?

I think so. We can at least say that Aristotle has uncovered an interesting and natural subtype of modality. We regard nomological or metaphysical possibility as drawing theoretically useful distinctions in a wider, more inclusive sense of possibility. Aristotle's usual metaphysical possibility can be regarded in a similar way; even if we don't agree that Aristotle's view plausibly captures what it is to be possible *simpliciter*, we can see it as describing a theoretically useful kind of possibility.[40]

6.6 Cotenability and Branching

Right now we have that two powers p_0 and p_1 make true necessary counterfactual conditionals $\Box(\alpha \mathrel{\Box\!\!\rightarrow} \beta)$ and $\Box(\gamma \mathrel{\Box\!\!\rightarrow} \delta)$, so that we can infer that $\Box((\alpha \wedge \gamma) \mathrel{\Box\!\!\rightarrow} (\beta \wedge \delta))$. If we know that $\Diamond(\alpha \wedge \gamma)$, we can conclude that $\Diamond(\beta \wedge \delta)$; but how will we know if the former is true? What if the triggering of one power requires that the other be suppressed, or if the triggering of one power destroys the other power?

A similar problem: in the simple case of one active power, we have the counter-

[40]Here I was asked if was not walking back the prior conclusions, and after all restricting the possibilities that are grounded by powers. I don't see it. I have not abandoned the claim that *Aristotle* has it that powers ground all possibilities, and that possibilities are constrained in the pictured way. The acknowledgment that people who are not Aristotle may wish to take a way more moderate conclusions (more moderate, that is, from the standpoint of contemporary metaphysics) has no impact on the interpretive claims made.

factual $\Box(\epsilon \mathrel{\Box\!\!\rightarrow} \zeta)$. Perhaps it is right to think, as I've claimed, that in the widest sense of 'possible' it is always possible for a power to be triggered and to manifest its result. But when we consider possibility against the background of some set of assumptions—perhaps including a case Aristotle is particularly interested in, where the facts about the past are assumed—then we can't know that the triggering is possible.

These are similar problems because in the second case we are asking whether the triggering of the power is cotenable with the background assumptions; in the first case, whether the triggering of one power is cotenable with the triggering of another power (perhaps against some background assumptions). In both cases it seems plain that sometimes powers will be cotenable and in others not; what explains the difference?

Unfortunately I know of no indication in Aristotle's texts that he considered the question explicitly and decided in a principled way which powers can activate together. I will suggest that there is a partial answer that seems reasonably connected to the texts. But a whole answer seems to require instead falling back to reasonably Aristotelian options for completing the thought.

In section 6.9 below, I'll discuss the idea some scholars have had that the kind of physical modality we're talking about is not the only one Aristotle acknowledges. He may accept necessity based on the essences of substances, as well. One might think we could rely on that here. Then the answer to the above questions might be that $\diamond(\alpha \wedge \gamma)$ iff $\alpha \wedge \gamma$ together with statements of all the essences of things (together with relevant background assumptions?) does not entail a contradiction.

But I think this is not very satisfying by itself. Say we consider two objects with accidental powers such that when at a distance greater than some d they repel each other and at a distance $\leq d$ they collapse together. They cannot exercise both the powers to repel and to attract at the same time. But it is unclear what it is about the essence of any substance that shows this. It is rather something about the two powers, the power to attract and to repel, and their mutually excluding triggering conditions, that explains why both powers cannot simultaneously activate.

It is plausible that powers will sometimes not be cotenable, i.e., Aristotle is not thinking of powers as "atoms" of possibility which can all be toggled off and on irrespective of each other. This is plausible in part because powers will have their triggering conditions stated in terms of each other. An animal perceives something, for example, when it gets close enough but also when the appropriate medium relates the animal to the thing. In general the triggering conditions activating for some power p_0 may include that powers $p_1 \ldots p_n$ act—and perhaps that some others $p_{n+1} \ldots p_m$ do not act. But this means that if we know that the activations of those power $p_1 \ldots p_n$ are all (and jointly)

possible (in the absence of $p_{n+1} \ldots p_m$), then we will know that the triggering of p_0 is possible, too.

Similarly since the triggering conditions for a power may well need to rule out the activations of other powers, the triggering of the power is not possible with the activation of those other powers.

In effect this is just to point out that the antecedent of the counterfactual we are trying to show to be possible may itself be the consequent of another counterfactual. As the question of whether some situation is possible can be pushed back to the question of whether there is some action to produce that situation, the question of whether that action is possible can be pushed back to the question of whether there is some way to produce that action.

Now I suspect that Aristotle will be happy enough to think this way, because he plausibly sometimes thinks of a series of smaller motions as (partially?) constituting a larger motion.[41]

This answer does not appear to be a complete answer. On pain of regress we can't keep using the same tactic indefinitely. But it is also clear that it puts a substantive constraint on possible answers to the cotenability question, as follows.

Consider determining what is possible in the following way. We stipulate that for some time and set of powers, every power in the set has a possible antecedent, and then let that decision propagate according to the above. For example, we might stipulate that human decisions are open, and so get not only that it is possible that I do this or that, but also that the various results of my acting in this or that way are possibilities.

[41]In my opinion this is a plausible reading, e.g., of *Generation of Animals* B.1.735a1–5. Consider too that *Metaphysics* Θ.8.1050b24–8 would seem to suggest that *our* activities must be constituted at some level by changes (lest they not be laborious).

We may be inclined to take inspiration here from Aristotle's apparent claim that changes have form and matter (*De Anima* A.1.403a29–b4, see below). Then perhaps the matter of a motion might be thought of as the smaller motions, which, when ordered by a form, constitutes a further motion. Surely there is a reasonable analogy between form and matter of a substance and form and matter of a motion. But I am inclined to agree with those who have been dismissive of Aristotle on this point (Hardie 1964, pp. 64–66; Barnes 1971, p. 107) that at best this is a rough analogy. (A change may be constituted of other changes, but it is not constructed out of them as an object is constructed out of preexisting matter that it may be contingently made into.) And I would prefer to side-step the controversy on the issue if I can. So I do not feel very tempted to rely on the idea here.

(At *De Anima* A.1.403a29–b4 it is actually that the form of anger is a kind of craving and the matter is a surging of blood. So perhaps this is not analysis of a motion but of an activity. In any case, much has been made of the passage in the hopes of clarifying Aristotle's theory of mind and especially of perception. For a start see Sorabji (1974, pp. 69–70) for discussion of the form and matter of the "physiological process" of anger; Sorabji (1992, pp. 209–10) for an explicit endorsement of the idea that the reception of form without matter by a sense-organ is the matter of perception; Burnyeat (1992b, pp. 16–18, 25–26) for discussion and rejection of that idea; and Caston (2004, pp. 253–4) for more discussion of the positions and how they relate to the wider debate on perception.)

Generating what is possible relative to some decision about initial powers is flexible but still constrained.

This seems to me to capture at least part of how we do ordinarily think about what is possible. In planning what to do, we do not worry (outside of philosophy classrooms) about whether facts about the motions of the elements rule out one of our options. That is not the way that Aristotle's examination proceeds in *Nicomachean Ethics* Γ, either. To bother about elemental motions in that context seems to be on the wrong "level" of analysis.

The most constrained path is to make this stipulation for no powers. Then we will only know that the powers with *actual* antecedents have possible consequents. The most generous path that seems plausibly Aristotelian is to make the stipulation for all powers (maybe, all powers existing now and activating now or later) but only if their joint activations are in some very capacious sense cotenable.

