

# Noncausal Dispositions

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Metaphysicians and philosophers of science have a special place in their heart for the “nomic family”: causation, laws of nature, nomic necessity, objective chance, and relatives like counterfactual conditionals or explanation. These phenomena are at the same time apparently pervasive and philosophically puzzling: and while they all seem to be intimately connected, it is difficult to spell out exactly what those connections are. (The literature is littered with unsuccessful attempts to do so.) My focus in this paper will be on dispositions, which are collectively a member of the nomic family which are receiving more philosophical attention lately. Dispositions are no longer the poor cousins of causes or laws in the metaphysics literature, it seems.

Dispositions are often thought to have an intimate connection to causation. Sometimes it is thought that the general form of a disposition claim can be put in terms of an object's *response* to a *stimulus* (see Lewis 1997 p 157, or Bird 1998 p 233), which implies that when dispositions manifest they do so via an effect (a response) caused by a particular cause (the stimulus). A number of accounts of dispositions account for them in causal terms. Some analyses of conditionals that have been offered analyse them in part in terms of causation: for example, Lewis 1997 analyses dispositions in terms of a counterfactual whose consequent concerns the stimulus being involved in a cause of the response (Lewis 1997 p 157).

Other links with causation have been suggested by other writers. Prior, Pargetter and Jackson 1982, for example, characterise the connection between dispositions and their bases in causal terms, and rely on this characterisation when arguing that dispositions all have categorical bases. Some recent writers have hoped to construct a successful analysis of causation in terms of dispositions: see for example Anjum and Mumford 2010, who advertise a dispositional theory of causation (p 143), or Bird 2010 who also defends dispositional accounts of causation. If there are non-causal dispositions of the sort I will argue for in this paper, these other projects will also be in trouble, or

so I will argue in section three. The trouble is not fatal, but projects like those of Prior, Pargetter and Jackson; Anjum and Mumford; and Bird will need to be prosecuted with care.

The main form of disposition ascription I will be working with in this paper is the form “X is disposed to  $\Phi$  in C”, where  $\Phi$  is what I will call a *manifestation* and C will be what I will call a *condition*. I also take it that often when dispositions are specified with the forms “X is disposed to  $\Phi$  if C” or “X is disposed to  $\Phi$  when C”, or “X is disposed to  $\Phi$  in circumstances C” or “X is disposed to  $\Phi$  on condition C” these disposition specifications amount to roughly the same thing. A number of the writers mentioned above seem to think we can understand the link between condition and manifestation in partly causal terms: how C causes  $\Phi$ , or how it would cause  $\Phi$ , or in some more indirect causal way. I will argue that the connections between C and  $\Phi$  need not always be causal.

Two issues connected with the correct understanding of disposition ascriptions easily arise, and are perhaps best dealt with here. The first is an issue about the connection between disposition ascriptions and dispositions. One hypothesis might be that the disposition ascriptions and the dispositions are correlated one-to-one: that two expressions “X is disposed to  $\Phi$  in C” and “Y is disposed to  $\Psi$  in D” are associated with the same disposition when, and only when, what “X” refers to is identical to what “Y” refers to, and likewise  $\Phi=\Psi$  and  $C=D$ . But this hypothesis is not compulsory: one could think of dispositions as more “coarse-grained” so that, for example, a particular vase’s disposition to break when struck is *identical* to its disposition to break when struck with a hammer. (One might also take dispositions to be so fine grained that co-reference of the three expressions is not sufficient for identity of the corresponding dispositions, though this option has not yet been explored in the literature, to my knowledge.) My own view is the view that there are coarse-grained *and* fine-grained dispositions, but I will not rely on this perhaps extravagant view here. Instead, despite my frequent discussion of dispositions in this paper, when being as careful as possible the central claim I wish to defend is one that need not take a stand on this ontological question about dispositions: the central

claim is that there are true claims of the form “X is disposed to  $\Phi$  in C” where C does not cause  $\Phi$  even when the relevant disposition manifests.

The other issue arising is what to say about “unconditioned” dispositional ascriptions: where a  $\Phi$  is specified, but no C. A volcano may be disposed to erupt, or a drunk to sing, or sweaty gelignite to explode. It might be that whenever one of these ascriptions without an explicit condition is made, some implicit C is supplied by context, or it might be that an “unconditioned” disposition ascription is true provided various conditioned ones are: I need not take any particular stand on the question between the two kinds of disposition ascriptions in this paper. What is worth pointing out, though, is that the existence of “unconditioned” disposition ascriptions apparently provides us with two ways to read claims of the form “X is disposed to  $\Phi$  in C”, “X is disposed to  $\Phi$  if C”, and so on. One is the familiar one, according to which the claim concerns an object does in C, and not directly what happens apart from C. (Jane might not be disposed to swear, but be disposed to swear if offered \$1000 to do so.) The other reading attributes the unconditioned disposition to an object, but only in certain circumstances: if a piece of metal becomes brittle when supercooled, it might currently not be disposed to shatter, but would be disposed to shatter if supercooled. The possibility that, in particular, “X is disposed to  $\Phi$  if C” can bear a reading where it says “If C, X is disposed to  $\Phi$ ” ought to be kept in mind: I will explain why I think the cases I will cite are not all of this latter sort in section 3.

