

Causal Necessity in Aristotle

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1. Introduction

Recent discussions of causation have seen a revival of several concepts after a period in which Humean and neo-Humean views and critiques had rendered them suspect: causal powers, dispositions, and causal necessitation.¹ Along these lines, for example, some theorists appeal to causal powers as genuine features of objects which enable them to act on other things, while others explicate the idea of causal determination by appealing to and defending the idea of causal necessitation.² In general, the redeployments of these concepts figure in attempts to understand the relation of causation as one in which causes determine or bring about their effects in virtue of their intrinsic

¹ The notion of causal necessity, for example, has been defended by several theorists: the so-called Dretske-Tooley-Armstrong (Dretske (1977), Tooley (1977), Armstrong (1983)) theory of natural laws posits nomological (as distinct from metaphysical) necessitation relations between universals, while Shoemaker (1998) argues that causal necessity simply is a kind of metaphysical necessity, one which is rooted in the causal powers of certain properties. Powers and dispositions, once widely ridiculed as explanatorily vacuous, have been defended by Harré (1970), Shoemaker (1980), Cartwright (1994), Heil (2005), and Martin (1994), among others. These views contrast with so-called counterfactual analyses of causation, the most well-known of which is that of David Lewis (1973), (1994), and (2000), attempt to account for causation without appealing to causal necessitation, often citing Hume as the reason for their doing so, as Lewis does.

² If we understand causal determination as, roughly, a relation by which one thing makes something else the case (perhaps contingently so), and causal necessitation as that by which the cause makes the effect necessary, then one may assert or reject them independently of one another. One might claim, for example, that if a certain gene may either express itself by giving rise to a heart condition or remain unexpressed, then the heart condition would be determined by the gene (since it constitutes the gene's expression), but is not necessitated by it, since the gene could have remained unexpressed. There is also room in logical space for embracing causal necessitation without causal determination: one may, for example, embrace some kinds of nomic connections between universals while embracing a Humean ontology of discrete particular events or states of affairs—the particulars would thus remain discrete from one another, so that we might deny that a particular cause determines its effect, while nonetheless maintaining that the cause necessitates the effect insofar as the universals under which they fall are linked.

features, rather than as a purely extrinsic relation such as constant conjunction and contiguity between events. These understandings of causation which reject Hume's epistemologically-based critique of 'necessary connexion' in turn bear striking resemblances to that of Aristotle, who of course does not take Hume's epistemological worries into account to begin with.

Aristotle, indeed, conforms to the model of understanding causal connections which the Humean rejects, even though he is not one of Hume's explicit targets. He believes that causal relations are genuine features of the world, not imposed by the observing mind, and that they result in the existence of the objects and substances we see, as well as the changes they undergo.³ He also uses modal language consistently with regard to (efficient) causation, suggesting that he, too, thinks of causal determination as a kind of necessitation.⁴ Like contemporary theorists whose views resemble his, therefore, he must explain the nature of the necessity involved, and how this necessity amounts to an account of causal determination.

Understanding Aristotle's claims about causal necessity is made complicated by the fact that both he and we recognize multiple senses of 'necessity', or in Aristotle's case, 'ἀνάγκη'. Furthermore, even when using 'necessary' in a univocal manner, the claim that causes necessitate their effects may be expressed (and attacked) in a variety of

³ This is asserted most famously at *Phys.* 194b17-23: 'For since our study is for the sake of knowledge, and we do not think we know something until we grasp the 'Why' of it (and this is to grasp its primary cause), it is clear that we must also do this regarding generation and destruction and all natural change, so that, knowing their principles, we may try to bring each of the things into which we are inquiring back to them.' [ἐπεὶ γὰρ τοῦ εἰδέναι χάριν ἢ πραγματεία, εἰδέναι δὲ οὐ πρότερον οἴομεθα ἕκαστον πρὶν ἂν λάβωμεν τὸ διὰ τί περὶ ἕκαστον (τοῦτο δ' ἐστὶ τὸ λαβεῖν τὴν πρώτην αἰτίαν), δῆλον ὅτι καὶ ἡμῖν τοῦτο ποιητέον καὶ περὶ γενέσεως καὶ φθορᾶς καὶ πάσης τῆς φυσικῆς μεταβολῆς, ὅπως εἰδότες αὐτῶν τὰς ἀρχὰς ἀνάγειν εἰς αὐτὰς πειρώμεθα τῶν ζητούμενων ἕκαστον.] (All translations are my own.)

⁴ The primary passages in which causes are said to bring about their effect necessarily (ἀνάγκη) are *Phys.* 198b5-9, *Gen. Corr.* 324b8, 1048a7ff., and 1027a32-b6. They are given and discussed below. While Aristotle uses modal language with respect to other modes of causality (such as *per se* formal causation), my concern here is only with necessity in efficient causation.

ways and for a variety of reasons. Only by examining what, if anything, underlies Aristotle's claims that causes necessitate their effects can we determine whether they express a coherent view of causal necessity, whether that view also gives an account of causal determination, and whether it is vulnerable to modern criticisms.⁵

I shall argue that Aristotle recognises not one but two distinct kinds of necessitation relations as operating in causal interaction, one of which pertains to the relation between a particular cause and its effect, the other to the nature of causal powers themselves. In section 2, accordingly, I present the evidence for thinking that Aristotle views causal relations as necessitation relations, as well as some of the main interpretive problems raised by his claims. I then turn in sections 3–6 to an analysis of Aristotelian causal relations as such, and the natures of the two kinds of necessitation I propose to distinguish. On one plausible interpretation, the necessity obtaining between particular causes and effects is a kind of (what we would call) metaphysical necessity, while that pertaining to causal powers is a kind of nomological necessity, which is (as standardly conceived) slightly weaker than metaphysical necessity. On another interpretation, which I find reason to favour, both forms of necessity are of the stronger, metaphysical type.

⁵ It is important to separate the issues of causal necessitation and determination (i.e. the way in which causes bring about their effects) from that of causal determinism (i.e. whether, given an initial state of affairs, subsequent states are in some sense inevitable). One may offer a theory of causal determination (in the former sense) without being a causal determinist (in the latter sense): that is, one may think that causes determine their effects but that the universe is not deterministic. Most discussions of causal necessitation in Aristotle focus on whether Aristotle is a causal determinist, with particular attention to the sea battle in *De Int.* 9 and the causal processes culminating in a man's being killed at a well after eating spicy food in *Meta.* E 3. (See D. Frede (1992) and Sorabji (1980, pp. 10-11, 51-56) for such discussion.) Debates about determinism in Aristotle turn on whether everything that happens is somehow inevitable, or at least whether, given the state of the world at one time, all the events or facts of a future time are somehow fixed. If there are exceptions to causal determination, it is then a question of how they constitute exceptions: whether co-incidentally (κατὰ συμβεβηκός) or in virtue of how they are described, or perhaps because they genuinely lie outside the causal order. The question of determinism is, however, different from the question of whether and how Aristotle thinks causes necessitate their effects. The question I address here is in a way prior to the question of determinism: given an uncontroversial instance in which a cause does make some effect inevitable, what is the nature of the modality ascribed to the relationship between them?

The two forms of necessity are, on either understanding, complementary for Aristotle, and, it is their combination which allows Aristotle to account for causal determination in terms of necessity.

2. Causal connection and modality

Aristotle consistently uses modal language with regard to efficient causal relations, and his language suggests that he thinks of causes as necessitating their effects. This modal talk presents several difficulties straightaway, as we shall see, and we should be aware of them when attempting to formulate the nature of his commitment more precisely.