The very capacious sense may seem to introduce some sort of modality in addition to what we've already discussed, but I am not convinced the impression is right. If we think of the content of powers as conditionals, then we need some way to tell if the conjoined antecedents are cotenable. And you might think that means we need another principle to test for compossiblity of the conjoined antecedents.

But I suggest that the appearance is an artifact of representing the powers syntactically. Consider another way of representing a power: as a set of ordered pairs of situations (intuitively, pairs of the various ways the power could be activated and the situation of its activation).[42] Then the question of cotenability becomes merely the question of whether there are any two pairs, one from each set, with the same first member.

The general point is that what it takes to determine cotenability depends on the representation of the power. If you're working with a language, you might need to add syntactic derivation rules; you're working with a set-theoretic object as above, you might need the ability to check, e.g., whether sets intersect. So we need to attend to what machinery is added because of the facts about cotenability and what machinery is added because it's necessary to deal with the chosen representation. When a different representation is chosen it becomes less obvious that appeal to anything other than the content of the powers themselves is necessary. It's not clear, also, what operations we get "for free" in this construction, but it seems plausible that we're running into them when we start talking about whether two situations are of the same type, whether two

[42]The use of 'situation' here need not be constrained to possible situation. But in any case this is meant to be a representation, not a reduction.

sets intersect, about logical possibility, etc.

6.7 What Kind of Modality Is This?

The central principle behind this sort of modality is that what is possible is what could be reached, from the actual world, by some series of changes. There has to be some way to "get" there, some way to produce that possible situation, through the causal activities of things that actually exist.

Searching for a causal path to a goal situation is one way to think about what we do when we plan.[43] To find such a path is to discover that the goal is attainable and to discover a way to attain it. If a goal is possible but not attainable—for example, that the physical constants be different—for the purposes of practical action it may as well be impossible. We need to abandon such situations as possible goals. Also, they are irrelevant as contingencies we may need to plan ahead for, and they will never enter into our search for a workable path.

This is not just a metaphor. Planning can literally take the form of searching the kind of tree we can use to represent a branching time model for some node in the tree that has the desired property. If we put a cost on each transition from node to node such a search allows us to think about the relative efficiency of plans, too.

The kind of possibility Aristotle is thinking of, then, we might call "practical attainability." That explains why the past is fixed and why possibilities are relative to and realized at particular times.

Note that I do not claim that a Leibnizian conception of possibility, centering on possible worlds bearing no intrinsic relation to actual times and places, cannot recover this Aristotelian kind of modality. Of course it can. (A good starting point would be to think of possible worlds that are qualitatively identical to the actual world up to some time. In order to rule out impossible ways for the world to evolve, we will still need to know a lot about which causal processes are physically possible, i.e., about the abilities things have). But it requires a construction; it is not already present in the primitives of the theory. Similarly we can construct some large subset of Leibnizian possible worlds from Aristotelian branching modality, roughly by seeing the worlds as maximal paths through the entire tree.

Still, the fact that Aristotle starts with the branching time model and that we would

[43]Arguably this is an understatement: as Newell claims "search is not just one method among many that might be used to attain ends but is the most fundamental method of all" (Newell 1994, 96, see 95–107 for discussion).

have to supply a construction of Leibnizian worlds is an important clue to what was running through Aristotle's head as he thinks of these modal phenomena. Less psychologistically, these sorts of equivalencies are compatible with one representation being more natural (or more useful for the work we typically do when thinking of modality) than the other. Even among in some sense equivalent models, some of them do a better job of revealing essential attributes of the phenomenon. If we think that modality has an essential and deep connection with causation and (actual) time, then it is reasonable to make the branching time model the starting point and the privileged model.

Attainable possibilities are important in other "applications" of modality. For example, we are often unwilling to blame someone for some action if there was no other possible way.[44] But clearly when we say "no other possible way" in this context, we do not mean to quantify over possibilities like the physical constants being different, etc.: those are irrelevant to what a person should have done or thought ahead about. We hold a person responsible (on this way of thinking) for what they do provided they could have done otherwise, and ignore possibilities that are altogether causally not accessible.[45] The possibilities that are relevant when we attribute praise or blame, like the possibilities that are relevant when we plan or choose or intend to do something,[46] are possible events situated in actual time.

This conception of possibility is all about what things, including people, can *do*. That helps to explain why possibilities are tied closely to actual time: your actions happen in time and realize results in time. And it helps see why it is natural to root possibility in the powers of actual objects. Remember that the power concept in Aristotle's mind probably had *its* beginning in the abilities of living things, including people (see section 1.5.2 in the introduction). The actions done by people and things are not instances of mere flux, but directed and cohesive processes. That is why they need to be explained by the existence of powers. What *can happen* is ultimately, on this way of thinking, a matter of the potential interactions between what individual things and people *can do*.

[44]As Aristotle acknowledges throughout *Nicomachean Ethics* Γ.1, on compulsion as an excuse. Most examples are of coercion but one of unavoidably being moved by natural forces is at 1110a3.

[45]There are further questions about to what degree we require that the possibility be accessible by powers under the agent's control, or accessible given what the agent knew, etc. (and Aristotle is concerned with just this in *NE* Γ.3). But in any case these are all further restrictions on the branching time tree.

[46]What we choose is not impossible, and someone who said they chose something impossible (presumably, as such) is stupid (*NE*.Γ.2.1111b20–22). Similar remarks go for deliberation (see *NE*.Γ.3.1112a18–23, 1113a1–5).

6.8 In Defense of the Principle of Plenitude

The principle of plenitude has largely not found favor among modern commentators. But I believe that it is a reasonable (though not compulsory) thing to think—once we understand the modalities involved correctly.

I have already noted that Aristotle's principle of plenitude may be used to rule out a class of counterexample to the kind of practical modality I claim late Aristotle primarily operates with. Since we have very good textual evidence for Aristotle's commitment to the principle of plenitude,[47] this can be thought of as confirming the claim about modality—that claim turns out to hang together well with another prominent Aristotelian commitment.

In this section I claim that this conception of modality illuminates the principle of plenitude. This offers further confirmation that we are on the right track in limning modality as fundamentally practical and rooted in powers. And of course it is of independent interest since the principle of plenitude strikes us as strange and in need of justification.

First: here, adapting the formulation in Waterlow (1982b, pp. 1–2), is a version of plenitude:

Plenitude It is possible that *p* iff at some time it is the case that *p*.

Equivalently:[48]

Plenitude' At all times it is the case that *p* iff it is necessary that *p*.

There are two big problems about the principle, which we'll take in order.

First, why would Aristotle accept the principle?

As Waterlow (1982b, p. 2) puts it, "[its] plausibility to Aristotle is something of a mystery." (Cf. the gentler skepticism of Hintikka (1973b, p. 93).) I will try to show that the concrete doubts expressed by Barnes (1977, p. 184) are not right: it is far from obvious that Plenitude means, as he says it does, that "elephants will tell each other

[47]See: esp. *DC*.A.12. Also *GC*.B.9.335a33–34, 11.338a1–3; *Phys*.Γ.4.203b30, *Meta*.E.2.1026b27–28, K.8.1064b32–33, Θ.3.1047a11–14, 4.1047b3–6 (and ff.), 8.1050b7–8, 20–21, 10.1051a1b13–17, N.2.1088b23–25, Δ.12.221b28–29, 222a8–9. Defense of this reading of these passages can be found in Hintikka (1979) and Hintikka (1973b). See Barnes (1977) and Judson (1983, pp. 219–221) for more skeptical takes (though neither goes so far as to reject all textual evidence and every version of the principle). Here I'll leave it at saying that I find the textual evidence, in the aggregate, to be extremely compelling.