There are a number of expressions used to indicate dispositions, or something like them. As well as “dispositions”, we have “powers”, “propensities”, “capacities”, “potentialities” and perhaps others. No doubt some philosophers will see shades of meaning here, or will want to associate these expressions with slightly different phenomena. Nevertheless, I think many of the lessons we can learn about non-causal dispositions will apply to powers, propensities, capacities, etc. Perhaps some of these expressions suggest causal connections more than others (“powers”, for example), but I will not try to determine what differences, if any, we should mark between what we pick out with the different members of this group of terms.

## ***2. Varieties of Noncausal Dispositions***

There are a number of cases where it seems plausible to me that there are noncausal dispositions. I am not sure what would count as a decisive argument that there are genuine dispositions in any of these cases: it is open to a theorist to hold to the line that each of these disposition ascriptions is a mistake, perhaps at the cost of buying an error theory about a number of ordinary disposition ascriptions. To those with antecedently open minds, however, my hope is that one or more of the following cases will convince. It would be enough, for some purposes, to show that non-causal dispositions were possible in principle: insofar as we want an analysis of dispositions to cover all merely possible dispositions, for example, a merely possible example that undermined the analysis would suffice. Most of the cases I will offer, however, are apparently actual, and so undermine even plain universal generalisations about dispositions which would rule them out.

The first kind of case I will discuss concern *exotic* cases: cases that are thrown up, or might well be thrown up for all we know, by cutting edge physics. The first kind of exotic case concerns allegedly non-causal quantum mechanical effects. In the EPR experiment, one particle is measured in a certain way, and given a particular result of that measurement (e.g. that the electron is spin up), the chance that a different particle is measured to be a given way (e.g. spin down) is different from the chance it would have been that way if we did not have the information from the former measurement. There appears to be a set of dispositions of the system for the second particle to bear certain chances of being measured with particular features, in the circumstances where the first particle is measured with particular features. However, one popular interpretation is that this quantum-mechanical effect is an acausal one: the experiment can be set up so that there is no time for a signal sent from the first detection to reach the second one, for example, so if the first measurement did cause changes in the second particle's measurement, there would be causal action that propagated faster than the speed of light, which some hold to be impossible on grounds drawn from the theory of relativity.

Even if the measurement of the first particle does not causally influence the measurement of the second, the second surely has a disposition to be measured in a certain way in the EPR setup, in the circumstances where the first has been measured in a certain way. The states of the two particles are "entangled", and the laws of

physics entail probabilistic correlations between the two. This seems to be enough to ensure that the second particle has a disposition to correlate with the first particle, even if this correlation is non-causal. It is, of course, not compulsory to accept that the interpretation of EPR cases given above is correct. One could think that the interaction between the two particles is causal after all, for example. But the acausal interpretation of EPR phenomena is a standard one, and it is interesting to notice that the claim about the disposition of the second particle seems to sit quite happily with that interpretation.

A second kind of exotic case concerns chancy coming into existence. Various sorts of particles have some chance of appearing spontaneously, according to our best physics, through vacuum fluctuations: the photons that explain the Casimir effect, for example, or the electron/positron pairs in vacuum polarisation. Take some such pair that has appeared. Plausibly, given the laws, they had a chancy disposition to come into existence: this coming into existence is governed by discoverable laws, and it is a stable feature of the world that some such “virtual particles” are created with a certain chance in any region of space. It can be a little difficult to say *when* the pair of particles have this disposition: before they existed, they arguably had no features at all, and once they existed they arguably no longer had the disposition to *come into* existence. But we can say when the pair manifested their disposition to come into existence, and this puzzle is not special to this case: if we ever want to say that anything has the potential to come into existence, a similar puzzle will arise.

As before, there are ways to insist that this disposition, even if it is allowed to be genuine, is causal. Perhaps the empty spacetime caused the particles to appear, or perhaps the particles are caused by states of the underlying fields. Perhaps the particles are caused to appear by some not yet understood underlying physical process. And we might reject the existence of such “virtual particles”, claiming that they are only postulated as a theoretical convenience, or a mistaken postulation that future physics will clear away. Finally, we might deny that these particles have any disposition to come into existence, and additionally deny that the spacetime they appear in has any disposition to have particles spontaneously appear in it. (If we do not deny the latter, then if the particles are not caused by the spacetime, we still seem

to have an acausal disposition on our hands: the spacetime will have a disposition to manifest virtual particles with such-and-such chance whenever it is otherwise empty.)

A last way we could resist the postulation of acausal dispositions of spontaneously existing particles is to reify the fluctuations themselves as distinct entities from the particles, and to say that the fluctuations are the real circumstance under which the particles come to exist. I am afraid that this would at best push the acausal disposition back a step – what are the conditions that cause the fluctuation? If there are none, but the fluctuation nevertheless was disposed to occur with some low chance, we have not improved matters: and if we can find a circumstance to cause the fluctuations with some chance, by transitivity we could have used that story to show that the spontaneously existing particles were causally produced by the circumstances.