In summing up his discussion of the four causes in *Physics* II 7, Aristotle writes:

We must give the ‘Why’ in all ways, for example, that this necessarily comes from that (‘from that’ either simply or for the most part); and if this is going to exist (just as the conclusion comes from the premises); and because this was the essence; and because it is better this way, not simply, but relative to the essence of each thing. (198b5-9)

[καὶ πάντως ἀποδοτέον τὸ διὰ τί, οἷον ὅτι ἐκ τοῦδε ἀνάγκη τόδε (τὸ δὲ ἐκ τοῦδε ἢ ἀπλῶς ἢ ὡς ἐπὶ τὸ πολὺ), καὶ εἰ μέλλει τοδι ἕσσεσθαι (ὥσπερ ἐκ τῶν προτάσεων τὸ συμπέρασμα), καὶ ὅτι τοῦτ’ ἦν τὸ τί ἦν εἶναι, καὶ διότι βέλτιον οὕτως, οὐχ ἀπλῶς, ἀλλὰ τὸ πρὸς τὴν ἐκάστου οὐσίαν.]

The use of ‘necessarily’ (ἀνάγκη) in the first line above clearly refers to efficient causation: the last two kinds mentioned are unequivocally formal and final causation, and the comparison with logical entailment indicates that the second mode referred to is

material causation.⁶ Since this passage is a general account of the four ways of ‘giving the Why’, Aristotle here seems to be asserting that the very schema for stating that something is an efficient cause involves saying that its effect follows necessarily.⁷ It is worth noting that in this passage Aristotle seems to imply that something may follow its efficient cause necessarily, though not always.⁸

Aristotle also claims that when an appropriate agent is in a position to cause an appropriate patient to undergo a certain change, the patient *must* undergo that change: ‘And what is capable of being hot, when what is capable of heating is present and approaches, necessarily becomes hot’ (324b8). [‘τὸ δὲ δυνάμενον θερμὸν εἶναι παρόντος τοῦ θερμαντικοῦ καὶ πλησιάζοντος ἀνάγκη θερμαίνεσθαι.’] The same view is expressed at *Metaphysics* 1048a7ff., where rational capacities are distinguished from non-rational ones in virtue of the fact that when an agent of the former type approaches the patient, it is not necessary that it act, whereas agents and patients with

⁶ The use of the relationship between premisses and conclusion to illustrate the material causes is obscure, though not unprecedented. In the discussion of the four causes in *Posterior Analytics* B 11, Aristotle does not speak of matter in the familiar way in which he discusses artefacts in *Physics* I 7; because of this, some commentators have wondered whether Aristotle is referring to material causation properly so-called by the obscure phrase ‘That which necessarily is, some things being the case,’ [τὸ τίνων ὄντων ἀνάγκη τοῦτ’εἶναι] (*Post. An.* 94a21). Whatever Aristotle’s reason for using a logical example to illustrate the material cause here, however, he is clearly not referring to any of the other types of cause.

⁷ On a weaker reading, Aristotle is here giving only an example, implying that some efficient causation involves necessity, but that not all efficient causes need do so. It is perhaps best not to prejudge this issue, especially since efficient causation in some form is extended to a variety of domains to which Aristotle might not wish to extend necessity (e.g. large-scale historical events such as invasions). Nonetheless, as we shall see, since Aristotle makes parallel necessity claims with regard to agent-patient relations, and these are his paradigm case of efficient causation, we may say that at the very least an important subset of efficient causal relations are subject to necessity.

⁸ The implication is pertinent to the question of whether Aristotle’s notion of causal necessity will tolerate exceptions or failures, which is taken up in section 6. This passage seems to conflict with a passage at *Meta.* 1026b29, where Aristotle contrasts things which are necessary with those which occur for the most part; in that passage, however, he has just clarified above at lines 27-28 that he there means necessity in the sense of not possibly being otherwise (τῷ μὴ ἐνδέχεσθαι ἄλλως), rather than necessity in sense of “compulsion” (κατὰ τὸ βίαιον). So there is apparently, for Aristotle, no incoherence in the notion of something’s being necessitated “for the most part”. Cf., however, *Gen. Corr.* 336a27: “For the same thing, being in the same condition, by nature always does the same thing.”

non-rational capacities must act whenever they approach each other (see section 5 for discussion of this passage). Thus, however he understands the details of causal interaction, Aristotle takes seriously the idea that in the agent-patient relations by which objects realise their capacities for change, the change to the patient occurs of necessity.⁹

Aristotle's claims that causes necessitate their effects present several interpretive difficulties straightaway, given the wide variety of ways in which it is possible (for us as for him) to render a claim about modal or causal connection.

First, it has become common in recent philosophical literature to distinguish between several types of necessity, including logical, conceptual, metaphysical, and nomological necessity, among others.¹⁰ While the natures of these forms of necessity are by no means uncontroversial, they form a useful background to the discussion of necessity in Aristotle. Some of his claims might sound plainly ridiculous if interpreted as claims of logical or conceptual necessity, but less so if interpreted as claims about metaphysical or nomological necessity. Even between these last two there are important

⁹ Again, it is important to stress that my concern here is not with determinism and causal chains, but with the manner in which causes bring about their effects in straightforward cases of basic interaction. The former topic is highly controversial, especially since it intersects with questions about whether teleology, free action, and moral responsibility are compatible with causal determinism. That Aristotle thinks basic causal interactions involve some kind of necessity is far less controversial. Sorabji (1980, p. 144f.) does argue that Aristotle sometimes affirms causation while rejecting necessitation; I agree with Fine's (1981) criticism of his arguments (section VII). Indeed, both passages in which Aristotle discusses the different senses of 'ἀνάγκη' (*Post. An.* 95a1 and *Meta.* 1015a20-b5, cited and discussed just below) include a notion of necessity as compulsion (ἡ βία), which in the latter passage Aristotle claims is said of action and passion (ποιεῖν and πάσχειν). (As will become clear in section 6, I do not think this is the only sense of ἀνάγκη relevant to causal interactions for Aristotle.)

¹⁰ See, for example, K. Fine (2002), Plantinga (1974), chapter 1. Shoemaker (1980, 1998) analyses causal necessitation in particular as a kind of metaphysical necessity, whereas others (e.g. Armstrong (1983)) keep them distinct. I do not mean to imply that the different forms of necessity in the contemporary literature have all been adequately understood, or even that they are obviously distinct or irreducible. They are at least, however, different notions of necessity worth exploring.

differences (as they are usually conceived) which will be helpful in making our own interpretation precise.¹¹

Aristotle also distinguishes several senses of ‘ἀνάγκη’, and it is not clear on the surface how they relate to each other, or to contemporary usage. In the *Posterior Analytics*, he draws a twofold contrast between necessity ‘according to nature and impulse, on the one hand, and by force and contrary to impulse on the other’ [‘ἡ μὲν γὰρ κατὰ φύσιν καὶ τὴν ὀρμὴν, ἡ δὲ βίαια ἢ παρὰ τὴν ὀρμὴν’](95a1). The entry in the so-called Philosophical Lexicon of *Metaphysics* Δ, on the other hand, identifies five senses of ‘necessary’ (ἀναγκαῖον): conditions required for life, conditions for some good to arise, the “compulsory” (τό βίαιον) or “compulsion” (ἡ βία), the necessity of demonstration, and what he claims to be the primary sense, namely that which does not admit of being otherwise (1015a20-b5).¹² Neither of the above-mentioned passages gives a complete list of the senses of ‘necessity’ Aristotle seems to recognize, but we may nonetheless distinguish the primary kinds as (1) “simple” necessity, (2) necessity by impulse, i.e. according to a thing’s nature, (3) necessity by force, against impulse, and (4) hypothetical necessity.¹³ It is clear that Aristotle’s uses of ‘ἀνάγκη’ in contexts dealing with efficient causation do not indicate hypothetical necessity (which is, rather, the mode of necessity relevant to final causation).¹⁴ However, the relation of the other senses,

¹¹ I shall discuss in Section 6 whether and to what extent causal relations turn out to be metaphysically or nomologically necessary.

