Teleological Dispositions

1 Introduction

Some things are disposed to break when struck. Some things are disposed to bend when stressed. Some things are disposed to dissolve in water. Things have dispositions.

But dispositions need not manifest. A vase disposed to break when struck may meet its end by melting rather than breaking. A rod disposed to bend when stressed might succumb to rust without ever bending. And a chunk of salt disposed to dissolve in water may be used up while making hydrochloric acid.

These are mundane observations. Reflecting on them, however, leads to two important intuitions about dispositions. The first is that dispositions have some kind of *directedness*. The second is that dispositions have some kind of connection with *conditionals*.

Consider the vase that meets its end by melting rather than breaking. The vase doesn't break. Yet it seems that in virtue of being disposed to break when struck, the vase is in a state that is *in some sense* directed at a state-of-affairs in which the vase breaks. Likewise, even though the wire never bends, it seems that in virtue of being disposed to bend when stressed, the wire is in a state that is *in some sense* directed at a state-of-affairs in which the wire bends. Generalizing, the idea is that something with a disposition is in a state that is *in some sense* directed at a manifestation of the disposition. Put simply: a disposition need not manifest but it is *in some sense* directed at manifesting.

I've characterized the directedness intuition as one that needs an explanation. What needs to be explained the *sense* in which dispositions are directed at manifesting. Keeping this in mind, let's turn to the intuition that dispositions have some kind of connection to conditionals.

What if the vase had been suitably struck instead of being placed in the furnace? Presumably, it would have broke and so its disposition to break when struck would have

manifested. Likewise, what if the wire had been suitably stressed before corroding? Presumably, it would have bent and so its disposition to bend when stressed would have manifested. Generalizing, it seems that while a disposition need not manifest, it nonetheless *would* manifest if certain conditions were to obtain. There thus appears to be some kind of connection between dispositions and conditionals.

Suppose the connection between dispositions and conditions is a strong connection. In particular, suppose that we have an informative and counterexample free conditional analysis of dispositions. Then perhaps we could explain the directedness intuition: the sense in which a disposition is directed at manifesting is that the disposition *would* manifest *if* conditions C were to obtain (where conditions C are specified by the given conditional analysis).

Orthodoxy would have it that the correct account of dispositions rests on a conditional analysis of dispositions and so such an explanation of the directedness intuition is the right explanation. I argue otherwise. In particular, I argue for a *teleological account* of dispositions. According to this account of dispositions, the connection between dispositions and conditionals is explained in terms of the directedness of dispositions and the directedness of dispositions is a *teleological* directedness.

We begin by undermining orthodoxy. Following Molnar (2003) and Fara (2005), I believe the project of analyzing dispositions in terms of conditionals is a lost cause. But the purpose of our overview of conditional analyses is not to establish such a strong conclusion. The purpose is rather to motivate a turn towards a teleological account of dispositions.

2 Conditional analyses

2.1 The simple conditional analysis

Our starting point is the so-called *simple conditional analysis* of dispositions. The basic idea behind this analysis is that every disposition has a stimulus condition, and if that stimulus condition were to obtain, the disposition would manifest. More explicitly, the proposal is this:

(SCA) Necessarily: x is disposed to M when C iff x would M if C were the case.[1]

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[1]See Ryle (1949), Goodman (1954), and Quine (1960).

For example, if (SCA) is correct, a vase is disposed to break when struck just in case the vase would break if it were struck.

(SCA) is obviously compatible with the observation that a disposition need not manifest: if the vase is never struck, its disposition to break when struck never manifests. But (SCA) has some problems. We'll mention two of the most notorious.

First, there is *the problem of finks.* The problem here is that the stimulus condition for a disposition may also be a condition for losing or acquiring the disposition. The classic example is C. B. Martin's *elecro-fink.*[2] It's connected to a wire that is not disposed to conduct electricity when touched by a conductor. However, the fink ensures that if the wire were to be touched by a conductor, the wire would *acquire* the disposition. Thus, while the wire is *not* disposed to conduct electricity when touched by a conductor, it would conduct electricity if it were touched by a conductor.