Notice that the case of spontaneous appearances of virtual particles through random fluctuations is not confined to the sub-atomic realm. On some theories, the existence of the entire universe is ultimately due to quantum fluctuations (Tryon 1973): perhaps *our universe* had a disposition to appear with a certain chance, just given the laws. It is not clear what circumstance we could take to cause the whole thing (if there was such a circumstance, it would be part of the whole universe). It may well be that an acausal disposition explains why there is something (concrete) rather than nothing.

The case of quantum-mechanical dispositions, and the case of spontaneous appearances due to quantum fluctuations (whether of particular particles or of the whole Big Bang) are both arguable cases of acausal dispositions. But I do not want to rest the case for acausal dispositions entirely on exotic cases like these. This is in part scientific caution: the cutting-edge science of today can be left on the cutting-room floor tomorrow.<sup>1</sup> This is particularly so when one relies on loaded interpretations of current physics: no doubt the EPR phenomenon is real, but how or whether to describe it in causal terms is a matter of controversy. And it is in part conceptual caution: it does not seem entirely obvious how to extend relatively ordinary notions

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<sup>1</sup> Well, some of this physics has its origins in the 1930s, and so is not that cutting-edge as the cutting-edge goes. But the foundations of quantum mechanics are still scientifically and philosophically controversial in a way that still encourages some caution in drawing philosophical conclusions entirely from particular interpretations of quantum-mechanical phenomena.

like that of a disposition to cases like, for example, quantum fluctuations in the early universe. (Though of course to investigate matters like early inflation or virtual particles we have no choice but to try to use *some* of our existing conceptual repertoire.)

The second category of cases I wish to consider are more mundane. The Ancient Egyptians knew when to start expecting the inundation of the Nile when the star Sirius rose at, or just before, sunrise. It is obvious to us (though perhaps not to the ancient Egyptians) that the apparent movement of Sirius does not have any relevant causal impact on the flow of the Nile. Still, it is plausible that the Nile was disposed to flood after Sirius rose at dawn. Knowing this disposition of the Nile was what enabled Egyptians to do predictions vital for their whole way of life. The disposition did not manifest unerringly: occasionally there would be terrible droughts upriver. But a disposition need not manifest unerringly to be present, any more than a torturer lacks a disposition to be cruel if he sometimes spares a victim.

It would be hard to deny that the Nile had a disposition to flood. But perhaps some will want to resist the claim that it had a disposition to flood that manifested in the circumstances of Sirius rising with the sun. It did do so reliably and predictably in those circumstances, so while one could insist that more is needed for the Nile to have the disposition to flood in the circumstances of Sirius rising with the sun, it is not clear what could justify this insistence. Of course, the Nile had a range of causal dispositions associated with its flooding as well: it was disposed to flood in Egypt when water that fell as rainfall earlier had moved far enough down the river. But allowing for these causal dispositions does not rule out the disposition specified in terms of Sirius.

Consider another example. Two legislators are disposed to vote alike: when Abel votes for a measure, Cain does too, and when Cain votes against, so does Abel. (And this is no more co-incidence: they vote together across a range of alternative possibilities.) Plausibly, then, Abel is disposed to vote in the affirmative in circumstances where Cain votes in the affirmative, and vice versa. And this remains very plausible, it seems to me, even if we discover that Abel's vote is not caused by Cain's nor Cain's by Abel's. Perhaps the two independently formed very similar

opinions on political matters, or perhaps the party whip is the common cause of Abel's votes and of Cain's. Their similar temperaments do not disqualify Abel from being disposed to vote no if Cain votes no: rather, that seems one perfectly intelligible way for Abel to have that disposition. Depending on whether we consider an example where they have independently arrived at dispositions or have their decisions produced by a common cause, we arrive at two general classes of non-causal dispositions. The first is when two causally independent phenomena march together (my view is the Nile flooding is also a case of this), and the second is where manifestation and condition are products of a common cause. It seems plausible to say that barometers are disposed to drop in the circumstances of a storm, or even the circumstances of an imminent storm. This is usually a common-cause case: the dipping and the storm are both produced by low atmospheric pressure.

To head off a possible misunderstanding, I am not here claiming that every case of correlation or two things having a joint cause is also a case where a disposition linking the two phenomena are present. Merely satisfying one of those conditions does not seem to me to be sufficient for dispositionality (and I am not here attempting to offer necessary and sufficient conditions for a disposition to obtain). I claim only that there are particular cases where either coincidental correlation or the effects of a common cause explain why a disposition is present.