¹² Interestingly, the first two of these both correspond to what Aristotle elsewhere calls hypothetical necessity; it is not clear, though, whether the ‘primary’ sense is equivalent to what Aristotle elsewhere calls simple (ἀπλῶς) necessity, and the notion of necessity by impulse or nature is absent. The passage from the *Metaphysics*, in fact, seems to include both philosophical and non-philosophical uses of the word ‘ἀνάγκη’ (such as the “necessity” of taking medicine at 1015a24).

¹³ Impulse/nature is opposed to force at *Post. An.* 95a1, and hypothetical necessity is contrasted with both simple necessity and necessity by force in *Meta.* Δ.

¹⁴ The canonical statements of this relation are at *Phys.* 200a7-15 and *Part. An.* 642a1f.

especially (2) and (3), to efficient causation is an interesting matter, to which I shall return in section 6.

Further, claims that causes necessitate effects are sometimes offered (or attacked) as dealing with metaphysical connections between entities such as events, but sometimes as dealing with epistemological connections, such as the grounds in virtue of which one may legitimately infer the effect from the cause.¹⁵ These two kinds of concern are of course closely related, but nonetheless distinct: it is one thing to inquire whether and how causes function so as to bring about their effects, and quite another to inquire whether and how we are entitled to infer the existence of the effect from that of the cause.

Finally, claims about causation, and hence causal necessitation, may be pitched at different ontological levels—most importantly, as claims about universals,¹⁶ particulars, or both. One may assert or attack the view that some particular thing, such as an event like a collision, necessitated something which followed (e.g. an acceleration).

Alternatively, one may assert or attack the view that everything of a certain type necessitates a certain type of effect—for instance, that a certain kind of chemical bond must always be dissolved in the presence of a certain kind of acid. The latter kind of claim may in turn simply be a general claim about all the particulars in a certain kind—e.g. that every bit of this kind of acid must dissolve every instance of this kind of bond;

¹⁵ Hume's critique of causal reasoning rests on his argument that an inference from cause to effect cannot be justified: deduction does not work, since causes and effects are only contingently related, and an appeal to inductive inference would beg the question. A full treatment of recent characterisations (both sympathetic and unsympathetic) of causal necessitation would be impossible. Paradigmatic Humeanism may be found in Ayer (1954) and Lewis (1994). Ayer asserts that since the only kind of necessity is logical necessity, no notion of causal necessity is defensible. Lewis expresses his Humeanism as the claim that causal facts supervene on 'the spatiotemporal distribution of local qualities' (473): there is, therefore, nothing to differentiate event A's necessitating B from A's being followed by B; the causal claim itself is given a counterfactual analysis (Lewis (1973), (2000)).

¹⁶ Or classes of similar objects, for those who object to universals.

alternatively, it may be a claim about universals or properties themselves—e.g. that properties like energy, temperature, and certain structures must interact in a certain way, whether or not the relevant interactions actually take place.

Thus, while it is clear that Aristotle is committed to understanding efficient causation as a kind of necessitation, this commitment can be made precise in different ways. In order to evaluate it, we must be sensitive not only to the details of his theory of causal interaction, but also to the general distinctions underlying claims about modality and causation.

3. Necessitation relations between actual and potential causes

In order to assess the nature of causal necessity in Aristotle, we may note first that the ambiguity concerning the relation of causal necessitation is also evident in his discussions, insofar as there are two importantly different contexts in which Aristotle maintains that effects *must* arise given their causes. This ambiguity is not framed in terms of universals and particulars, but rather in terms of causes conceived of as potential or as actual.

Aristotle claims, as we have seen (section 2), that when something which is a potential cause is in a position to bring about the effect which is potential in something else, the change *must* take place: ‘And what is capable of being hot, when what is capable of heating is present and approaches, necessarily becomes hot.’ (324b8) [‘τὸ δὲ

δυνάμενον θερμὸν εἶναι παρόντος τοῦ θερμαντικοῦ καὶ πλησιάζοντος ἀνάγκη
θερμαίνεσθαι’.]¹⁷

This passage asserts a relation between what is capable of heating (τοῦ
θερμαντικοῦ) and what is capable of being heated (τὸ δυνάμενον θερμὸν). As he goes
on to make clear, the capacity of an object to heat another consists, in fact, in its being
hot: the active cause is the source of the change, and in the case of one thing which heats
other things, the fire is or has (ἔχει) heat in matter (324b19). So Aristotle asserts that
there are properties which must, under certain conditions, give rise to the actual presence
of properties which the patient has potentially.¹⁸ There are, thus, necessitation relations
between potential causes and potential effects.

Since these potentialities are themselves grounded in properties of the relevant
particulars, these relations may be understood as necessitation relations between
properties or universals. That is, the positive properties which correspond to having the
potentialities to heat and to be heated are linked insofar as their presence in given
particulars makes actual heating necessary under certain circumstances. If so, the

¹⁷ See also *Phys.* 255a35f. and *Meta.* 1048a5f. These remarks are worth comparing with Aristotle’s account of animal motion, in which he asserts that given certain desires and the appreciation of relevant facts, action follows directly (εὐθύς); see *De Motu*, 701a13ff., 1048a10ff., *EN* 1147a27. This understanding of the relation of desire to action seems analogous to the relation between basic causal powers, independently of how we understand the nature of practical reason (including the debate over whether it results in beliefs or in action alone; see Nussbaum (1978) essay 4, and for a contrasting view Charles (1984) chapter 2-C).

¹⁸ Sometimes those properties are the same, and sometimes not: heat causes heat, but hardness isn’t caused by hardness. Aristotle clearly does not think the so-called Principle of Causal Synonymy (PCS) is universal, indicating that causal synonymy holds in some cases and not in others: “Now it is no doubt true that one thing comes to be in the unqualified sense out of another thing; and further it is true that the efficient cause of its coming to be is either an actual thing [τινος δὲ ἐντελεχείᾳ ὄντος] (which is the same as the effect either generically or specifically, as e.g. fire is the efficient cause of fire or one man of another), or an actuality [ἐντελεχείᾳ] (for what is hard does not come to be through what is hard)”(320b17-21). The precise conditions under which Aristotle thinks the PCS holds, and whether he has good reasons for thinking it holds when it does, are not entirely clear (see, for example, Mourelatos (1984) for discussion).

necessitation relations between potential causes and effects appear to be grounded in the existence of nomological relations between properties, or universals.

At the same time, in a famous passage, Aristotle appears to commit himself to the view that the particular components of a chain of efficient causes are necessitated by their antecedents:

For, will this be the case or not? If this happens, but if not, then not. And this will happen if something else does. And thus it is clear that if time is forever taken away from a delimited time it will come to the present, *so that this man will die by force,¹⁹ if he goes outside; and he will do that if he is thirsty; and that if something else; and in this way it will come to what is happening now, or to something which has happened. For example, if he is thirsty; and that will happen if he eats pungent food; and this either happens or does not; so that from necessity he dies or does not die.* (Meta. 1027a32-b6, emphasis added.)