Martin also provides an example going the other way. Suppose the elecro-fink has a reverse cycle. On reverse cycle, the electro-fink ensures that any wire connected to it that *is* disposed to conduct electricity when touched by a conductor *loses* this disposition when it is touched by a conductor. Consider such a wire. While the wire is disposed to conduct electricity when touched by a conductor, it would not conduct electricity if it were touched by a conductor. On the contrary, if it were touched by a conductor, it would lose this disposition. So, we have counterexamples to (SCA) in both directions.

Second, there is *the problem of masks.* A mask is something that prevents a disposition from manifesting when the stimulus condition obtains, and it does so *without* taking away the disposition.[3] A standard example involves an antidote for a poison.[4] The poison is disposed to kill when ingested. But when ingested, the poison takes some time to do its work. During that time, if you were to take the antidote, you would be saved. The antidote, however, does not remove the poison's disposition. It simply prevents the poison from doing any more damage. Put it this way: even though the poison is *killing* you, it need not kill you. You could take the antidote. So, there are situations where the poison wouldn't kill if it were ingested even though the poison is disposed to kill when ingested. We have another counterexample to (SCA).[5]

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[2]See Martin (1994).

[3]Masks owe their name to Johnston (1992).

[4]This example is due to Bird (1998).

[5]Choi (2008) denies that (SCA) is subject to counterexample from finks and masks. Somehow, the right-hand side of the relevant instance of (SCA) is such that the possibility of finks and masks doesn't arise. Like many others, I'm not convinced. One reason why I'm not convinced is that if Choi is right, it's hard to see why so many have had the intuition that (SCA) is subject to counterexample by situations involving finks

2.2   Appealing to the exclusion of external interference

One response to situations involving finks and masks is that they involve some kind of external interference.[6] In the case of finks, some kind of external interference causes an object to acquire or lose the relevant disposition when the stimulus condition for the disposition obtains. In the case of masks, some kind of external interference prevents the manifestation of a disposition from obtaining even when disposition's stimulus condition obtains and the disposition remains.

Perhaps, then, we can avoid the problem of finks and the problem of masks by appealing to a clause which excludes external interference.

(ECA) Necessarily: x is disposed to M when C iff x would M if C were the case and nothing external were to interfere.

(ECA) should only be seen as a first attempt. For it raises the following question: nothing external *to what* interferes *with what*? More needs to be said.

I'm going to attempt to fill in the details. We'll begin with a conditional analysis of dispositions inspired by Lewis (1997).

(LCA) Necessarily: x is disposed to M when C iff x has some intrinsic property I in virtue of which: if C were the case and x were to retain I, x would M.

One might ask: why the appeal to intrinsic properties? Lewis answers, in effect, by claiming that dispositions are intrinsic properties of their bearers.[7] This claim is controversial. Some have argued that some dispositions are extrinsic properties.[8] But we need not concern ourselves with whether dispositions are intrinsic properties. More important for present purposes is that the appeal to intrinsic properties seems to solve the problem of finks.

Consider once again the wire connected to the electric-fink that is *not* disposed to conduct electricity when touched by a conductor. This wire doesn't have an intrinsic property I in virtue of which the wire would conduct electricity if it were touched by a conductor and retain I. The wire does have such an extrinsic property: namely, being connected to the electro-fink. And, sure enough, if the wire were touched by a conductor, the electro-fink would make the wire acquire such a intrinsic property. But this is neither

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and masks.

[6]See Johnston (1992).

[7]See Lewis (1997, p. 155).

[8]See McKitrick (2003).

here nor there as far as (LCA) is concerned. It correctly predicts that, in this scenario, the wire is *not* disposed to conduct electricity when touched by a conductor.