Other dispositions have their circumstances specified in terms of times (and perhaps spaces). Every Lithium-8 atom has the disposition to decay with a 50% chance every .838 seconds.<sup>2</sup> We might debate what the manifestation of this disposition is (is it a decay with a chance that this is the manifestation? Is the manifestation the chance of the decay itself? Is the manifestation some hypothetical frequency?), but the condition specified in this disposition ascription is clear: the condition is that .838 seconds pass. Does the passage of time cause the decay? Plausibly time itself does not cause the decay (if anything does, it is more likely to be earlier states of the Lithium-8). Two children's blocks can have different dispositions with respect to a given space: the first can be contained within the space with ease, while the second is

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<sup>2</sup> Or maybe <sup>8</sup>Li only has this disposition in normal circumstances, e.g. when it is not being bombarded by neutrons. My own suspicion is that bombardment only masks this standing disposition to decay with its ordinary half-life, but either resolution of this question will allow a version of this example to go through: simply ask about the disposition of an isolated <sup>8</sup>Li atom.



disposed to occupy extra space in addition. Where the “space” is a gap in another object, such as a round hole in a large block, this disposition might be understood causally: the edges of the hole are liable to cause the latter block to not enter while the edges will suffer the first to pass. But when the space is empty, or is filled with something that will not impede the block (air, for example), this causal replacement is not available. Empty space does not seem to *cause* the larger block to overspill it, or *cause* the smaller block to occupy it with space to spare. There seems to be a range of dispositions specified in terms of times and spaces that are legitimate: and unless we want to adopt a non-standard view where times and spaces do more causal work than we normally suppose, these furnish examples of noncausal dispositions.

The third category of noncausal dispositions I want to consider might be considered “philosophical exotica”: it is plausible that there are dispositions of this sort if we accept controversial philosophical theses. I am committed to these theses, so I find the associated disposition ascriptions plausible: but those who do not find the motivating theses plausible will have a relatively easy way to resist these cases.

Carrie Jenkins and I have argued that there is a wide range of cases where we can explain earlier events in terms of later events (what we call “Backwards Explanation” (Jenkins and Nolan 2008)). In a number of the most mundane cases of this, the explanans does not cause the explanandum. We can explain some kinds of flower’s closing during the day by citing the fact that it will soon rain. We can explain a volcano’s smoking on Tuesday by its eruption on Thursday, when it is a volcano where smoking regularly precedes eruption. We can explain a planet’s slowing now by citing the fact that in the near future it will reach the perihelion of its orbit. There are also cases of intelligent behaviour which can be explained by the future: it can be that we discover why Jim cleaned his apartment on Monday when we find out that his parents arrived in town on Tuesday: the arrival can explain the unexpected cleaning.

In these sorts of cases, I think corresponding disposition ascriptions are plausible, at least when the explanatory connection is regular enough and robust enough. These disposition ascriptions will cite circumstances C that are not causes of the manifestations, unless there is a lot more backwards causation in mundane macroscopic cases than we thought. The flower is disposed to close, when rain is in

the near future. The volcano is disposed to smoke prior to eruption, and in the particular case, was disposed to smoke on Tuesday in circumstances where it erupts within a matter of days. Jim is disposed to clean his apartment on Monday, in the circumstances that his parents are arriving to stay with him on Tuesday. And so on. Call these “backwards dispositions”. I do not wish to claim that every case of backwards explanation corresponds to a case of a “backwards disposition”: only that *some* of the cases which motivate the backwards explanatory claims also motivate ascriptions of dispositions where the conditions cited in C occur after the manifestation  $\Phi$ , where those conditions do not cause the manifestation. And as we say in the paper, we are not committed to thinking these explanations are “brute”, or that there are no “forwards” explanations of phenomena like the flower’s closing or Jim’s cleaning. Likewise, I am not here committed to a claim that we cannot find *other* disposition claims which specify dispositions of flowers or sons in terms of circumstances that would cause their behaviour. It may even be, for all I have said, that these causal dispositions are somehow more “basic” than the backwards dispositions, though a theorist seeking to uphold the view that “backwards dispositions” are always parasitic on causal dispositions would need some defence of that claim.

Jenkins and I have also argued that objects have (non-trivial) dispositions in impossible circumstances C (Jenkins and Nolan 2011). Some of these dispositions concern C conditions which are nomic impossibilities, and some concern conditions that are even metaphysically or logically impossible. In then nomic cases, some of the dispositions described involve different specifications of the laws of nature. Photons are disposed to travel at a speed of  $3 * 10^{10}$  m/s in the circumstances of the speed of light being  $3 * 10^{10}$  m/s (and not being  $3 * 10^9$  as it is in our world.) Automobiles, on the other hand, do not have the disposition to travel at  $3 * 10^{10}$  m/s in the circumstances of the speed of light being  $3 * 10^{10}$  m/s (Jenkins and Nolan 2011 p 12). Notice that the condition of this disposition of photons is plausibly a physical law, rather than of a cause: the laws of nature about the speed of light do not *cause* light to travel around at one speed rather than another. Other cases we cite (Jenkins and Nolan 2011 p 8) are dispositions where the C condition is mathematical: Heidi is disposed to prove conjecture X in circumstances in which a proof for X exists, and knowledge of this disposition of hers might be of use when trying to work out who to

assign the task of attempting to prove X. But a mathematical conjecture being provable does not *cause* mathematicians to prove it: plausibly, mathematical truths like this do not cause anything.

Our interest in that paper was in dispositions with impossible manifestations  $\Phi$  or impossible conditions C, but there are cases like those of the previous paragraph that are possible as well. A particular automated theorem prover can be disposed to find a 10-line-or-less proof of a given theorem in a given system, on the condition that there is such a proof. Even when the proof actually exists, (and so it is not a disposition with an impossible condition) the proof does not *cause* the proving, however. A given system has a disposition to behave in a certain way, in the circumstances where the laws of nature are thus-and-so: we argue that this sort of disposition can play a role in the discovery that the laws of nature *are* thus-and-so. But again, the laws do not *cause* the behaviour: particular causes do that, not laws.