[48]Equivalently over the duality of $\Box$ and $\Diamond$, that is; we've seen there is every reason to think Aristotle accepted that duality. It is a very simple inference. Therefore I see little reason for the anxiety in Judson (1983, pp. 219–221) over amount of textual evidence for one version of plenitude versus the other.

human jokes, the first daffodils of autumn will appear when the leaves fall upwards to the trees, and pigeons will hunt cats through the city backwards." On the contrary such paradoxical results are generated by attempting to apply principle of plenitude to a type of modality it was not meant for. I will argue that Aristotle has a more restricted notion of possibility than the average contemporary philosopher, but one that makes much more sense of plenitude, and meshes well with his other commitments too.

Second, how can we state the principle in a precise way that doesn't make it so obviously false that it cannot be what Aristotle meant?

6.8.1 Why Would Aristotle Be Tempted by the Principle of Plenitude?

First let us talk about why one would accept the principle. As Waterlow (1982b, pp. 1–2) and Hintikka (1973b, p. 97) point out, it is in both cases the left-to-right directions of the biconditionals that strike us as implausible, while the other direction strikes us as trivial. So it is the left-to-right direction I will focus on.

Against *plenitude* left-to-right: it seems possible that a genuine possibility should, say simply by chance, never turn out to occur. Against *plenitude'* left-to-right (really, the same objection rephrased): can we not picture that some contingent generalization holds for all time as a matter of global accident?[49]

Aristotle does give an argument for *plenitude* at *De Caelo* A.12. It is plausible that the argument in part relies on a premise like:

No infinitely inert power (NIIP) If a power actually exists for an infinite amount of time, and it is possible that it be triggered during that time, then it is triggered at least once.[50]

[49]Here Professor Schmaltz commented "I'm not sure about the equivalence: couldn't a temporary power fail to be actualized due to a temporary accident?" But this is an objection to the principle, not to the equivalence of the two versions of it. It is a reasonable objection to the principle. In the next section we will see Aristotle does give some indication he is aware of it, and discuss it further.

It would seem I erred in not giving an explicit argument for the equivalence, which I remedy now.

Say *plenitude* left-to-right is true. *Plenitude'* left-to-right follows: assume at all times it is the case that p. So at no time is it the case that $\neg p$. So by *modus tollens* on *plenitude* it follows that it is not possible that $\neg p$. By the duality of necessity and possibility it follows that p is necessary.

Say *plenitude'* left-to-right is true. *Plenitude* left-to-right follows: assume it is possible that p. So by the duality of necessity and possibility it is not necessary that $\neg p$. Thus by *modus tollens* on *plenitude'* left-to-right it is not true that at all times $\neg p$. Thus there is some moment where p is true. That is the consequent of *plenitude'*, which completes the proof.

Notice that this argument does not mention powers, temporary or otherwise, and that the only features of possibility and necessity it relies on are their duality.

[50]Apparently this is used as a premise at *De Caelo* A.12.281b21–22: Εἰ δὴ ἄπειρον χρόνον, ἔστω

As we usually think of possibility, this is hard to swallow: similarly to the above objection, couldn't the power simply never trigger as a matter of extreme luck? We might be prepared to claim that to think that possibility actual borders on a skeptical hypothesis—still, it seems a possibility, a perfectly coherent way for things to turn out.

Instead of thinking of the situation as if one were sitting outside of time and seeing if a coherent description is constructable, consider what happens when one thinks of possible situations as the ones that we need to actually plan around and take to be practically relevant. In particular, let us continue with our previous thought that what is possible now is what has a positive objective chance of happening, and that this gives a natural sense to the idea that one thing can be *more* possible than another.

Say we have a power that has some finite positive chance at least c to be triggered over a finite number n of moments (or intervals) that are all independent opportunities for it to be triggered. Now say someone offers you a bet: if the power is triggered, you get a dollar; if not, you have to give up your stake. The chance the power is triggered at least once is at least $1 - (1 - c)^n$, so you should be willing to wager anything under that against the dollar.

Now say the number of trials increases without bound. So the chance the power is triggered at least once increases toward 1. Now say the number of trials is literally infinite. What should you be willing to wager? For any finite amount you could put up, you ought to be willing to wager more.[51] For *practical* purposes, you should effectively be certain that the power will activate at least once. Your plans should bank on it happening; to plan around the contingency of it not happening is like planning around $2+2$ coming to 5. You should be willing to assert that the power will activate at least once, and to assert that it's not the case that it won't. The situation that the power never activates is, on the practical attainability modality being considered, not possible. The objective chance the power will never activate might as well be zero.

Here I'm inclined to say rather stronger things: the chance is literally zero; the deep connection is not with practicality or credences or action as such, but probability; the

ὑπάρχον ὃ δύναται.

Professor Schmaltz asks: " But couldn't one accept this and nonetheless hold that there could be powers that exist for a finite period of time but are never triggered due to particular circumstances?" Yes. But that is the interpretively correct result. Aristotle does not appear to believe his commitment to the principle of plenitude commits him to the idea that every power is activated at least once, as we will see in more detail in the next section.

[51] I am assuming that c is independent across trials and bounded below. The first assumption seems reasonable since the point of interest is not an immortal single capacity but distinct substances of the same type repeatedly attempting to activate the same power at different times. The second assumption is stronger than it needs to be for the purpose at hand, but probably a weaker assumption is not plausibly what Aristotle had in mind.

view amounts to the claim that what is (physically) possible is coextensive with what has a non-zero probability. The platitude to cite is: if there is no chance something can happen, it's not possible it happens. For obvious reasons I will not pursue the idea here, but I did want to indicate how a fuller treatment of the topic might go.

Of course I don't mean to say that Aristotle would have thought about any of this in terms of credences or bets. But I have only used that to frame the intuition. The intuition is one that Aristotle may well have shared, that as the power exists for longer and longer it becomes not only vanishingly unlikely that it will never activate, but for all practical purposes impossible.[52]

I will finish by discussing a family of objections. A very plausible sounding principle governing any modality (in the narrow sense of possibility and necessity) is the following:

A5 For all propositions p, $p \rightarrow \diamond p$.[53]

Familiar cases will be raised to try to show that vanishingly unlikely events that are counted as impossible on the current conception of modality are possible.[54] For example: say you throw a dart at a board. There are continuum many points it could hit (the argument goes), and it's as likely to hit any point as any other, so the chance it hits a given point must be zero (and that is indeed the measure of such a set).

Or say you flip a coin an infinite number of times; the chances it comes up heads every time is zero, but it seems possible ....

The stories might be taken as plausible sounding cases about what could happen. But I think they get their greatest bite when we note that, if they make sense as described in the first place, it is easy enough to find plausible equivalent cases that do in fact happen. Then if the objector is right, the conception of modality we are limning violates A5. That seems unacceptable in an account of metaphysical modality.

[52]"For all practical purposes"; here I was asked, aren't I falling back from an interpretation of the Principle of Plenitude in its full strength? No, I am not.

I am not falling back to the claim that that Aristotle thinks that some restricted version of possibility satisfies Plenitude. He thinks that Plenitude is true of what he takes to be possible, without modal restriction on what counts as possible. For I am claiming that for Aristotle what is possible *is* what is possible "for practical purposes"—or more carefully, what is possible for practical purposes taken to an extreme limit. That *you*, a contemporary analytic philosopher, are likely to think this is a restriction of what is possible is interesting enough to be worth pointing out, but that changes nothing about the interpretive claims as to whether *Aristotle* took this as a restriction.