The scenario involving the electro-fink running on reverse cycle is handled in a similar manner. In this case, the electro-fink makes the wire, when touched by a conductor, lose some intrinsic property, and consequently lose the disposition to conduct electricity when touched by a conductor. But what would happen if the wire were touched by a conductor *and it were to retain this intrinsic property*? It would conduct electricity, so it seems. So, (LCA) correctly predicts that the wire *is* disposed to conduct electricity when touched by a conductor.

Masks, however, are still a problem. You ingest the poison but take the antidote. The antidote doesn't remove the poison's disposition to kill when ingested. It just prevents the manifestation of the disposition from obtaining. So, the poison retains whatever intrinsic property grounds its disposition. (LCA) thus predicts that you die. But you don't, thanks to the antidote.

There is a modification of (LCA) that avoids this counterexample. Consider (LCA$^+$) and one of its instances.

(LCA$^+$) Necessarily: x is disposed to M when C iff x has some intrinsic property I in virtue of which: if C were to obtain and x were to retain I, there would be a process p such that if nothing external to p were to interfere with p, x would M (as a result).

(1) Necessarily: the poison is disposed to kill when ingested iff: the poison has some intrinsic property I in virtue of which: if it were to ingested by x and it were to retain I, there would be a process p such that if nothing external to p were to interfere with p, the poison would kill x (as a result).

Now take some time t after you have ingested the poison but before you have taken the antidote. The poison is causing damage to your organs at t. Let this process be p. The question, then, is whether p is such that if nothing external to it were to interfere with it, the poison would kill you as a result. It seems plausible, at least from the rather limited description of the case, that p is such a process. Shortly after t, you take the antidote. In doing so, another process obtains, one which is external to p. This process prevents p from developing into one in which the poison kills you as a result. But if it weren't for this external interference, p would have developed into such a process. Thus, (1) correctly predicts that the poison is disposed to kill you when you ingest it.

(LCA$^+$) is the best I can do to spell out the "provided nothing external interferes" response. But my best is not good enough: the analysis is subject to counterexample.

Our counterexample a variant of one due to Manley and Wasserman (2008).[9] Suppose there is a concrete block that withstands any damage done to it by a sledgehammer unless it is hit in just the right spot with just the right amount of force. Furthermore, it is nearly impossible to hit the block in this spot with the right amount of force. But if the block is hit in the right spot with the right amount of force, it shatters as a result. The block has an Achilles' heel. Now while this block *could* shatter from being stuck, it seems that we would quite rightly think that it is *not* disposed to shatter when struck.

Now suppose that, due to some freak occurrence and despite no intrinsic change to the block, conditions are temporarily just right for the block to be hit in the just the right spot with just the right amount of force, provided someone is around to strike the block. For the next two seconds, if anyone were to pick up a sledgehammer and strike the block, the block would be struck in just the right spot with the right amount of force. But no one is around to strike the block.

While conditions did momentarily obtain such that the block would shatter if it were struck, these conditions did not thereby render the block disposed to shatter when struck. We thus have a counterexample to (LCA$^+$). During the above described two second interval, it is not the case that the block is disposed to shatter when struck. However, it is the case that the block has some intrinsic property (its Achilles' heel) in virtue of which, if the block were struck and retain this property, there would be a event such that if this event were to continue without interruption, the block would shatter (as a result). So my best is not good enough.[10]

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[9]Manley and Wasserman (2008) use their example to refute conditional analyses that reply to the problem of finks and the problem of masks by appealing to hyper-specific stimulus conditions. The basic idea behind such analyses is that when we say, for example, "the vase is disposed to break when struck," the disposition ascribed is not simply being disposed to break when struck but being disposed to break when stuck in some hyper-specific way. (This seems to be Lewis's response to the problem of masks: see Lewis 1997, p. 153.) I don't consider "hyper-specific" conditional analyses here, mainly because they seem to be *ad hoc* responses to the problems of finks and masks. Manley and Wasserman offer a more substantive (and conclusive) argument against hyper-specific conditional analyses.