[πότερον γὰρ ἔσται τοῦτο ἢ οὐ; εἴαν γε τοῦτο γένηται· εἰ δὲ μή, οὐ. τοῦτο δὲ εἴαν ἄλλο. καὶ οὕτως δῆλον ὅτι αἰεὶ χρόνου ἀφαιρουμένου ἀπὸ πεπερασμένου χρόνου ἤξει ἐπὶ τὸ νῦν, ὥστε ὁδὶ ἀποθανεῖται βίᾳ, εἴαν γε ἐξέλθῃ· τοῦτο δὲ εἴαν διψήσῃ· τοῦτο δὲ εἴαν ἄλλο· καὶ οὕτως ἤξει εἰς ὃ νῦν ὑπάρχει, ἢ εἰς τῶν γεγονότων τι. οἷον εἴαν διψήσῃ· τοῦτο δὲ εἰ ἐσθίει δριμέα· τοῦτο δ' ἤτοι ὑπάρχει ἢ οὐ· ὥστ' ἐξ ἀνάγκης ἀποθανεῖται ἢ οὐκ ἀποθανεῖται.]

The necessitation described in this passage would occur from one particular to the next:

this food necessitated *this* feeling, necessitating *this* action, and so on. Necessitation between elements of a causal chain thus appears to obtain between active, particular causes.²⁰

¹⁹ Following Ross (1924) in excising ‘νόσφ ἢ’ at 1027b2.

²⁰ The passage from *Phys.* 198b5f. describing all four causes, cited in section 2, is ambiguous as between being about universals or particulars; it appears, in fact, to indicate a commitment to causal necessitation between particulars, though considered as types. There, he asserts that a claim of efficient causation is of the form “this [τόδε] necessarily comes from that [ἐκ τοῦδε]”: ‘τόδε’ (‘this’) and ‘ἐκ τοῦδε’ (‘from that’) suggest that Aristotle is indicating particulars. He immediately makes this assertion more precise, however, saying that the effect arises “‘from that’ either simply or for the most part”. To be able to claim that this particular comes necessarily from that particular *always* or *for the most part* requires considering them as types, though this need not weaken the claim that there are necessitation relations between particulars.

Hence, by asserting that both potential and actual causes in some way necessitate their effects, Aristotle's claims suggest that he thinks of causal relations as necessary in two ways, corresponding to the views that causation is both a necessitation relation between properties (potential causes and effects) and between particulars (actual causes and effects). That is, there is the claim that (1) it is necessary that what has a causal power to heat objects *must* heat them in given circumstances, and the claim that (2) it is impossible for something to exercise a causal power unsuccessfully—when one billiard ball strikes another, necessarily the latter moves. One might wish to maintain that the two kinds of necessitation are not distinct: potential causes or causal powers are themselves particular states of an entity, and they necessitate their potential effects precisely by actualizing their corresponding actual effects. That is, all that is required is the necessity that an active power must yield its corresponding actual change, and it is because of this necessitation between active causes and the effects they produce that we may speak of necessitation relations between causal powers and capacities for change. Such an identification would be premature, however: *prima facie*, we might wish to maintain that when a builder is building a house, a house must be under construction, but we go further when we claim that under certain conditions, a builder must build.

4. Efficient causal necessitation between active causes

The way in which active, particular efficient causes necessitate is suggested by Aristotle's discussion of agency in *Physics* III 2-3. There, he attempts to deal with a potential problem—which he describes as formal or logical (λογική)—for his analysis of

causation and change in terms of the activity of an agent (ποιητικόν) and a patient (παθητικόν) upon which it acts.²¹ He poses the following potential *reductio*:²²

1. Assume that necessarily, the agent's (A's) move from being potentially active to actually active is one actualization (E1), and the patient's (P's) move from being potentially F to actually F is another (E2).
2. All motions are "in" some subject.
3. So, E1 and E2 are both "in" something.
4. Either (a) E1 is in A and E2 is in P, or (b) E1 and E2 are both in P. (The other options are implausible.)
5. If (4a), both A and P will be moved. Hence either every mover is itself also moved, or it is both moved and unmoved.
6. If (4b), then (a) the actuality of A is not *in* A, and (b) P is the seat of two simultaneous changes rather than one.
7. (5) and (6) are both absurd, hence the plausible assumption that the agent's activity is distinct from the patient's patency is false.

The general tenor of Aristotle's worry appears to be this: assuming that to be the seat of an actualization is to undergo a change, the distinctness of the agent's activity from the patient's patency means that in causation, either each is the subject of a distinct

²¹ The significance for Aristotle of describing a problem or argument as 'λογική' is a matter of considerable interest and debate. See especially Burnyeat (2001), p. 19-24. Hussey (1983) argues that Aristotle here means that the argument is a dialectical one (66). As I have reconstructed the argument, the problem appears to be a general one, not based in any particular theory or counter-argument, but one whose resolution requires rejecting assumptions that have at least intuitive plausibility.

²² *Phys.* III 3 202a13ff. Gill (1980) argues convincingly that 'ἐνέργεια' and 'ἐντελέχεια' are being used synonymously in this passage, and Hussey (1983) is in agreement (66). My reconstruction of the argument differs slightly from Gill's in form, though not in content.

change (5), or the patient is the subject of two changes (6). Either way, we do not have the desired result, namely that the agent be the author of a single change in the patient. Aristotle's reasons for rejecting (5) are somewhat obscure, but they need not concern us here.²³ Interestingly, although the worry he addresses in this passage is not the Humean one, it approaches it very nearly: we must not allow that agent and patient be undergoing changes which are fully distinct from one another, for then causal relations do not genuinely connect agent and patient, but nor is it clear, on the other hand, how A's activity could take place anywhere other than in A itself. Aristotle's attempt to defuse the worry will thus be indicative of how he might respond to the Humean worry itself.

Aristotle's response is to accept the claim that both actualizations are in the patient (4b), and to deny the absurdity of (6), the claim that the patient may be the seat of two actualizations, one of the patient and one of the agent—on condition that we understand that the distinctness of the agent's agency and the patient's patiency does not prevent there being a single change. What follows, for Aristotle, from the agency and patiency both being located in the patient is not that there are two *changes* in the patient (where, I think, we must read change in a strong sense, as referring to the canonical kinds of change, defined as the loss of one contrary in favour of another within a single category²⁴), but that two actualizations (ἐντελέχεια) of potentialities are located there.²⁵

²³ He rejects it at 202a28-31, by *reductio*: supposing there to be one actuality in the agent and one in the patient, Aristotle claims, it follows that 'everything that moves something is itself moved, or having motion it is not moved' [ἢ πᾶν τὸ κινεῖν κινήσεται, ἢ ἔχον κίνησιν οὐ κινήσεται]. See Ross (1936), p. 540, and Hussey (1983), p. 67ff.

²⁴ See *Phys.* 200b33 and 201a9f., and *Gen. et Corr.* 319a11-16, 319b31-20a1

These actualizations are like the road from Athens to Thebes and the road from Thebes to Athens, or like actual teaching and actual learning (202b7f.): they somehow coincide (perhaps spatiotemporally), but their definitions are not the same, nor do they have all of their properties in common (202b14-16).

The co-incident of causal activity with the resulting change is likened, then, to two further phenomena: the road between Athens and Thebes and the instruction taking place between a teacher and a student. According to Aristotle, the road from Athens to Thebes is not strictly identical with the road from Thebes to Athens, at least not such that they have all their properties in common, nor is teaching the same as learning, even though in each case there is something to which each of the pair belongs as a subject: in Aristotle's terms, these entities are the same (*to auto*) but different in being or definition.²⁶

²⁵ I am thus far in agreement with Gill (1980); however, she concludes from the fact that A and P's actualizations coincide in the change to P that both A and P in fact are changed (or moved). This conclusion is too strong: Aristotle's account of agency and patiency must be understood against the background of his distinctions between first and second actualities and potentialities. The agent need only be understood to change in the sense that it moves from a state of first to second actuality with regard to its potential to effect a certain change in an appropriate patient. This, as Aristotle stresses elsewhere, is not a change in the strict sense. See especially *DA* 417b12-16. Aristotle does indeed affirm at 202a3f. that every mover which is capable of motion is also moved when it moves something else; this, however, is because such movers must be in contact with their patients in order to move them. Thus it follows that the agent is moved when it acts, but this is a nomological entailment, and follows from the manner in which action takes place: the agent is not itself moved *insofar* as it acts on the patient.