For current purposes, some of our opponents in the “Disposition Impossible” paper will be allies here. In arguing for non-trivial dispositions with impossible  $\Phi$  or impossible C, one of the main opposing positions would be one according to which any disposition claim about an object of the form “X is disposed to  $\Phi$  in C” would be automatically true when C was impossible. (Jenkins and Nolan 2011 pp 4-7 argue that both Armstrong 1996 and Lewis 1997 are committed to something close to this kind of trivialism.) This sort of trivialist will think that when there is an impossible C there need be no *distinctive* causal connection between C and the  $\Phi$  of the disposition specification: “Obama is disposed to become a communist in the circumstances in which a round square is discovered by aliens in a distant galaxy” would be true, according to a trivialist, even without a story about causal influences between geometrical discoveries by distant aliens and Obama’s politics. Whether there are some noncausal dispositions accepted by the trivialist might depend on what the causal condition at stake is, since there are modal or counterfactual causal conditions trivialists might want to argue are satisfied whenever C is impossible. Since I reject trivialism about dispositions with impossible conditions, I do not want to argue for noncausal dispositions on this basis: but it is worth pointing out that cases where C is impossible can be used to support the existence of noncausal dispositions whether we take the non-trivialist line of Jenkins and Nolan or one of the main trivialist lines.

It is the nature of philosophy that not all of the examples I have offered above will convince all readers. For many of the lessons below, being convinced by even one of the examples will be enough. And hopefully even those readers who have not been convinced by any of the examples (for example, if they are more sure all dispositions are causal than they are of any example to the contrary) will think that there is a case for noncausal dispositions to be taken seriously, and so that the lessons below might well have a significant case to be made for them, even if that case has not yet converted those readers.

### **3. Lessons**

There are several things the existence of non-causal dispositions can teach us. The first is that analyses of dispositions in terms of *C causing  $\Phi$*  in some circumstance are misguided. Lewis 1997, for example offers this rather complex analysis of dispositions, intending it to be general:

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*. (Lewis 1997 p 157).

An “*x*-complete cause” is “a cause complete in so far as havings of properties intrinsic to *x* are concerned, though perhaps omitting some events extrinsic to *x*” (p 156). If the target is a general analysis of dispositions, we need to be able to go from “*x* is disposed at time *t* to give response *r* to stimulus *s*” to and from our other dispositional locutions. But either of the two obvious ways of getting from this to “*X* is disposed to  $\Phi$  in *C*” are in trouble. The most obvious way would be to let *x*=*X*, *r*= $\Phi$ , *s*=*C*, and let *t* be the present time when dealing with the present tense. In that case, this analysis will fail when the condition *C* goes along with a relevant intrinsic change to *X* without causing it. For example, the ancient Nile in the middle of winter was not *intrinsically* such as to flood: in the run-up to flooding, it acquired new intrinsic characteristics, such as having much more water in its headwaters. The Nile, even in winter, had the disposition to flood when Sirius rose with the sun. But in winter it did not have any intrinsic property that was a Nile-complete cause of flooding. At such

times, it was disposed to flood in circumstances of Sirius rising with the sun, but did not have any intrinsic property such that if it kept it, that property plus Sirius rising with the sun would amount to a Nile-complete cause of its flooding. Likewise with many of the other cases: a pimpernel flower disposed to close before rain, on a sunny day, lacks any intrinsic property that would be, together with future rain, a pimpernel-complete cause of the closing, since the pimpernel undergoes intrinsic changes that lead to the closing before rain (changes in the light-sensitive cells on its surface, for example). Lewis seems to be presupposing that relevant intrinsic changes in objects are causally produced by the “stimulus”: noncausal dispositions show this is not always so.

On the other hand, perhaps not every  $C$  is a “stimulus”, nor every  $\Phi$  a “response”, in Lewis’s sense. In that case, Lewis’s analysis is even more plainly inadequate as a general analysis, since it is silent on disposition statements with non-stimulus  $C$ s and non-response  $\Phi$ s. Analyses employing causation other than Lewis’s need not suffer from his analysis’s particular problems, but it is a fair conjecture that noncausal dispositions will give other analyses that invoke causation trouble too.

Noncausal dispositions may also make extra trouble for counterfactual analyses of dispositions, even those counterfactual analyses that, unlike Lewis’s, make no explicit mention of causation. To see the problem, let us consider the “simple counterfactual analysis” of disposition claims: ( $X$  is disposed to  $\Phi$  in  $C$ ) iff (if  $C$ , then  $X$  would  $\Phi$ ). On some accounts of the truth-conditions of counterfactuals, the truth of these claims is a matter of what happens in possible worlds much like this one until the occurrence of  $C$ , and then which differ from this one only in the downstream causal consequences of  $C$  (see Bennett 2003 195-221). If we adopt some such account, the counterfactuals corresponding to many of the non-causal disposition ascriptions in section 2 will come out false. Consider dispositions supported by common causes (the two politicians that vote alike because of the party whip). Suppose a bill comes before the legislature, and the whip has instructed Abel and Cain to vote for it. If Abel were to vote against it, would Cain? Presumably not. Yet, I argued above, it is plausible in this sort of circumstance that Cain is disposed to vote for it in circumstances where Abel does (remember that Abel is overwhelmingly likely to vote for it, since what he will in fact do, as always, is follow the whip’s direction). “Backwards dispositions”

are another case: given the account of counterfactuals under discussion, were Jim's mother not to arrive on Tuesday he would still have cleaned on Monday – when the world deviates enough to ensure his mother's non-arrival, the cleaning is unaffected, safely in the past.