[10]Contessa (2013) offers an "interference free" conditional analysis of disposition ascriptions. But his best is no better than mine: it is subject to counterexample as well. Bypassing the details of his analysis, it suffices to note that his analysis predicts that if x is intrinsically disposed to M when C and y is something that interferes with x's being intrinsically disposed to M when C, then it's not the case that x would M if C were the case. But this prediction is incorrect. Here's why.

Suppose x is intrinsically disposed to break into pieces when struck. Further suppose that y is something that interferes with x's disposition in the following way. If x were stuck, a process P of x breaking into pieces would begin as a result. However, this process P wouldn't culminate because some state-of-affairs S

2.3   Appealing to normal conditions

One might worry that the counterexamples we've consider so far invoke situations that are in some sense abnormal or atypical. Certainly, the situation involving the block with an Achilles' heel is not a normal situation. Likewise, it seems that wires, whether or not they are disposed to conduct electricity when touched by a conductor, are not normally connected to some sort of electro-fink. And in the situation where you ingest the poison but take the antidote, it would be natural to say something like "The poison didn't kill you, but normally it would have."

Perhaps, then, we should consider a conditional analysis of dispositions that explicitly appeals to normality.

(NCA) Necessarily: x is disposed to M when C iff in normal conditions, x would M if C were the case.

Supposing that situations involving finks, masks, and Achilles' heels are not normal situations, the hope is that (NCA) allows us to properly ignore these situations.

But in what sense are such situations abnormal? Fara (2005) points out there need not be anything bizarre about a mask:

> Dispositions of objects are being masked all the time. I'm disposed to go to sleep when I'm tired; but this disposition is sometimes masked by too much street noise. Cylinders of rubber are disposed to roll when placed on an inclined plane; but this disposition can be masked by applying a car's brakes...[T]he masking of dispositions is such a humdrum occurrence that any adequate account of [dispositions] must accommodate it.[11]

Similar remarks apply to Achilles' heels: they are so common that any adequate account of dispositions must accommodate them. In short, then, unless the defender of (NCA)

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involving y would obtain that stops the process. So, while x would have started cracking when S obtains, it wouldn't yet be broke into pieces. But due to S obtaining another state-of-affairs S' would obtain. Due to S' obtaining, another process P' of x breaking into pieces would begin and culminate. So, if x were struck, it would (after all and despite y) break into pieces.

Now, since S is a state-of-affairs that prevents the manifestation of x's disposition to break into pieces when struck without taking away x's disposition, y is some kind of mask. Furthermore, since S' is not state of affairs that involves x being struck, x being broken into pieces in S' is not a manifestation of x's disposition to break into pieces when struck.

Putting this all together, we have a counterexample to Contessa's analysis: (i) x is intrinsically disposed to break into pieces when struck, (ii) y is something that interferes with x being disposed to break into pieces when struck, and (iii) x would break into pieces if it were struck.

[11]Fara (2005, p. 50).

further specifies the sense of normality she is appealing to, the threat of counterexample remains.

A defender of (NCA) may protest that she does not need to specify the exact sense of normality in (NCA). She may simply rest her case on the intuitive plausibility of the "Yeah...but normally..." response to situations involving finks, masks, and Achilles' heels. But this will not do.

To see why, let us begin with an observation due to Fara (2005). This is the observation that situations that are normal *with respect to x being disposed to M when C* are situations where x would M if C were the case. Following Fara, we further note that it follows that if the sense of normality appealed to in (NCA) is one that is relativized to x being disposed to M when C, the right-hand side of (NCA) is subject to trivialization. It amounts to the trivial claim that situations where x would M if C were the case are situations where x would M if C were the case.