[53]I call it A5 after the equivalent axiom in Cresswell and Hughes (1977, p. 31).

[54]Both the case of the circle and the coin are mentioned in Williamson (2007), for example; and it seems to me they are by now a part of the lore on the topic in any case. I don't know where the examples originate.

Whatever else might be said about these cases, I think we can find concrete places where Aristotle will reject them. Let us consider them in order of increasing difficulty.

First, consider throwing a dart at a board (which, it is claimed, consists of continuum many points) or spinning a pointer on a wheel so that it randomly stops (stops, it is claimed, on one of continuum many points on the perimeter of the circle traced out by the pointer's motion) (Williamson 2007, pp. 173–174). Therefore there are continuum many possible outcomes, for each point the dart or pointer might select. So the chance that any particular point is struck is zero. But clearly (one says) a point is struck, so the zero probability event cannot be regarded as impossible.

Here I think Aristotle is very unlikely to accept the physical assumptions invoked: the board does not consist of a continuum of (actual) points, despite the fact that we can divide it up that way in thought; and (he at least ought to say) no dart narrows to a single point, so that it can hit only a single point on the board.

We might insist that it is metaphysically possible that darts be like that. In the first place I can see no clear justification for that claim. More importantly I can see no justification that the dart should be possible on the Aristotelian sense of possibility under consideration. What series of changes are we supposed to imagine that would produce such a dart? If the situation is possible at all, it seems it would require different physical constraints at a very basic level, e.g., matter being of a different nature.

Perhaps it is a bit better to talk about something like flipping a fair coin a countably infinite number of times. Is it not possible that it will come up heads every time?

It is arguably not possible that a coin be flipped this way, as some kind of long experiment. But no matter. For so far this seems very similar to asking: is it not possible that a power will at every opportunity fail to activate? It seems there is a fact of the matter, independent of anything a particular mortal experimenter does, as to whether a power ever activates over the future of the world.

Worse, the objector can add: consider that the experiment will result in *some* sequence of heads and tails (or activations and non-activations). Call it S. Since S in fact will happen, it must be possible, by A5. And yet before the sequence takes place, we ought to think the probability of that sequence is zero, according to the line sketched above.[55]

This version of the objection seems to be imagining that at some point, after the world has run its course, we can look back and say: ah, it turns out that the activation

[55]There is something a little funny about this line of thought in that, without begging the question against the Aristotelian anyway, there seems to be no independent way to pick out the sequence S. But I don't know how to turn my unease on the point into a reply to the objection.

pattern of such-and-such power after December 1st is this pattern. For at some point there must be a fact of the matter about what the sequence is for the objector to be able to claim that a statement of the sequence is true, which they need for this objection as it is the antecedent of A5.

But the Aristotelian may well insist that there is no fact of the matter, at least in general, until all the flipping of coins has happened. That is just what Aristotle denies if he claims that the future is open.

A reply like this does not have to lean on the open future. *Truth* aside, the Aristotelian may well insist that to make such claims is to (try to) talk about a completed actual infinity. There is no end of time from which we can look back and say: yes, that infinite sequence of flips happened, and so was possible all along.

To put this differently: earlier we said that something is possible if it happens at some node in the tree of branching possibilities, and something is necessary if it happens at all of them. That doesn't tell us anything about whether generalities about whole branches in the tree are possible or not. It doesn't even require that it makes sense to make such claims. It is at least consistent to insist that we can think and talk about what takes place at nodes in the tree without being able to quantify over whole branches (or perhaps merely to say that such quantification is no longer about modality, or about the same modality).[56]

The objector may try again by reversing direction. For Aristotle, the past is necessary and fixed. And, it extends infinitely away from the present. So there is some fact of the matter about whether, for each moment in the past, the power has activated or not.

Looking to the future, the objector found that the sequence is impossible, and there is no moment from which to say it has actually occurred and so must be possible. Looking to the past, the objector will find the situation inverted: there is no moment "before" all time, from which one may look forward and say that the sequence (which we see from the present moment has actually occurred) is impossible. So once again the objection founders.

I am less sure that we can meet these objections as claims about modality in general if we abandon the open future and rejection of actual infinities. But we can still say this: the truth and the possibility of S occurring are not questions of any practical import. There isn't a (realistic) bet on this sort of question that will ever cash out one way or

[56]Plausibly the original account does, however, put constraints on how we extend the account to deal with the possibility of such "eternal" states of affairs. If we say that it is possible that a power be activated, and we say that it makes sense to make claims about the totality of actual time, then the first possibility and plenitude rule out that the totality of actual time has no activations.

the other. When we constrain our attention to propositions which do have to do with what is practically relevant, we find that if one of these is true, then it is possible.

In this connection it is worth noting that very similar problems, if indeed they are problems, arise without mentioning possibility at all. Say God offers me a bet that S will be the particular sequence he is thinking of at that moment. It seems on the standard approach I ought to have credence 0 the sequence thought of is S and I ought to be willing to place any bet against its being S. Since I have credence 0, even if God offers me the bet anew after promising me that S is indeed the sequence he is thinking of, my credence can't budge![57]

This is all to say that while I cannot quite see my way clear of the problem, it does not seem to be a problem for the type of modality as such, but for the idea of practicality it trades on. Interpretively, it is tempting to be dismissive on the grounds that Aristotle could not be expected to anticipate objections like this, which, anyway, take their most damaging form once we have left behind (plausibly) Aristotelian positions like the openness of the future and the absence of completed infinities.

In defense of the idea itself, it may be sufficient that we shouldn't be surprised by now to find that extending our normal ways of thinking to infinitary cases produces unintuitive results.[58] Anyway if the validity of the principle can be pushed to the point where it stands or falls with open problems as to the adequacy of conventional decision theory's ability to handle infinitary cases, then we have done at the least considerable work in rehabilitating the principle—even if, unfortunately, a real sticking point remains.

It may also be that the possibility of S belongs to a wider notion of possibility than the one Aristotle is talking about, and A5 holds well enough as long as we confine our notice to the mundane, practical, and finite. (Anyway the principle A5 gets its plausibility from mundane examples.) It may be that we cannot do without wider notions, but that is no reason to think the narrower one has no legitimacy or purpose.

[57]Say, if you like, that instead of 0 my credence is some infinitesimal non-standard number less than any finite non-zero number (see, e.g., Williamson (2007) for some reasons to be skeptical the approach works). Even if the idea can be spelled out consistently to preserve the intuition that S should not get assigned a zero chance, it seems to offer little substantive help. It may make us feel better not to have to call the credence 0, but what is the functional difference? E.g., still I cannot revise my credence to any finite positive number between 0 and 1 that is greater than a rational.

[58]Compare one of the morals drawn by Williamson (2007, p. 179):

> Cantor showed that some natural, apparently compelling forms of reasoning fail for infinite sets. This moral applies to forms of probabilistic and decision-theoretic reasoning in a more radical way than may have been realized.