²⁶ In Aristotle's terms, they are not the same "in being" (μη ὡς τῶ εἶναι τὸ αὐτό). In other words, Aristotle recognizes different kinds or degrees of sameness. It has been questioned whether Aristotle has a firm grip on the modern concept of strict numerical identity (see especially White (1971)), but here in any case he contrasts a type of sameness for which Leibniz's law is in effect, namely sameness of being or essence, with one for which it is not. That is, despite the cause and effect being somehow the same, to apply Leibniz's law and assert that they have all the same properties would be to commit the fallacy of accident as described at *Soph. El.* 179a35f. The basic difference asserted as holding between them is thus clear enough for our purposes, though the exact nature of their sameness is not obvious from the examples of the two roads or teaching and learning, and is discussed further below. Indeed, it is likely that the full force of these examples for Aristotle must to some extent be understood in light the most plausible analysis of causal interaction.

The most obvious way for Aristotle to secure causal necessitation is thus to claim that cause and effect are somehow one and the same entity—the fire’s heating of the pot is the same thing as the pot’s being heated by the fire; hence, the mere existence of the cause entails the existence of the effect. The question, then, is the nature of their sameness.

It is tempting to understand the intensionality by which cause and effect are in one way the same and in another way different as turning simply on ways a thing may be described: a single road may be described as going from one city to another, or the other way around. Similarly, the heating of a pot may also be described as the exercise of the causal power of the heat in or upon the pot. This would yield causal necessitation right away, since cause and effect really are the same thing, merely picked out by different descriptions, like Samuel Clemens and Mark Twain.

However, such an interpretation would yield unfortunate results for Aristotle. The road from Athens to Thebes may also be a convenient way to get to Delphi, but the existence of the road from Thebes to Athens follows directly from the existence of a road from Athens to Thebes in a way which is guaranteed by the nature of roads. The existence of a convenient way to Delphi does not so follow: we may infer from the fact that X is a road from Athens to Thebes that it is also a road from Thebes to Athens, but it may not be inferred from the fact that X is a road from Athens to Thebes that X is a convenient way to get to Delphi, since other geographical or logistical facts might have been different. In the causal scenario, the act of teaching may be further described, in a given instance, both as an act of learning, and as an act of earning money. In this case, we do not yet have a reason to point to the former as the genuine effect of teaching and

the latter as an incidental bonus. Teaching and learning are necessarily co-extensive, whereas teaching and earning money, unfortunately, are not.

A linguistic interpretation of this intensional co-incidence would therefore fail to secure the necessity required for causation: the alternate ways of describing various phenomena are in general wide-ranging and non-necessary, while the correct description of the cause and the effect must be necessarily co-extensive. This requires distinguishing a privileged class of descriptions among all of those which pick out the change taking place in the patient; however, if there is a privileged class of alternate descriptions {G} that a phenomenon must have if it may be described as 'F', the members of that class must depend on the nature of the phenomenon in question.²⁷

Furthermore, Aristotle insists that the agent's activity and the patient's patiency are in a real sense distinct, moreso than mere synonyms such as 'clothing' and 'garments' ('ἄλωπιον' and 'ἱμάτιον', 202b13). So the intensional coincidence of cause and effect must turn on something more metaphysically robust than alternate means of description.

As an alternative, we may argue for a more metaphysically fine-grained interpretation of the road and teaching examples. On this view, the road from Athens to Thebes is different from the road from Thebes to Athens in a way much like the ordered pair <1,2> is different from <2,1>—roads are, on this conception, essentially directional. As such, the existence of a road from Athens to Thebes entails the existence of a road from Thebes to Athens because the endpoint of any road may be used as a starting point of a road in the opposite direction. Similarly, an act of learning may be inferred from an

²⁷ It is worth noting that Aristotle here asserts that the co-extensive entities are 'one' ('ἓν', 202a20), and that he does not describe them as co-inciding 'κατὰ συμβεβηκός', as he does, for example, with the various and indefinite ways in which we may pick out a cause in *Physics* II 3 195a32f.

act of teaching, and vice versa. These mutual entailments are grounded in fundamental facts about the natures of roads and instruction. The one is a path or strip of matter linking two places, and the other is a transfer of understanding from one person who has it to another who does not.

If we extrapolate along these lines to the case of change, we get the result that all changes are both a move in the patient from being potentially-F to actually-F, and the activity of a formal entity or property in some agent—and, according to Aristotle, the existence of one follows from the existence of the other.²⁸ It is thus a fundamental metaphysical fact about these kinds of natural change that they are instances both of agency and of patiency: they are not merely, as we might conceive them, the gain or loss of a property; once analysed, the change in which a subject gains or loses a property is itself the action of an agent.²⁹

Aristotle thus secures one kind of causal necessitation: a particular, active cause cannot exist without the process of change it is suited to cause also existing. A heating fire cannot exist without something's being heated, just as a building builder cannot exist

²⁸ It might be that this analysis could not be extended to all categorial changes as Aristotle conceives them: locomotion, in particular, might have to be divided between changes of place which are the result of something else's action and those that are the result of a thing tending towards its natural place (i.e. realising its own nature, as described at *De Caelo* I 2). On the other hand, if we take seriously Aristotle's arguments in *Phys.* VI 241b34ff. (see also 254b25ff., and especially 255a12-14) to the effect that nothing can, strictly speaking, act on itself by itself, but rather we must distinguish an agent and a patient even in cases such as these, then Aristotle would be committed to a kind of double intensionality for them: the agent's action and the patient's patiency are the same, though different in being, while at the same time the agent and patient themselves are also co-extensive but distinct in being. This intensionality need not be problematic if there is good reason to maintain that it captures genuine distinctions, as it appears to in the case of properties grounding causal powers. Of course, in the case of natural motions, it is more appealing simply to set them aside as arising from other, more dubious commitments.

²⁹ The entailment does not go both ways, however: there are some activities in agents which do not coincide with or entail changes in patients, such as thinking. Hence, we should not view the mutual entailment relations between agency and patiency as holding in general, but rather as definitive of and restricted to the canonical kinds of change. Activity *per se* is, in a significant way, broader than causal activity.

without something being built. However, this causal necessitation is very thin.

Housebuilders build houses, but builders who are building only necessitate things-being-built: they do not necessitate the existence of houses, at least insofar as the process is distinct from the completed product, and may be interrupted. Similarly, one may claim, the existence of a heating fire at a given time may entail that something is being-heated at that time, but it does not entail that anything gets hotter.

What a critic may fairly demand of an account of causal necessitation, then, is that it explain not only why the heating of a pot necessitates that pot's being heated, but why things which can heat inevitably do heat objects which are susceptible to heat, or why things which can inebriate inevitably do inebriate things which are susceptible to inebriation, and so on. In Aristotle's terms, this amounts to asking whether there are also necessitation relations between potential causes and potential effects—that is, whether there are nomological necessities between causal powers and dispositions to change.