Now recall the incident involving the poison and the antidote. It may be natural to respond with "Yeah, the poison didn't kill you, but normally it would have." But if asked why the poison would normally would kill you, it seems to me that one would say "Because it is disposed to kill when ingested." But then the sense of normality appealed to is one that is relativized to the poison being disposed to kill when ingested. If so, the "Yeah...but normally..." response in this case actually undermines (NCA). It suggests that the notion of normality appealed to in (NCA) is one that is relativized to x being disposed to M when C, and thus the right-hand side of (NCA) is subject to trivialization.

So, it would be a mistake to a defender of (NCA) to rest her case on the "Yeah...but normally..." response to situations involving finds, masks, and Achilles' heels. Furthermore, we've seen that unless the defender of (NCA) gives us some reason to think otherwise, we have reason to believe that the sense of normality appealed to in (NCA) is one that is relativized to x being disposed to M when C. Consequently, we have reason to believe that (NCA) is subject to trivialization.[12]

Similar remarks apply to appeals to ideal conditions, typical conditions, or *ceteris paribus* conditions.[13] Moline (1975) nicely captures the typical attitude towards such appeals.

> [T]hey are fundamentally dodges...They amount to muddled ways of disguis-
> ing from ourselves more or less serious ignorance of the dispositional prop-

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[12]See Hauska (2008) for further concerns about appealing to normality.

[13]See Mumford (1998) and Steinberg (2009).

erties of individual things or persons and of types of things or persons.[14]

I agree, *ceteris paribus.* That is, unless an "escape-clause" conditional analysis of disposi-
tions can show that it is legitimate to appeal to its escape-clause(s), it is fundamentally a
dodge. Thus, the worry isn't just that such analyses are subject to trivialization. It is also
that, trivialization aside, they are uninformative.[15]

2.4   Appealing to proportionality

The conditional analyses we've considered so far face either the threat of counterexample,
the threat of trivialization, or a worry about informativeness. Finks, masks, and Achilles'
heels provide the threat of counterexample. Adding some qualification or "escape-clause"
to avoid this threat brings with it either the threat of trivialization or a worry about in-
formativeness.

Perhaps, then, we should try to avoid the threat of counterexample some other way.
This is what Manley and Wasserman (2008) try to do with (PROP).

(PROP) Necessarily: x is disposed to M when C iff x would M in a suitable proportion
of C-cases.

The basic idea behind (PROP) is that instead of looking at what would happen at the closest
world(s) where C obtains, we look at what would happen in situations (some actual, the
rest merely possible) where C obtains. If a suitable proportion of these situations are
situations where x Ms, then x is disposed to M when C. The converse is alleged to hold
as well.[16]

An interesting feature of (PROP) is that situations involving finks and masks are not
ignored. To illustrate, consider a vase disposed to break when struck and the following
instance of the (PROP).

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[14]Moline (1975, pp. 244-5).

[15]It should noted that Moline's complaint isn't avoided by inventing a new type of conditional with a
semantics that is supposed to model normal conditions, ideal conditions, or *ceteris paribus* conditions. So,
the conditional analyses of Maurreau (1997), Gundersen (2002), and Bonevac et al. (2006) do not avoid
Moline's complaint. Similar remarks apply to an appeal to context to avoid the counterexamples (see Fara
2005).

[16]One might wonder whether (PROP) is a conditional analysis. Certainly, the right-hand side of (PROP) is
not a subjunctive or indicative conditional and no such conditional is embedded in (PROP). So, how exactly
is it a conditional analysis? Perhaps the idea is that the truth or falsity of the right-hand side depends upon
a bunch of counterfactual facts, facts like x would M if C_1 were the case, x wouldn't M if C_2 were the case,
x would M if C_3 were the case, and so on. In any case, Manley and Wasserman take it to be a conditional
analysis, and we'll follow suit.

(2)   Necessarily, the vase is disposed to break when struck iff the vase would break in a
        suitable proportion of cases where it is struck.