It may be that the suggestion about truth-conditions for counterfactuals is to blame here: perhaps other analyses of the relevant counterfactuals are correct, or maybe we want some other kind of conditional to analyse some or all dispositions. Or maybe this is a problem with the “simple counterfactual analysis” that more sophisticated counterfactual analyses would avoid. But on the face of it at least there is trouble here to be avoided by those seeking a close link between counterfactuals and dispositions.

The second general lesson is that it is likely to be a mistake to attempt to generally identify the categorical basis of dispositions in causal terms. (There is a debate, of course, about whether dispositions have categorical bases at all. I do not want to presuppose that they do so much as to point out that *if* one takes dispositions to have categorical bases, it will be difficult to give a general characterisation of the disposition-categorical base in causal terms.) One of the best known attempts to characterise categorical bases causally is due to Prior, Pargetter and Jackson 1982. They do not use the expression “categorical basis”, but they do claim to show that (i) all dispositions have a “causal basis”, and (ii) no dispositions cause, so that given how they characterise the causal basis it must be categorical.

There are two ways noncausal dispositions cause trouble for the Prior, Pargetter and Jackson (hereafter PPJ) theory. The first is that they should make us suspicious that every disposition has a “causal basis”, and the second is whether the “causal basis” of a disposition, as they define it, has anything very much to do with a basis of a disposition as ordinarily understood. PPJ offer an argument that all dispositions have a causal basis, but this argument is invalid twice over. A “causal basis” for PPJ is “the property or property-complex of the object that, together with ... the antecedent circumstances... is the causally operative sufficient condition for the manifestation in the case of ‘surefire’ dispositions, and in the case of probabilistic dispositions is causally sufficient for the relevant chance of the manifestation” (PPJ p 251). Let me

focus on the deterministic case. In the deterministic case, considering the case of a fragile glass *A* which is knocked in a non-actual but close possible world, PPJ argue

The closest worlds will be deterministic and have the same laws as ours... [b]ut then it will either be determined that *A* breaks, or that *A* does not break. In the latter case clearly *A* is not fragile. In the former there will be a causally sufficient antecedent condition operative in producing the breaking... Hence if *A* is fragile and Determinism is true, there must be a causal basis. (PPJ p 251-2)

The first way this argument fails to be valid is that, for all PPJ have stipulated, it is possible that *A* have two properties (or property-complexes) which, together with knocking, provide a causally sufficient condition for breaking in nearby worlds. Such a case is one where their premises are true but “*the* property or property complex of the object that...” is an improper description, and so nothing meets the letter of their definition of a causal basis. This problem can be repaired without damaging the spirit of their proposal: perhaps instead we could understand a causal basis as being any property or property-complex that forms a sufficient causal condition for the manifestation together with the condition. A more serious problem is that, for all they have shown, *A* could have properties in the nearby knock-and-break worlds that it lacks in the actual world, and *those* properties, together with the knocking, are what are causally sufficient for *A* to break in those worlds. In such a case, the candidates to be the “causal basis” of the disposition are absent from *A* in the actual world, and so in such a case *A*’s disposition lacks a causal base. I am not asserting here that this *is* what happens with fragile glasses, just that this scenario is compatible with the premises PPJ offer. The complaint is not that their conclusion is false, but rather the only argument they offer for their conclusion is invalid, even if we reinterpret “causal basis” in the way necessary to avoid the first-mentioned problem for their argument.

Given the failure of the PPJ argument for their conclusion, we might think invoking noncausal dispositions is unnecessary. But their conclusion is worth consideration even if their argument does not establish it: should we think that every object with a disposition to  $\Phi$  in  $C$  has a causal basis for that disposition in their sense, i.e. that every object has a property (or some properties) such that, in (nearby) possibilities where the object is in  $C$  and retains the causal disposition,  $C$  and that property (or one

of those properties) together are causally sufficient for the object to  $\Phi$ ?<sup>3</sup> If there are cases where things manifest dispositions where the manifestation is completely uncaused, then we will have counterexamples. (Perhaps quantum fluctuations are like this – see above.) Otherwise, it might rather depend on what “sufficiency” amounts to. If it requires just that there be some property of the object which, when cited together with C and perhaps the laws, entails that the object  $\Phi$ s the condition will be fairly trivial. (The property of either  $\Phi$ ing or not being in C, for example.) If it requires that a property of the object would be part of a sufficient cause, and part of circumstances C is also part of a sufficient cause, then many of the noncausal dispositions cited will count against this. Jim’s mother arriving on Tuesday is not part of the cause of his cleaning on Monday, for example. One politician’s voting need not be part of the cause of his likeminded independent colleague’s voting. And so on for many of the cases. PPJ’s criteria for the “basis” of a disposition seem narrowly tailored to causal dispositions.<sup>4</sup>