5. Necessitation relations between potential efficient causes

It is worth noting that when he uses modal language in relation to efficient causation Aristotle does not appear to have in mind the principle that the agent's activity and the patient's patiency are co-extensive but different in being. Even assuming that the passage describing the causal chain in *Metaphysics* VI (1027a32-b6, given in Section 3) is indeed an assertion of necessitation between active particular causes, if Aristotle has that principle of coextension in mind, it is in the background. Further, even though his

response to the so-called “logical” worry may also be a legitimate response to the Humean worry, the worries are not the same, and Aristotle’s discussion does not arise out of a problem with necessitation. The passages asserting that the effect *must* arise given the cause seem, rather, to be concerned with the nature of causal powers: as we have seen (section 4), things with powers to act or be acted upon necessarily exercise those powers under certain circumstances. We must therefore examine Aristotle’s view that powers must become active under certain circumstances.

Book θ of the *Metaphysics* is concerned with the nature of potentiality, and in the first chapter of that book Aristotle addresses the natures of potentialities for agency and patiency:

It is clear, then, that there is in one sense a single capacity for action and passion (for a thing is capable of something both by itself having a capacity to be acted upon and by another’s capacity to act on it),³⁰ but in another sense they are different. For the one is in the patient (for it is because of its having some principle—and even matter is a certain principle—that this patient is acted upon, and another by another; for what is oily is flammable, while what is yielding in this very way is crushed, and it is the same for other things), while the other is in the agent, such as heat or the art of building, the one being in what is capable of heating, and the other in what is capable of building. (1046a18-27)

[φανερὸν οὖν ὅτι ἔστι μὲν ὡς μία δύναμις τοῦ ποιεῖν καὶ πάσχειν (δυνατὸν γὰρ ἔστι καὶ τῷ ἔχειν αὐτὸ δύναμιν τοῦ παθεῖν καὶ τῷ ἄλλο ὑπ’ αὐτοῦ), ἔστι δὲ ὡς ἄλλη. ἡ μὲν γὰρ ἐν τῷ πάσχοντι (διὰ γὰρ τὸ ἔχειν τινὰ ἀρχήν, καὶ εἶναι καὶ τὴν ὕλην ἀρχήν τινα, πάσχει τὸ πάσχον, καὶ ἄλλο ὑπ’ ἄλλου· τὸ λιπαρὸν μὲν γὰρ καυστὸν τὸ δ’ ὑπεῖκον ὡδὶ θλαστὸν, ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων), ἡ δ’ ἐν τῷ ποιῶντι, οἷον τὸ θερμὸν καὶ ἡ οἰκοδομική, ἡ μὲν ἐν τῷ θερμαντικῷ ἢ

³⁰ The sense in which Aristotle is here asserting the capacity to be a single thing is not quite clear: it could be either that capacities are (or are describable as) either capacities to act or capacities to be acted upon; alternatively, there is one fact that involves both, namely that A is capable of acting on B such that B undergoes a certain change (Ross (1924) appears to take it in the latter sense (p. 241). In the preceding section, Aristotle seems to characterise potentialities as being properties or states of the given entity (see especially lines 11-13); if that is what ‘φανερὸν’ in line 18 picks up, then he seems to mean that potentialities are, in one sense, like monadic properties. The discussion of their difference, however, suggests that they are one in the ‘fact-like’ sense, namely, a single potentiality for a kind of change implies something about a distinct agent and patient, but is no less of a unity for doing so.

δ' ἐν τῷ οἰκοδομικῷ.]

In this passage, Aristotle asserts that potentialities for patiency and for agency are in a way the same, and in a way different. It is initially unclear whether he means to assert that they are potentialities of a different sort (i.e. what it is to be an agent is a potentiality in a slightly different sense than what it is to be a potential patient), or whether he is here again making an assertion of co-extension but ontological distinctness about pairs of potentialities themselves, i.e. that X's ability to heat and Y's ability to be heated are in one way the same thing, and in another way distinct.

The conclusion Aristotle draws from these observations, however, is that a thing cannot, insofar as it is a unity, act on itself by itself (1046a28). This suggests that being able to act on something in a certain way and being able to be changed in a certain way require a certain amount of complexity to ground those capacities: a metaphysical simple could not act on itself. If so, Aristotle is positing an ontological distinctness to the two potentialities: a thing can only act on itself "*quâ* other", which requires at least that it have two numerically distinct capabilities, one for agency and one for passion. His observations, then, that what is oily is inflammable and what yields in a certain way may be crushed, on the one hand, make capacities for being acted upon dependent on features or properties of the patients; similarly, since heat and the art of building are in the agents capable of heating and building, these capacities for action ought to be construed as based in distinct states of whatever has them. They are not brute, ungrounded capacities, then, but rather correspond to certain features of certain entities. At the same time, capacities are paired, and constitute a unity: heatability is a single potential change, one whose existence consists in both a state of the potential agent and a state of the potential patient.

So, just as Aristotle asserts that there is no incoherence in the idea that the activity of a property which belongs to X may take place in a distinct Y (202b5), he here asserts that a single potentiality may be grounded in a pair of distinct states, one in the agent, one in the patient. Indeed, the two claims come to the same thing: the paired properties have a single actualization, which is located in the patient.³¹

Aristotle's account of causal relations between causes considered as potential therefore relies on the idea of paired states, which are "one" in virtue of their jointly constituting the existence of a single potential for change. Potentials for change are in that sense like marriages—unitary entities whose ontological grounds are located in otherwise distinct individuals.

How, then, do such potentialities necessitate? As we have seen above (section 3), Aristotle affirms consistently that in the appropriate circumstances, an agent with a potentiality F to act on patients with potentiality G for a certain kind of change *must* act, and the patient *must* change. This goes for both the basic kinds of causal interaction among lifeless objects as well as for rational agents, although the account for rational agents is slightly more complex. Nevertheless, even a rational agent, who is capable of producing "contrary effects" (e.g. as a doctor can produce either health or sickness in a patient), *must* act in a certain way given a desire and appropriate circumstances.³²

³¹ Compare Aristotle's inclusion of action and passion in discussion of relatives (τὸ πρὸς τι) at *Meta.* 1021a26-29, where he states that X is a relative in terms of capacity in virtue of a need to refer to something else in specifying what X is. X may have the capacity, but what it is for it to have that capacity must be analysed with reference to the properties of other things.

³² Commentators disagree as to the precise formulation of the claim that rational powers must be exercised under certain circumstances, and how it differs from the exercise of non-rational powers; I agree with Charlton (1987, p. 279-80) that Aristotle does not here mean that desire is the efficient cause of the results of the exercise of rational powers (as against Charles (1984, pp. 57-8) and Sorabji (1980, p. 52)). However, unlike Charlton, I do not think this disagreement comes to one about whether the necessity by which rational powers are activated given the right circumstances and desires is *de re* or *de dicto*.

Aristotle thus expresses the view that, under certain circumstances, all agents must actualize their potentialities for acting in certain ways:

The latter [i.e. non-rational] capacities are necessary—whenever what is capable of agency and what is capable of a certain kind of patiency approach one another, the one acts and the other is acted upon, while the former [i.e. rational capacities] are not necessary; for the latter [i.e. the non-rational capacities] are all capable of producing a single thing, while the former [rational capacities] are capable of producing opposites, as if it would produce both contraries at the same time. But that is impossible. Necessarily, therefore, something else is directive; by that I mean desire or choice. For whichever one should desire decisively, that it will do whenever it is thus capable in virtue of its being present and approaching what is capable of being acted upon; thus everything with rational capacity, whenever it desires that for which it has a capacity and is so disposed as to have it, necessarily it acts. (1048a5-15)

[τὰς μὲν τοιαύτας δυνάμεις ἀνάγκη, ὅταν ὡς δύνανται τὸ ποιητικὸν καὶ τὸ παθητικὸν πλησιάζωσι, τὸ μὲν ποιεῖν τὸ δὲ πάσχειν, ἐκείνας δ' οὐκ ἀνάγκη· αὗται μὲν γὰρ πᾶσαι μία ἐνὸς ποιητικῆ, ἐκείναι δὲ τῶν ἐναντίων, ὥστε ἅμα ποιήσει τὰ ἐναντία· τοῦτο δὲ ἀδύνατον. ἀνάγκη ἄρα ἕτερόν τι εἶναι τὸ κύριον· λέγω δὲ τοῦτο ὄρεξιν ἢ προαίρεσιν. ὁποτέρου γὰρ ἂν ὀρέγηται κυρίως, τοῦτο ποιήσει ὅταν ὡς δύναται ὑπάρχη καὶ πλησιάζῃ τῷ παθητικῷ· ὥστε τὸ δυνατόν κατὰ λόγον ἅπαν ἀνάγκη, ὅταν ὀρέγηται οὗ ἔχει τὴν δύναμιν καὶ ὡς ἔχει, τοῦτο ποιεῖν.]