6.8.2 What Does the Principle Quantify Over?

This way of thinking through the principle helps us see how to phrase it, too. Many have already noted that the principle shouldn't be taken as quantifying over literally all events. For Aristotle emphasizes that a particular cloak, for example, may fail to realize the possibility of being cut as opposed to destroyed in some other way. And yet he acknowledges that it is possible before it is destroyed some other way that it is possible it be cut apart (*De Int.* 9.19a12–14).[59]

Therefore at (say) the present moment it is possible that the cloak be cut in five minutes. (Evaluate all the following from the current moment.) Say we let Plenitude tell us it must be true that the cloak is cut at some time. (Then that is at least true now, presumably.) When will it be true? Not in five minutes, or any time after that, or it would have to be true that the cloak is cut at five minutes from now. But not before five minutes from now, either. For in that case we would have a proposition that flipped from true to false as time went on; while perhaps Aristotle believes that the indeterminate can become determinately true or false, nothing suggests that the former is a possibility.

Unlike the situations where the physical constants are different, it is not plausible as a matter of interpretation to bite the bullet here. For attempting to do so threatens to collapse necessity, possibility, and truth. But Aristotle concludes from the example of the cloak that not everything that happens does so of necessity.

After giving the example Aristotle explains:

> φανερὸν ἄρα ὅτι οὐχ ἅπαντα ἐξ ἀνάγκης οὔτ' ἔστιν οὔτε γίγνεται, ἀλλὰ τὰ μὲν ὁπότερ' ἔτυχε, καὶ οὐδὲν μᾶλλον ἢ ἡ κατάφασις ἢ ἡ ἀπόφασις ἀληθής, τὰ δὲ μᾶλλον μὲν καὶ ὡς ἐπὶ τὸ πολὺ θάτερον, οὐ μὴν ἀλλ' ἐνδέχεται γενέσθαι καὶ θάτερον, θάτερον δὲ μή. (*De Int.*9.19a18–22)
>
> So it is clear that not everything is or comes to be by necessity, but in some cases whatever happens is by chance, and neither the affirmation nor the denial is more true, and in other cases it is rather one alternative for the most part, but still both alternatives are possible.

The collapse of necessity, possibility, and actuality if we allow plenitude to apply indiscriminately happens as follows. Say we think of the proposition meant by 'the cloak is cut at t_1' in the way a contemporary philosopher might, so that a proposition's

[59]This upshot of the passage is recognized by Waterlow (1982b, p. 3), Barnes (1977, p. 184), and Hintikka (1973b, p. 100).

truth value is eternal. Since the described event does not happen, the proposition is always false. So by Plenitude' (left-to-right, *modus ponens*) it is necessary that it is false, and so it is not possible that it be true. Thus what does not happen cannot happen.

To hold that truth and possibility are relative to times complicates the argument, but does not avoid the result. On this way of thinking, it is possible that the cloak is cut (it is indeterminate that it will be cut and indeterminate that it will not be) until some time $t_2 \leq t_1$. At t_2 it becomes too late to put into action a causal process that would cut it in time: the process could not complete before t_1. After t_2 it is false that the cloak is cut at t_1. (As before, I assume that a proposition will not change truth values once it takes a determinate truth value.)

This means that it is always the case that it's not the case that the cloak is cut at t_1. For the embedded proposition 'the cloak is cut at t_1' is always either false or indeterminate. There is no moment where it is true that the cloak is cut at t_1. So, by Plenitude (left-to-right, *modus tollens*), it is not possible that the cloak is cut at t_1. The same argument can be repeated for any proposition which never comes to truly describe what happens at t_1; such propositions are at no moment true and so necessarily not true. So what will not in fact happen is not possible beforehand, either; what will happen is possible, and necessary, but what does not happen is neither.

We could instead take the principle to be quantifying over something like event-types, that make no reference to particular objects. I take this to be essentially the strategy of Barnes (1977, p. 184):[60]

> Not all NSAs [non-temporal states of affairs] involve perishable particulars: some involve only imperishables …others involve no particulars at all. Let us call such unparticular states of affairs *proper NSAs*. Now the Principle of Plenitude is concerned with proper NSAs; and it asserts that any proper NSA which is contingent does at some time actually obtain ….

It is also the strategy I will pursue. However, I have two concerns. First, the notion

[60]A rather different strategy is taken by Judson (1983). According to him the point is that plenitude governs the capacities of the "cosmos' elemental components" (220) and not the capacities of "finite individuals" (225).

However, this does not solve the problem of the cloak's being cut: clearly Aristotle does think fire *et. al.* perish and have finite lifespans. We may be tempted to locate the capacities of fire in some sort of overarching substance, the fire-stuff, that loses this or that part when a parcel of fire turns into air: but it is clear that Aristotle neither thinks of the perishing of fire as the destruction of a part of a realer whole substance nor denies elements the status of substances. We may like to find some important difference in that fire seems to be stuff rather than an individual object, but that is not a distinction that Aristotle ever focuses on.

Contra Judson, what is needed is not to distinguish some type of thing to be governed by the principle of plenitude, but to distinguish types and things.

of an arbitrary event-type is not particularly Aristotelian. I am not especially anxious about using modern concepts to explain non-modern texts; still it is better if we can find a way to connect that concept to what Aristotle does say.

Second, in *De Caelo* A.12 Aristotle uses the principle to show something about individual objects (Waterlow 1982b, p. 56). It certainly seems that the argument is meant to show that some particular substances, since they are eternal, must be necessarily eternal.

If the principle is meant to apply directly to such cases, then either it is incorrect to construe it in terms of event types; or some event types will be so specific that they effectively pick out individuals anyway, in which case they are unlikely to do the work originally wanted from them.

If, on the other hand, the principle is not meant to justify the claim about particular objects directly, fair enough; but then we are entitled to ask what it is about the principle that nonetheless makes it relevant to the case Aristotle uses it for.

The motivation for talking about NSAs is that the problem with the coat is likely to recur when the propositions quantified over are able to refer to particular objects which have finite, bounded lifetimes.[61] Since Aristotle works freely with the idea of types of capacity, we can use that idea to find an Aristotelian way to restrict the principle.

Aristotle relies in his argument for plenitude on the idea that a capacity that persists for an infinite stretch of time[62] will eventually activate.[63] (A particular capacity won't in general persist forever, but that type of capacity may well be always instantiated, or at least may well be instantiated for an infinite stretch of time.) And it seems it will do so an infinite number of times, since if we consider the eternity of time remaining after the last activation of some finite bunch of them, the same argument as before will show (provided it worked in the first place) that the power will activate in that remaining span

[61]Barring a gerrymandered or circular way of picking out an exceptional subset of such particulars.

[62]Provided also, we'll add, that it has an infinite number of independent opportunities to activate and the chances are bounded below (or a similar weaker assumption).

[63]Professor Schmaltz: "I'm still not sure how this rules out the existence of powers that exist for a finite period of time but are never activiated. Doesn't this possibility rule out Plenitude?" It is not intended to rule out the existence of such powers, both because Aristotle accepts them and because ruling such out while understanding powers as Aristotle does would be implausible.

Doesn't that rule out Plenitude? The point in the body of the text is that this depends rather a lot on how Plenitude is construed. Construing Plenitude in such a way that the existence of such powers does not rule it out is necessary for anyone who wishes to claim Aristotle did not contradict himself between commitment to Plenitude and his remarks on the cloak. (More reasonably, an interpreter ought to at least find a way to construe Plenitude so that a contradiction is not obvious.) That requires that the activation of a particular temporary power not be considered to be a possibility in the sense relevant for Plenitude.

This requirement is not something I'm committed to because of the particular motivation for Plenitude I try to find in Aristotle. Rather, we're committed to it already if we hope to make Plenitude make any sense in the light of Aristotle's other commitments. I try to provide a motivation for Plenitude that respects that.

of time. Now if we have a second power, whose activation conditions and active state are both compatible with those of the first power, then (again if our initial argument works), sometime during the infinite moments where the first power is activated, the second power will activate as well ….