A third general lesson to learn is that it will be harder than it might at first seem to give a dispositionalist analysis of causation. Bird 2010, for example, offers this as “one simple proposal” for an analysis of causation in terms of dispositions:

(SD) A causes B when A is the stimulus of some disposition and B is the corresponding manifestation. (Bird 2010 p 161)

(SD) will clearly turn all of the non-causal dispositions in this paper into causal dispositions, if a “stimulus” is interpreted as one of the conditions C and “manifestation” as X  $\Phi$ -ing. The examples of section 2 are all counterexamples to SD, so interpreted. Bird also suggests a modification of SD, so that in effect there is causation when the putative cause and effect are linked by a chain of events that each meet the criteria of (SD) (e.g. if the manifestation of one disposition is the stimulus of a second, the stimulus of the first is a cause of the manifestation of the second) (Bird

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<sup>3</sup> If we wish to explicitly cover the probabilistic cases as well, we need to be more careful: does every object X with a probabilistic disposition to  $\Phi$  in C with probability P have a property (or some properties) such that, in nearby possibilities where the object is in C and retains the disposition, C and that property (or properties) are sufficient to ensure there is a P probability that X  $\Phi$ s?

<sup>4</sup> I think their criteria also face other serious problems, such as problems of finkish and masked dispositions. But even if their criteria are repaired to solve those problems, non-causal dispositions cause trouble of a quite different order.



2010 p 166). This modification is of no help in dealing with noncausal dispositions, however: any (SD) cause is a cause in the modified sense too (one-link chains are chains), and so noncausal dispositions are all apparent counterexamples to Bird's theory. Other dispositional analyses of causation will face similar challenges.

There are a number of ways to resist the general lessons I have drawn. One would be to restrict claims about the connections between causation and dispositions to a privileged class of dispositions. Instead of generalisations covering any disposition for an object  $X$  to  $\Phi$  in circumstances  $C$ , perhaps the generalisations can be explicitly restricted to "causal" dispositions, or to dispositions where  $C$  would be part of the cause of  $\Phi$ , or something similar. (Or maybe we could try for the effect of such a restriction without mentioning causation in the specification of the restriction: call the privileged dispositions "powers", or say that  $C$  must "trigger"  $\Phi$ , or be a "stimulus", for example.) A different kind of restriction would be to claim that a given analysis or proposed link between dispositions and other matters held only for the *natural* dispositions, or *fundamental* dispositions, or "first rate" dispositions captured in some other way. Some theorists of dispositions have probably been more interested in the metaphysical question of what kinds of properties should play a privileged role in our theorising than in the question of which properties are properly called "dispositions" in the ordinary sense of the word, so for those theorists at least it might seem an appealing option to allow that the cases I have been discussing do count as dispositions, but not the privileged sort that is their special focus of attention.

Whether these restrictions compromise the philosophical interest of claims about the connections between causation and (some) dispositions would then be a pressing question. While it is possible to offer an analysis of causal dispositions while not offering one for non-causal dispositions, the suspicion should be that if dispositions are susceptible to general analyses at all, there is likely to be an analysis that covers both cases: and if there is, it is likely to make an analysis tailored only for causal dispositions look redundant at best. Likewise with "basing" of dispositions in the categorical. If dispositions need categorical bases, it should be possible to say something satisfying in general about this basing relationship: and once that is done, an account of basing that only applies to causal dispositions might again look redundant at best (if it follows from the general characterisation), and maybe just

mistaken (if it conflicts with the general characterisation). Finally, analysing causation in terms of specifically *causal* dispositions feels less satisfying than analysing causation in purely dispositional terms, if that could be done without invoking a causal/noncausal distinction between dispositions. (This is in effect what happens if we draw an otherwise unmotivated distinction between conditions C that count as “stimuli” and those that do not.) That is not to say that there is nothing of interest left here – if, for example, it could be shown that a case of causation obtains if and only if disposition of a certain sort manifests, and that such dispositions are related to the cause and the effect in a particular way, that would still be informative. (My own suspicion is that dispositional theories of causation are at least informative enough to still suffer from counterexamples, even after we restrict them to avoid the problem of noncausal dispositions. But I will not attempt to defend this suspicion here.)

Another, quite different, way to resist the examples offered in section 2 is to argue quite generally that I have not identified genuine dispositions of objects to exhibit manifestations of the disposition in conditions. Instead, I have only identified circumstances under which objects satisfy “unconditioned” disposition ascriptions. According to this diagnosis, it is not that Abel is disposed to vote for a bill on condition that Cain is: rather, when Cain is disposed to vote for a bill, Abel has an “unconditioned” disposition to vote for that bill. It is not that a flower (e.g. a pimpernel) is disposed to close before rain: it is only that times before rain are occasions when the pimpernel is flat-out disposed to close. And so on. This sort of move is a very general strategy for disposing of apparently plausible cases where an object has a disposition to  $\Phi$  in a condition, so it must be handled with some care. If it can be applied in every case, then this strategy would be a victim of its own success, since then it would seem that being such that (In condition C)(X is disposed to  $\Phi$ ) would *amount to the same* as X being disposed to  $\Phi$  in C. So if this strategy is to be a useful “explaining away” strategy, it should only apply sometimes. Once this is recognised, the issue becomes whether it is plausible that only the “unconditioned disposition” readings are plausible in the cases I discussed.