There is no shortage of (nomologically) possible cases where the vase is struck and its
disposition is masked by something or other. There is also no shortage of (nomologically)
possible cases where the vase is struck but some fink makes it lose the disposition to break
when struck. The right-hand side of (2) takes these cases into consideration. If Manley
and Wasserman are correct, such cases are outweighed by those cases where the vase
is struck and breaks: there is a "suitable" proportion of cases where the vase is struck
and breaks. So, Manley and Wasserman's strategy for avoiding the problem of finks and
the problem of masks is not to add at some qualification to SCA so that such situations
are properly ignored. Rather, the strategy is to take such situations into consideration
but maintain that there are enough non-finkish and non-masking situations where the
relevant disposition manifests. Similar remarks apply to problems with Achilles' heels.

I'm not convinced that this is a successful strategy.[17] It's clear enough what a coun-
terexample going from left-to-right would look like. We would need x to be disposed to
M when C yet *across the relevant region of modal space* C-cases are, by and large, cases
where x's disposition to M is masked or finked and so x doesn't M.

My computer's CPU provides such a counterexample. The CPU is disposed to over-
heat when running a large number of (tasking) processes. That's why the computer has
a heatsink and fans. When the CPU is running a large number of processes, the heat-
sink and fans *mask* the CPU's disposition to overheat when running a large number of
processes. Now creatures smart enough to design such a CPU are also smart enough to
realize that its disposition to overheat when running a large number of processes needs
to be masked/finked when the CPU is running a large number of processes. And this
isn't an accident. It holds *across the relevant region of modal space* that cases where the
CPU is engineered are, by and large, cases where the engineers realize that its disposi-
tion to overheat when running a large number of processes needs to masked/finked in
some way. So, the relevant region of modal space is such that cases where the CPU is
running a large number of tasking processes are predominantly cases where the CPU's
disposition to overheat when running a large number of processes is masked or finked.
So, on any reasonable understanding of "suitable proportion," it's not the case the CPU

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[17]I should also say that I'm not convinced by an argument Manley and Wassermann make against com-
peting conditional analyses. Since this argument also applies to my teleological account of dispositions, I
leave discussion of it for the Appendix.

would overheat in a suitable proportion of cases where it is running a large number of tasking processes.[18] Yet the CPU is disposed to overheat when running a large number of tasking processes. That's why the heatsink and fans are there. We have a counterexample to (PROP).[19]

Here is similar but more fanciful counterexample. Suppose advanced creatures have engineered an artifact that is disposed to shatter when struck. While the blueprints for this artifact were being drawn, the creatures realized that the artifact will be disposed to shatter when struck. So, not only did they engineer a mask, they also made sure that the mask would be applied upon creation of the artifact. One more bit of fantasy. This artifact is so sophisticated that it can only be engineered by creatures smart enough to realize that the artifact will be disposed to shatter when struck and also realize that some kind of mask or fink will need to be engineered and applied upon creation. Well, maybe lesser creatures could somehow "accidentally" engineer the artifact but the probability is miniscule. The important point is that *across modal space* there are hardly any cases where the artifact is struck and shatters. Granted there are cases where the mask/fink is defective, cases where the mask/fink is not applied, and cases where lesser creatures create the artifact. But such cases are hardly worth noticing. What is worth noticing is that on any reasonable understanding of "suitable proportion," it's false that the artifact would shatter in a suitable proportion of cases where it is struck. Yet the artifact is disposed to shatter when struck. That's why the mask was applied upon creation.