Aristotle points out that there is no need to add that the potentiality is realized ‘if nothing prevents’, because the potentiality is not a potentiality for acting a certain way all the time or randomly, but under certain circumstances.³³ That is, in some sense, a potential to act a certain way must be actualized because it is of the essence of that potential that something which has it will act the way it does, when it does.

³³ It is worth comparing this remark with Aristotle’s criticism of Plato at *Meta.* 988a1ff., namely that form by itself cannot account for why generation does not occur all the time or only once, but only some of the time, and by way of efficient causation. He points out there that it is precisely the efficient cause that Plato has neglected, and completes his counterproposal here by arguing that forms come to be instantiated by way of necessary connections between things capable of instantiating them and the things which provoke the changes by which they come to be instantiated. He thus offers an account, it seems, of why forms are instantiated or produced *when* they are.

On the face of it, this explanation of necessitation looks open to the charge of vacuity that is often levelled at causal powers: Aristotle appears to be saying that (1) agents with potentiality F must actualize the potentiality G in patients which have that potentiality, and (2) they must do so because what it is to have F simply is to actualize G-potentialities under certain circumstances. On this account, it looks like causes necessitate their effects simply in virtue of the fact that they *always* cause them, and they always cause their effects simply because their potentialities as agents are defined by their conditions of success—if F is present in A and G in P, but G fails to actualize, this is, by definition, because the conditions for success are not present.

Whether or not this assessment is accurate depends on how we understand the relation between potential and actual causes. On one understanding, to have a potential to ϕ is simply, and no more than, to be something that ϕ s on occasion. On another understanding, to have a potential to ϕ is to have some positive feature or property, which is independently specifiable, and which is expressed by “ ϕ ing”. Heat may be measured independently, and is the basis for an object’s potentiality to heat other objects. On this second, more robust understanding of potentiality, claims that something has a certain power need not be vacuous—indeed, they involve a genuine ontological commitment.³⁴ As we have seen above (at the beginning of this section), Aristotle thinks of powers in the second, more robust sense.

³⁴ That is, Aristotelian powers do not appear to be “ungrounded”, though the precise nature of ungrounded powers, if there are any, is in dispute. See especially Ellis (2001) and Mumford (2006) for recent defences of ungrounded dispositions.

Indeed, as Aristotle observes, actuality is definitionally prior to potentiality,³⁵ and so these potentialities are in fact defined in terms of the actuality which constitutes their full expression—where ‘definition’ is here understood in an Aristotelian sense, as picking out what makes a capacity the capacity it is, and so not as a kind of mere stipulation. Furthermore, as noted above, Aristotle argues that we should think of the properties grounding efficient causation as paired, such that their joint existence constitutes a single potentiality, whose actualization is the change occurring in the patient. These paired properties are objective features of things which, as it happens, express themselves in certain ways—ways which constitute change in one of the basic categories—under certain circumstances.

Aristotle’s contention, therefore, is not that potential causes necessitate their effects because by definition, some C is a potential cause of an effect E in virtue of the sole fact that it always causes E under certain circumstances. Rather, his claim is that there are certain properties of things which, as a matter perhaps of brute facts about the natural world, simply behave in certain ways. That is, the regular behaviour of things which interact causally is explained by their having the properties they do, not the reverse.³⁶ Hence, the claim that something with the potential to ϕ will always ϕ under the relevant circumstances is not an empty one for Aristotle, but rather a consequence of his views about the nature of properties and his analysis of the activity of agent and patient in basic causal interactions.

³⁵ *Meta.* θ 8. The nature of definitional priority and its relationship to ontological priority is a delicate matter. See Wedin (2000), ch. 6 for a recent discussion.

³⁶ This importance of this point regarding the vacuity objection was pointed out to me by an anonymous referee for the BJHP.

Thus, the necessity by which things with causal powers act or are acted upon is simply an extension of the necessity by which things behave in given ways in virtue of having an essence. The two kinds of causal necessitation—actual and potential—are therefore closely related. Actual causes and actual effects are necessarily co-extensive, so that the one cannot exist without the other, while the potentialities which ground those causal activities have them as their full expression essentially: the potentialities are properties or features whose nature is to behave a certain way.

6. Causal necessity and causal failure

One may nonetheless find the following aspect of this account troubling: causal powers (or the properties that ground them) are essentially such as to be active under certain circumstances, and their activity is in turn co-extensive with the production of their attendant effects. Thus, under those circumstances, the effect must arise given the presence of the agent. This suggests that causal activity never fails to produce its effect unless it is interrupted. The only way for a heating element to fail to heat a heatable object with which it is in contact is for the process to be interrupted or counteracted, e.g. by one of the objects' being removed, or by simultaneous contact with a cooling element. Thus, an active causal power always produces its effect, without exception. Experience, however, seems rife with examples of failed attempts to cause, where it seems plausible to say the relevant causal power of the agent is active, but the effect is nonetheless not produced. Teachers may teach while students fail to learn, a key may be turned in a lock, while the lock doesn't budge, a match may be touched to fuel without ignition resulting.

In each of these cases, it is perfectly plausible for Aristotle to say that the reason the effect does not materialize is that the patient (i.e. the student, the lock, the fuel) was not appropriate; as we have seen, Aristotle thinks that properly speaking, the activity of the agent takes place *in* the patient, and the patient must be of the right sort.

The problem, however, is that in each of these cases, the agent certainly appears to do something, and what it does appears to be qualitatively indistinguishable from what it does in the successful cases. That is, the causal power seems for all the world to be active—the teacher is emphatically pressing points, the flame is hot—but there is no causation. Aristotle therefore appears to have a dilemma: either a given causal power may be active in one situation and inactive in another, despite the agent being in qualitatively identical states in each, or he must admit that a causal power may be active, but without the effect arising.

One relatively natural response is to accept the second horn of the dilemma, and allow that a causal power may be active without the effect arising, so long as the patient is not of the appropriate type or the circumstances are inappropriate. Indeed, it is plausible to suggest that a description of the appropriate patient would be a part of the description of the circumstances under which the causal power yields its attendant effects in the first place. If so, then nothing would prevent Aristotle from allowing that a causal power may be active in additional circumstances besides the ones which are essential to its being the causal power it is, just as our perceptual capacity may become active under circumstances beyond those which make it the capacity it is—we may hallucinate.

On this reading, Aristotle is left with a somewhat weak notion of causal necessity—the genuine activity of the agent would not, after all, be sufficient for the

effect under all circumstances. Rather, the claim of causal necessitation relations between the activity of an agent and a change in a patient would be like so-called *ceteris paribus* laws. This weakening of the necessity claim need not be a defect: causal necessitation relations are not logically necessary, and so must in some sense be compatible with the conceivability of the cause arising without the effect. If such necessity is, further, compatible with the actual failure of the effect to arise, then the distinction between this kind of causal necessity (assuming it is defensible) and the notion attacked by Hume becomes even more vivid. Once we have allowed that there is nothing objectionable about claiming that things with certain powers necessarily behave in certain ways under certain circumstances, then there is nothing objectionable or *ad hoc* about asserting that the cause may exist without the effect.