I do not think that only the unconditioned description readings are plausible in the cases discussed. (Some readers might disagree, thinking this diagnosis works for one

or two cases, but note that I only need one successful example of a non-causal disposition to make many of my points about them.) Flowers that close before rain seem to be disposed to close before rain through most of their bloom, and not just on rainy days: this suggests that we are not merely saying that they sometimes have an unconditioned disposition to close. Lithium-8 has a half-life *right now*, not just an unconditioned chancy disposition to decay over various time intervals. I am not here offering a general theory of when we can ascribe “conditioned” dispositions and when only “unconditioned” ones will do: but I think intuition is on the side of ascribing noncausal dispositions, and I do not know of an non-ad-hoc reason for redescribing or explaining away these ascriptions in the manner currently being discussed.

One way to resist the claim that there are noncausal *dispositions*, even if there are correct noncausal disposition ascriptions, was foreshadowed in section 1. There I pointed out that the careful claim of this paper was that “X is disposed to  $\Phi$  in C” does not always entail that C is a cause, or part of the cause, of  $\Phi$  when the relevant disposition manifests. This careful claim does leave open that whenever X is disposed to  $\Phi$  in C, that is because of a disposition that can also be specified in terms, e.g. X is disposed to  $\Psi$  in D, such that were the disposition to manifest D would be a cause of  $\Psi$ , or part of a cause of  $\Psi$ . That is, the central claim of this paper leaves open that every disposition successfully characterised in non-causal terms *also* has a characterisation in causal terms. My own view is that some dispositions specifiable in non-causal ways cannot also be characterised in such a way that the condition would cause the manifestation were the disposition to manifest: but defending this view would require an argument about the ontology of dispositions outside the scope of this paper. (Note that this third means of partially resisting the claim that there are non-causal dispositions mirrors a way of resisting the claim that there are dispositions which can only be specified by means of impossible  $\Phi$  or impossible C, discussed in Jenkins and Nolan 2011 p 17-18.)

I have not said what positive lessons we can draw from cases of noncausal dispositions. But there are a number of approaches to dispositions which can draw some aid and comfort from the cases I have discussed. While I mentioned above that some counterfactual analyses of dispositions face challenges from some of these

examples, the door is open to conditional analyses of other sorts: it does seem that if Sirius rises with the sun, the Nile will flood, or if the lightning flash occurs thunder will soon follow. (Conditional analyses would have to be complicated to deal with many standard problems, of course, even if they do not use ‘subjunctive’ conditionals.) Analysis of disposition talk as something like modal talk is still an option as well. A simple version of this would be that X is disposed to  $\Phi$  in C iff at the selected C worlds, X  $\Phi$ s. This sort of analysis does not require that C be causally connected to  $\Phi$ , in the actual world or in other worlds. Likewise, analysis of disposition claims as generic claims, for example “X is disposed to  $\Phi$  in C” amounting to “X  $\Phi$ s in actual and nearby possible C circumstances”, have an easy task explaining noncausal dispositions: generically speaking, the Nile rose when Sirius rose with the sun, for example. (Fara 2005 is one influential development of the generic view of dispositions.) Finally, *explanationist* views of dispositions, where the connection between C and X’s  $\Phi$ -ing is analysed as some sort of explanatory connection (which either does or would hold) can handle many of the cases mentioned, at least with the right assumptions about explanation.<sup>5</sup> Plausibly the passing of time can help *explain* phenomena like radioactive decay even if it is odd to describe it as a cause (pace some causal theories of explanation). The “backwards dispositions” discussed above, for example, are more satisfactorily accommodated by explanationism about dispositions if it also embraces the “backwards explanations” argued for by Jenkins and Nolan 2008. Finally, of course, some theorists want to treat dispositions as *primitive*: those theorists might take the cases in this paper as grist to their mill because of the trouble they cause various popular attempted analyses of dispositions.

In conclusion, cases of noncausal dispositions can show us that general analyses of dispositions (or related matters such as the disposition-categorical base relationship) cannot build in too much causation, and a number of extant theories of dispositions need to be revised. Perhaps some analysis in non-dispositional terms (e.g. a generic analysis or an explanationist one) will work. Or perhaps dispositions are too anarchic for this. Dispositionality is disposed to resist analysis in other terms, and is also disposed to resist even the drawing of correct and illuminating universal

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<sup>5</sup> Carrie Jenkins has argued for an explanationist account of dispositions in unpublished work.

generalisations connecting dispositions with other phenomena of metaphysical interest, whether causes, necessity, explanation, or what-have-you. *This* noncausal disposition of dispositionality provides the last useful lesson from noncausal dispositions offered in this paper.<sup>6</sup>

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