The train of thought can be continued with any finite number of powers, as long as they are all jointly compatible with each other and it makes sense to think about independent trials for all of them over the stretch of time. So, if we find it plausible that for any power type that is instantiated for an infinite stretch of time an instance will activate, we can extract that for some bunch of compatible powers the whole bunch will activate at some point. This gives us a concrete way to think of what kind of event Plenitude is quantifying over: the joint activations of compatible bunches of powers.

Thus we have turned the previous sketchy argument for Plenitude into a sketchy argument that activations of "clusters" of powers, if the they are compatible and so the joint activation is possible, happen at some point. Such activations of clusters of types of powers are a reasonable way to think of situations in the non-individualistic way Barnes was aiming for.

I have simplified in lots of ways. At least: we have acted as if there is a single power of each type, and the only question is of its being activated or not, and not brought into it location or instantiation in particulars; we have acted as if asking about whether a power activates is like asking about whether a coin flip comes up heads or tails, a discrete bounded trial, and as if asking if ten powers activate is like asking if ten coins came up heads. Probably there is more. It would be good to make the hazy intuitions I am attributing to Aristotle more precise, but I can't do it here.

6.9 Grades of Modality and Essentialism

I wish to address two topics in this section. First, one might think that Aristotelian modality is based in essences instead of powers.[64] Hopefully I have said plenty to make plausible the positive proposal that modality is explained by powers. Here I will also gesture at the failings of the other idea, that for Aristotle essences are the crucial thing.

Second, the literature on Aristotle's conception of possibility contains a dispute over whether Aristotle distinguishes between logical and metaphysical (or physical) possibility.[65] Can the current interpretation account for this distinction? It might be nice

[64]As mentioned last chapter, this was Freeland's view (C. Freeland 1986, pp. 84–85).

[65]The view that there is such a distinction is in Waitz (1844b, p. 376), Cornford (1931, p. 21), and G. E. R. Lloyd (1966, p. 423). It is denied by Sorabji (1969, pp. 129–130), Sorabji (1983, pp. 222–224),

if it could: one might wonder whether the conception of physical possibility outlined so far can explain, for example, why it is impossible for a 2 and 2 to make 5 or for a wife to be a bachelor. Even if it can, one may want to find a principled way to mark a

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and Bäck (1995, p. 126). See also M. Nussbaum (1978, pp. 312–214), which does not go so far as to clearly deny that Aristotle ever makes the distinction, but does attempt to defuse the facial evidence for it provided by one of the important texts for this question, *De Motu Animalium* 4.4699b17–21.

> ἐπεὶ δὲ τὸ ἀδύνατον λέγεται πλεοναχῶς (οὐ γὰρ ὡσαύτως τήν τε φωνὴν ἀδύνατόν φαμεν εἶναι ὁραθῆναι καὶ τοὺς ἐπὶ τῆς σελήνης ὑφ' ἡμῶν· τὸ μὲν γὰρ ἐξ ἀνάγκης, τὸ δὲ πεφυκὸς ὁρᾶσθαι οὐκ ὀφθήσεται), τὸν δ' οὐρανὸν ἄφθαρτον εἶναι καὶ ἀδιάλυτον οἰόμεθα μὲν ἐξ ἀνάγκης [εἶναι], συμβαίνει δὲ κατὰ τοῦτον τὸν λόγον οὐκ ἐξ ἀνάγκης· (*De Motu Animalium*, 4.699b17–23)
>
> Now 'impossible' has several senses: for when we say it is impossible to see a sound and for us to see the men in the moon, we use two different senses of the word. The former is invisible of necessity; the latter, though of such a nature as to be visible, will not actually be seen. And we believe that the universe is imperishable and indestructible of necessity, but the result of this argument is that it is not so of necessity. (Nussbaum's translation from M. Nussbaum (1978, p. 32))

The passage can be read as distinguishing two sorts of impossibility, one where something is impossible as a matter of the natures of the things involved (Aristotle's example: voice cannot be seen) and another where something is of a nature so as to happen, but still will not (the men in the moon will not be seen). If we take the pronouncement that it will not happen literally, it seems to follow given the principle of plenitude that it is literally impossible to see the men in the moon. Thus Aristotle is distinguishing necessity based what is permitted by the natures involved from necessity as involved in plenitude. Against this Nussbaum proposes

> Aristotle is not insisting that there is any sort of impossibility involved in imagining them seen, and perhaps not even claiming that nobody will ever be able to see them. He says only, "You won't see them," "They won't be seen"—a reasonable prediction—not a necessity claim. If the "won't" is meant as a serious prediction about the rest of time, plenitude is violated; if it is to be taken as loosely as I have just indicated, the question does not even arise. (M. Nussbaum 1978, p. 314)

Nussbaum's interpretation fits the context better. Aristotle is explaining that certain physical facts (that amount to the non-occurrence of events that would destroy the world) are necessary and that we need an explanation not just of why they are true, but of why they are necessary. He says that the destruction of the world is impossible without taking care to point out that it is in some particular sense of the word, both right after (supposedly) distinguishing two senses of it and throughout the rest of the passage. The appearance is that only one sort of necessity appears in the passage outside of the bit (supposedly) making the distinction.

It seems likely that whatever sense of possibility meant does obey plenitude. For in the contexts in which he discusses the questions of the world's continued existence more fully, he appears to use the principle. (Here in *DM* he is quick to put the question off to another time (4.699b31), presumably meaning the first book of *De Caelo* and the last of the *Physics*.)

Therefore, if Aristotle did intend a distinction between nature-based possibility and plenitude-based possibility, the point would seem to be: it is possible that the world be destroyed in the sense that it is of a nature so as to be destroyed, but it is not possible in the other sense (that obeys plenitude) and so will not happen at some point (no need to worry).

But the passage does not proceed this way. Instead the puzzle is that the natures involved do *not* rule out the destruction of the world. So nothing prevents it and it is apparently possible (no disambiguation). And the solution to the puzzle is put off. In particular the purported distinction is never actually applied.

distinction between the two. As we will see there is some reason to think Aristotle did mark a distinction similar to this.

6.9.1 Making a Distinction

First, I want to raise a terminological issue. I raise it to bury it immediately—but it is good to head off potential confusion. It is better to reserve 'logical necessity' for what attaches to propositions whose negations are logically equivalent to a contradiction. That is to say that I would prefer to think of claims about logical necessity as relying on or implying claims about logical consequence. But I doubt we can find in Aristotle

But Nussbaum's interpretation has a serious disadvantage. According to her "Aristotle is not insisting that there is any sort of impossibility involved in imagining [the men in the moon] seen." But this appears to fly in the face of the text, which has "Now 'impossible' has several senses" and "we say it is impossible …for us to see the men in the moon."