The analysis of causal powers offered in section 5, however, leaves Aristotle with an option for a stronger form of causal necessity, on which he may accept the first horn of the dilemma and allow that an agent may be active in one situation and not in another, despite the agent's being in qualitatively identical states in the two situations. On this reading the analysis of causal powers in terms of paired states or properties in the agent and in the patient evades the above dilemma neatly: since the causal power is comprised of paired properties, some of which are located in the agent and some of which are in the patient, the causal power itself is not truly active unless the potentialities of both agent and patient are being realised. On this account, there is no question of the causal power being active without the effect coming about (assuming the process is not interrupted).

On the other hand, the fact that an agent may be in identical states whether or not the effect arises does not imply that, when it does not arise, a causal power is active but

failing: such a view is only plausible if we assume that the causal power resides wholly in the agent, which it does not. The agent is indeed in qualitatively identical states in both situations, which yields the misleading appearance that a given causal power is active in both of them as well. On this account, however, such an inference is mistaken, just as it is a mistake to infer from someone's moving one's lips and emitting sounds that one is actualizing one's capacity for making coherent speech. Actualizing that capacity requires several things to happen in the individual speaker, of which lip movement is one. Similarly, the actualization of a causal power requires several things to happen across distinct individuals, not only in the agent.

Which understanding of causal necessity should we prefer? Though the question is not whether causal terms are success terms, we may put the question thus: is it appropriate to say that I was teaching, but no one was learning? The correct answer seems to be: in a way yes, and in a way no. On the first, weaker option, this is analysed as a genuine instance of teaching which does not result in learning. I might make the same sounds and gestures in an empty room, and this could be called teaching in the same sense in which we call teaching what I do with a student who is unteachable (or unteachable by me). On the second, stronger option, it is analysed as a failed attempt to teach, and we might suggest that my action could only rightly be called teaching by charity.

Aristotle, at least, might well prefer the second, stronger option. Just as a detached hand is only homonymously a hand, not because of linguistic facts but rather because hands are essentially for certain functions,³⁷ so causal powers are essentially

³⁷ See e.g. *De Anima* 412b17-22.

determined by their effects and the conditions under which they are brought about. The agent's states in these cases are not genuine exercises of causal powers, since the latter are essentially embedded in the circumstances under which the patient also exercises its capacity to change. We might again take the case of perception as analogous: is someone hallucinating a red object exercising his perceptual ability? On one hand, he is doing nothing different from someone who is perceiving a red object, and so we might wish to claim that he is exercising whatever powers he has when hallucinating as when he is perceiving. On the other, if perception is essentially a faculty for being put into a certain phenomenal state *as a result of bearing the right relations to a suitable object*, then that faculty is not being exercised, even though one element of the required pair is behaving as if it were.

It might still be argued that this leaves causation or causal necessitation mysterious: we can nevertheless imagine something hot which does not heat other objects, even when these are the kinds of things which are normally susceptible to heat. What, then, makes it the case that causation *must actually occur*?

At this point, however, Aristotle is entitled to say that we have arrived at something basic: certain kinds of things just act a certain way, and that fact should perhaps be no more controversial than the fact that there are kinds of things to begin with. The claim that there are necessitation relations between potential causes and potential effects is not a claim that it is impossible or incoherent to imagine a potential cause which is not followed by its attendant effect. Rather, it is a claim that there are metaphysically necessary connections between distinct entities, such that they jointly constitute a single

potentiality for change.³⁸ In other words, we may think of the potentiality for fire to expand metal as comprising certain properties of fire and metal; potentialities need not have a discrete, uninterrupted location the way we tend to think objects must, but may on the other hand be scattered. To say, then, that potentialities of this sort must be actualized under certain circumstances should be no more problematic than saying that hot things must exhibit the behaviours which are characteristic of heat.³⁹ To that extent, Aristotle's account of efficient causation is metaphysically continuous with his understanding of the way in which an individual realizes its own nature or actualizes a capacity such as knowledge of grammar. Aristotle therefore appears to have a uniform account of what has been called '*transeunt*' and immanent causality,⁴⁰ the difference between the two consisting not in different orders of necessity, but only in the spatial characteristics of the grounding properties.

In terms of Aristotle's distinctions, this metaphysical necessity would seem to comprise both necessitation by impulse (κατὰ τὴν ὀρμὴν) and nature (i.e. a thing's exercising its natural capacities as an agent), and necessitation by force (τό βίαιον, when those capacities involve co-incidental changes to something which would not undergo those changes as a result of its own natural impulses). Though there may be good reasons for distinguishing these two types of necessity for Aristotle, they are ultimately explained in the same manner, by appeal to the behaviour which follows from possessing certain properties.

³⁸ See Heil (2005), p. 350 for a similar view about dispositions.

³⁹ Aristotle's view may be compared in this regard with the so-called Dretske-Tooley-Armstrong view of laws of nature as nomological relations between properties. Both views seem to posit a necessitation relation between universals or properties, though Aristotle differs insofar as he analyses the necessitation between properties in terms of potentiality and actuality.

⁴⁰ e.g. by Armstrong (1997), p. 73, following W. E. Johnson.

Conclusion

Thus, a dismissal of Aristotelian causal necessitation which is based solely on the assertion that it is conceptually possible for the cause to exist without the effect would be misguided. On Aristotle's understanding of active efficient causal relations, as it happens, this assertion would in fact be false—the building builder cannot exist without the house under construction. With regard to potential efficient causes the counter-claim is true—the cause may exist without the effect—but given the further claims about properties to which Aristotle appeals, this possibility does not tell against his claim of necessitation. The ground of the former kind of necessity lies in the nature of change, that of the other in the nature of properties, and they are linked because change itself is defined with reference to causal powers grounded in properties. If that is correct, then the causal necessitation by which one thing brings about a change in something else is the expression of the very properties or property-instances by which they have the capacities they do.

We can see, indeed, that there is quite a wide gulf between Aristotle's view of efficient causal necessity in particular and the target against which Hume's or a Humean's criticisms might find purchase. What makes for causal necessitation in Aristotle's understanding is the nature of forms and properties, and the necessity of what is potential to become actual—which, as I have suggested, is in fact not much more controversial than the claim that certain kinds of thing behave in certain ways. In other words, it is for Aristotle in virtue of basic metaphysical facts, not facts about what

inferences may or may not be drawn, that causes make their effects necessary. (To the extent that Aristotelian causes are related to valid inferences, they are so in a different manner: the cause is picked out by the middle term permitting the syllogistic inference from ‘A belongs to all B’ and ‘B belongs to all C’ to ‘A belongs to all C’.⁴¹ The inference is not from cause to effect, but rather from certain facts which reveal why ‘A belongs to all C’ to that fact, which they jointly entail.)

The metaphysical facts underlying the claim that causes make their effects necessary are in turn of two different types, each of which appears to be a kind of necessitation in its own right, and each of which can be attacked or defended independently of the other. On Aristotle’s view, though, the two relations work in concert: the necessity of a causal power to act as it does and the co-extension of the agent’s agency with the patient’s patiency together yield an account of causal determination in terms of causal necessity.⁴²

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⁴¹ Canonically stated and discussed in *Post. An.* B 11.

⁴² For comments on earlier incarnations of this paper, I am especially grateful to Christopher Shields, Terence Irwin, Vasilis Politis, Laura Castelli, and the participants of the Ancient Philosophy Seminar at the University of Oxford. It has also benefited greatly from the anonymous review comments and suggestions I received.

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