Here is a way to preserve Nussbaum's sense that no distinction is being drawn between physical and logical necessity. Two senses of ἀδύνατον are being distinguished, but not two sorts of impossibility. The word ἀδύνατον can mean impossible, or it can mean incapable; I suggest that here Aristotle is telling us to focus on possibility. When someone is not able to do something (as we are not able to see the men in the moon), it does not follow that it is impossible or will never happen, but in many cases we can make a "reasonable prediction" that it will not happen. In this case, Aristotle is telling us, we need to focus on what is true of necessity (ἐξ ἀνάγκης, 20, 22, 23), which unambiguously contrasts with possibility and not capacity.

a particularly clear conception of formal logical consequence.[66]

However, this is a little unfair, since in the context of Aristotle's modality it often seems that with 'logical possibility' commentators do not mean something separate from conceptual necessity.[67] On this way of looking at it the thought would be that

[66]Aristotle's famous pronouncement in *Prior Analytics* A.2 has been cited as evidence that Aristotle has our concept of logical consequence:

> A syllogism is an account [or argument] in which, certain things having been supposed, something different of necessity results because they were that way. (*Prior Analytics* A.2, 24b18–20)

In particular, the requirement that the conclusion results from the premises of necessity is thought to capture the requirement that the conclusion follow logically; for example:

> The core of this definition is the notion of "resulting of necessity" (ex anankês sumbainein). This corresponds to a modern notion of logical consequence: X results of necessity from Y and Z if it would be impossible for X to be false when Y and Z are true. We could therefore take this to be a general definition of "valid argument". (Smith 2000, sec. 3)

> …'results by necessity because these things are so': this clause …is a clear formulation of the concept of logical consequence as it is still understood today: a proposition q follows from propositions $p_1 \ldots p_n$ if and only if it is impossible for $p_1 \ldots p_n$ to be true while q is false. (Striker 2009, p. 80)

But *contra* Smith and Striker this part of the definition of 'syllogism' does not capture logical consequence as it is standardly understood today. If we interpret "impossible" in their glosses as metaphysical impossibility, their definitions will have it that any argument concluding in a necessary truth is logically valid, which is not in line with the standard modern understanding of logical consequence. The definitions are adequate (though circular) if we take "impossible" to mean logically impossible, but obviously it begs the question to rely on this reading to show that Aristotle has the concept of logical consequence.

The standard account of logical consequence contains no modal terms and makes reference to something, a model or interpretation, which Aristotle appears not to know about. That is to say, appealing directly to the account is unlikely to help the claim that Aristotle had the concept.

To say that Aristotle grasped our concept of logical consequence (as opposed to a separate and reasonable good-making criterion), I would guess the most promising plan is to look at how he justifies various syllogism schemes and hope to show that he relies on considering different interpretations of the variables in the schemes in a way that presages the discovery of models. Offhand the prospects seem to me to be dim: usually the justifications instead proceed by attempting to reduce the scheme at hand to one of a privileged few that are taken to be obviously valid. If we wanted to see the approach as presaging contemporary methods, a more plausible candidate is proof theory and reasoning about syntax (Lear 1986).

Another idea is to find Aristotle clearly distinguishing logical contradiction from impossibility. As far as I know he does not clearly or consistently do so. Indeed the distinction seems absent in the place we would surely expect it to appear if anywhere, *Metaphysics* Γ 3–6, where Aristotle is at pains to explain how the principle of non-contradiction is more fundamental than other eternal and necessary basic principles (including science-specific principles, i.e., ones that are not logically necessary).

In short, I regard it as likely an anachronism to claim that Aristotle had, even dimly, the concept of logical consequence.

[67]For example:

> The *MA* discussion in more interesting, since, on one possible reading, the contrast *is* between notions of logical and physical necessity. Voice is (logically, conceptually) unseeable; the men in the moon are unseeable of necessity, but only because of a physical necessity. (M. Nussbaum 1978, p. 313)

Aristotle thinks that 'voice is not visible' is necessary in virtue of the concept of voice, and distinguishes that type of necessity from necessity due to powers. The point would apparently be that it is part of voice's essence (or perhaps it follows from its essence) that voice is not perceivable by vision.[68]

All that has been said so far is compatible with the idea that conceptual necessity of this sort coexists with metaphysical necessity as we have been discussing it. Conceptual generalizations, like that bachelors are not married or that voices are not visible, will characterize all actual times and all possible situations that can be reached through the activation of powers. Given that it is actually part of the essence of voice not to be visible, there is no power whose activation could bring us to a situation where that is not true.

So what is physically possible will be conceptually possible too. Since conceptual possibility does not (apparently) rule out the past being different, or there having always been more matter than there is, or nothing having ever existed, it's plausible that conceptual possibility admits of physically non-possible scenarios. But all we should conclude is that Aristotle thinks there are two separate grades or levels of modality; this doesn't suggest that he thinks or needs to think they are explained by different bases, as opposed to merely two choices of parameters on a construction from the same base.

As I have noted, there is some reason to think that conditional or hypothetical necessity attaches to what is physical and changeable: in that case the necessity of some effect is conditional on a prior cause holding. That something is a certain way 'forces' another thing to be a certain way.[69] On the other hand Aristotle claims frequently that absolute, unconditional necessity attaches to what is eternal and always the case, and it is possible that the essences of things are among such things.

Bäck (1995, pp. 102–106) suggests that we can unify these types of modality: all Aristotelian possibility on this account is really relative possibility. What is necessary is what follows logically from some body of assumptions. What is conditionally or phys-

> …he [i.e., Aristotle] does not recognize a distinction between causal necessity and necessity which is (in a broad sense) logical, i.e. conceptual. (Sorabji 1983, p. 223)

[68]Some authors have claimed Aristotle's scientific definitions are meant to be analytic and *a priori* (Łukasiewicz 1951, pp. 205–6; Lukasiewicz, E. Anscombe, and Popper 1953, pp. 74–6; Le Blond 1939, p. 92; S. Mansion 1946, ch. 4; Chevalier 1915). But we are not always aware of what an essence is; Aristotle gives examples of essences which contain reference to causes which may be unknown and are subject to empirical investigation (*Metaphysics* 1041a20–32, 1044b12-15, *De Anima* 419a9-11). On the other hand I don't see strong evidence that definitions are meant to hold in virtue of the meanings of words. The suggestion is discussed more by Sorabji (1983, pp. 195–201) and Bolton (1976), and, I think, convincingly refuted. To the extent it conveys something internal or mental, the word 'concept' in this context is misleading.

[69]See Bäck (1995).

ically necessary is necessary relative to what has already happened; what is absolutely necessary is what follows from the fundamental principles of the sciences, including 'formal' principles like the principle of non-contradiction. (This is called 'absolute' presumably because in the limiting case as many conditions as can be released are released.)

This has the consequence that whatever is true is necessary in some sense. Bäck is fine with this, on the grounds that all already true things are necessary, and what is possible is neither true nor false (at the time that it is possible). I.e., he thinks his position and his interpretation of *De Interpretatione* 9 are tied together (Bäck 1995, 105n34).

It would be nice to explain how these two sorts of modality can be united without relying on that particular interpretation of *De Interpretatione*, and I believe that is possible. Instead of relying on logical consequence, we should follow the cue we saw in the test for possibility in *Meta*.Θ.3 and think of what will be the case given some assumption and some set of tacit background assumptions. What is absolutely necessary is then necessary not because it logically follows from some set of principles, but because it is what is the case no matter what background assumptions we have (or: if we have none at all). What Aristotle typically takes to be physically necessary is what is necessary given the nature of powers and what has happened already, or something close to this.

It's true that future contingents (if they have truth values) are necessary against *some* set of background assumptions. *Contra* Bäck, I see little reason to think Aristotle would accept any and every set of assumptions as sufficient to show a conclusion's necessity. The modality generated is only as interesting and useful as the set of assumptions. As already noted, thinking about what is already the case and how those things can change given the physical natures of the things involved is a natural and useful way to think in the context of practical planning; that's why that set of background assumptions is worth considering. It shouldn't be surprising that the mere fact that a statement logically follows from *some* set of (true) assumptions or will be the case given *some* set of assumptions fails to say something more about the fact at hand than that it is true.

Therefore Bäck's unification of conditional and absolute modality (or something very like it) can be preserved without relying on his particular interpretation of *De Interpretatione* 9 or a too generous picture of what is necessary.

Once we see this, we have removed an important motivation for thinking that Aristotle may think there is a kind of modality about essences which is not grounded in powers—namely, the suspicion that such a modality cannot be accounted for in terms of powers.

6.9.2 Possibility Is Not Grounded in Aristotelian Essences

I will now say something briefly about why we should reject an alternative picture on which Aristotle thinks of modality as grounded in the essences of substances. The idea is that substances' essences are some suite of necessary properties—perhaps the necessary properties that play some special explanatory role for the substance's character. Descriptions of the essences, together with the claims that follow from them, constitute statements of the necessities. Then what is possible is what does not violate those necessities.[70]

First, this view has a problem capturing even a moderately capacious set of facts about modality. It has a ready explanation for why, say, I cannot be a turnip. But what about that I can, if I wish, write a sentence in Greek, but the same is not true for French? What about the fact that while it is possible that I play the piano beautifully, it is a much more distant possibility than the one in which someone who knows how to do so does it? That someone who lacks hands cannot play the piano? That I can sit and stand, but cannot do so at the same time?

On the face of it, these things cannot be explained easily by appeal only to essences. Aristotle seems to think people have the same essence or the same type of essence (*Meta*.Z.8.1034a5–8, I.9.1058b29–33). So something else must enter into the picture to explain why some people can do some things and not other people. It is straightforward and natural to appeal to the abilities that only some people have. My ability to sit or stand does not seem to enter into my essence at all. It seems it is something about the nature of those powers and their activations, not the essences of substances that might have the powers, that explains why they cannot both be activated simultaneously.

We might try to repair the view by talking not about the essences of *substances* in particular, but include the essences of other beings in other categories as well.[71] But if we do this, it seems very plausible that the essence of a power will be what I have described as its content and what is stated by its specification or definition. This ver-

[70]Recall Freeland's suggestion

> …he defines possibility by reference to truth and necessity …Aristotle appears to invoke some intuitive idea of 'compatibility' with what is, must or will be the case; he presumes that necessary truth, in turn, is the subject of, and explicated by, scientific inquiry into things' natures or essences. (C. Freeland 1986, pp. 84–85)

[71]In *Meta*.Z.4 Aristotle appears to suggest that non-substances either do not have essences or have them in a different sense than substances spoken of in their own right. Aristotle talks often enough of the being of non-substances, and of course he is characteristically pluralist about senses of words he thinks philosophically important. In the light of these facts I take the upshot of that passage to be that non-substances do, in some sense, have essences.

sion of the essentialist view seems increasingly similar to the one I am defending. The question is whether anything is gained by appealing to the wider pool of resources, interpretatively or conceptually, and I don't see that it is.

There is also some interpretative reason to think that this is not how Aristotle is thinking of essences. As Sorabji (1983, pp. 189–192) points out, Aristotle is often ambiguous about whether essences describe actual features of the members of the kind or some idealized version of the kind. For example, not all humans are rational, not all birds have feathers, etc.—the biological criteria we use to mark off species are often contingent. Similarly for a human to realize their form in the fullest sense is apparently an ethical achievement, not something they have already done simply by being a human. On the other hand sometimes Aristotle seems happy to infer from the universals having some property to members having it (Sorabji 1983, p. 190).

I would tentatively suggest that essence shifts over the course of Aristotle's career, and tends to be more descriptive in earlier logical works and more normative in later works. If that's right, then in the late period which we are concerned with, we cannot infer from my essentially having a certain property that I actually have it.[72] But that particular claim is not necessary. It is enough if Aristotle simply vacillates or is inconsistent. For this strongly suggests that he cannot be thinking to himself of essence as a suite of necessary properties.

Although it plays no role in itself in the conversation about modality, it may help to indicate what another role for essence might be. On my view a thing's essence does have some upshot for its *de re* necessary properties, but that is not the theoretical work essence is meant to do for Aristotle. A thing's essence is what it is about it that explains why the thing's existence, the activity that constitutes its being, is what it is. That is why it is the primacy of form as *efficient cause* of its substance that secures its primacy over matter (*Meta*.Z.17). A human's form, more than their matter, efficiently causally explains why a human existence and life has the character it has.

[72]Perhaps we can infer that I potentially have it—but not that I possibly have it, since there is no hope for recovery for some unfortunately mutilated humans. Indeed it seems likely that according to Aristotle a whole sex of the human race is bound not to fulfill the human form in the fullest sense (e.g., *Politics* A.13.1260a8–14, *GA*.B.3.737a27-8; cf. *GA*.B.1.732a6–10, Δ.6.775a9–17).

CHAPTER 7

Conclusion

The Aristotelian project of grounding what is possible in what powers exist, while it may not in the end be correct, works decently well for a bit of metaphysical system-building. Indeed it can be pursued with broadly Aristotelian tools, and it coheres well with Aristotelian commitments. Therefore it is reasonable to think of it as part of the "Aristotelian system," even if it becomes difficult at times to draw the line between exegesis and reconstruction.

I hope I have managed to give a sense, too, of how the project of grounding possibility in powers is of a part with the causal role for powers. Aristotle's physical world is one of unfolding change and activity. These changes are not merely one thing coming after another, but have an intelligibility and purposive structure. Powers are what encode that structure and so cause changes to unfold in their intelligible and predictable ways instead of as mere chancy flux.

Way back in the introduction I compared Aristotelian powers to laws of nature. I hope the meaning is now a bit clearer: just as one might think of discovering the laws of nature as a way of uncovering the real order in the physical world, so too I imagine an Aristotelian might think of discovering the character of the actual powers things have.

But I hope some of the differences have become clearer, too. In some interesting ways our intuitive pre-theoretic picture of the world matches the power-based view more closely. We do think of people and objects as having abilities, as acting and suffering, not merely as the seat for exchange of properties (including an exchange "governed" by independent rules). It seems to me we do think, when we've discovered what a type of object is able to do, that we have in some sense discovered something "in" the object, something empirical and right in front of our faces; not, say, some abstract law that floats over the physical world.

Similarly, I strongly suspect that our intuitive modal judgments have a great deal

to do with a sense for how processes "normally" unfold, and with a sense for how "interference" is likely to change that unfolding. That is captured well by the vision of modal judgments as grounded in powers through claims about the natural ends of those powers.

In other ways the picture fares less well. It does seem like a live scientific possibility that included among the nomic generalizations are some that are not reasonably thought of as the activity of any substance. Recall that it seems like for Aristotle δυνάμεις must be "in" some material substance. That our physical theories will cohere with these sorts of requirements does not seem to me to be the kind of thing we could know *a priori*.

The vision of the physical world sketched here, one where the abilities of objects play a starring role in structuring its evolution over time, seems to me to do a good job of capturing one pre-scientific "manifest image." Aristotle's own presentation is resolutely objectivist and realist, which perhaps is surprising given his eagerness to argue on the basis of our intuitions and even linguistic practices.

But I hope I've given a sense too of how there may be philosophical value in spelling out the system even if the strongest claims, including perhaps the realism, must be given up. Even if the claim that modality is to be grounded in powers must come to nothing, we may get a reasonable way of marking out a psychologically interesting class of possibilities, and some insight into how we think of those possibilities. Some of the particularly metaphysical ambitions of such a project may be vindicated if it turns out possibility and causation are anyway more a matter of how we think of the structure of the physical world than something independently woven into it.

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