Some may not be convinced by these alleged counterexamples. Regarding the alleged counterexample involving my computer's CPU, one might object that *because of the heatsink and fans*, the CPU is *not* disposed to overheat when running a large number of processes. This objection, however, seems (to me anyway) to confuse my CPU with my computer. The latter is not disposed to overheat when *the CPU* is running a large number of processes. The former is so disposed. That's why the heatsink and fans are there. One might also worry about my claim that, across the relevant region of modal

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[18]One might worry that there are at least continuum-many cases where the CPU's disposition is neither masked nor finked, the CPU is running a large number of processes, and so its disposition manifests. We are, after all, taking modal space into consideration. So, let X be the set of such cases. Surely the set of cases where the CPU's disposition is masked or finked but the CPU is running a large number of processes has the same cardinality as X. So, how can it be that there are more of the latter cases than the former cases? Good question. It is, however, a question for Manley and Wasserman to answer. They offer some suggestions. Whatever metric they use to justify the appeal to proportionality, it had better come out that my CPU wouldn't overheat in a suitable proportion of cases where it is running a large number of (tasking) processes.

[19]This scenario is also a counterexample to the variant of (PROP) found in Wasserman (2011).

space, cases where the CPU is engineered are, by and large, cases where the engineers realize that its disposition to overheat when running a large number of processes needs to be masked/finked in some way. Maybe engineers (across modal space) don't have to be that smart to engineer the CPU. I don't think so, but suppose I'm wrong. What about the counterexample involving the super sophisticated artifact? I find it hard to believe that such an artifact is *impossible*.[20]

2.5 A different direction

The problems raised for the above conditional analyses do not show that there is *no* satisfactory conditional analysis of dispositions. But they do *motivate* a move in a different direction. That is, they at least provide some reason for considering an account of dispositions that does not rest on a conditional analysis of dispositions. So, I propose that we look in a different direction. In particular, I propose that we look towards a teleological account of dispositions.

3 A teleological account of dispositions

3.1 Preliminary remarks

The move towards a teleological account of dispositions is not motivated solely by the shortcomings of the above conditional analyses. It's also motivated by the intuition that dispositions are, in some sense, directed at their manifestations.

Some may claim to not have this intuition. To them, I point to Goodman's famous characterization of dispositions in terms "threats and promises."[21] Goodman's metaphor captures an important intuition about dispositions. And it seems pretty clear that this intuition is the directedness intuition. So, if you are not sure whether you have the directedness intuition, check whether you get the metaphor. If you get it, you have the intuition.

Some may doubt that the directedness intuition should be given much weight when evaluating an account of dispositions. Perhaps the stronger intuition is that there is *an*

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[20]Manley and Wasserman (2008) suggest that (PROP) may have to be revised so that some C-cases are weighed more heavily than others. So, perhaps this is a way to avoid the above counterexamples. But then, as Cross (2013) notes, it's hard to see how (PROP) is an improvement over appeals to normal conditions, ideal conditions, or *ceteris paribus* conditions.

[21]Goodman (1954, p. 40).

important connection between dispositions and conditionals, and if we could only get this connection straight, we would have a conditional analysis of dispositions that explains, in some deflationary way, intuitions about the directedness of dispositions.

As a first step in developing a teleological account of dispositions, I turn this concern around and into argument for appealing to teleology in giving an account of dispositions. In particular, I argue that by appealing to teleology we can actually provide a counterexample free and informative connection between dispositions and conditionals.

3.2   The first step

Consider the following passage from Lewis (1997).

> Sometimes it takes some time for a disposition to do its work. When stimulus s arrives and the disposition is present, some process begins...When the process reaches completion, then that is, or that causes, response r. But if the disposition went away part-way through, the process would be aborted.[22]

To foreshadow what is to come, I claim that the processes Lewis describes are teleological processes. But before saying anymore about this, we need to slightly amend what Lewis says.

Masking cases show that even if the stimulus condition arrives and the disposition remains, there need not be some process that begins and ends with a manifestation of the disposition. So, taking masks into consideration, suppose Lewis had said something slightly different. Something like this:

> Sometimes it takes some time for a disposition to do its work. When the disposition is *activated*, some process begins. When the process reaches completion, then that is, or that causes, response r. But if the disposition went away part-way through, the process would be aborted. Nonetheless, if nothing were to interfere with this process, there would be response r.

We would then have the following *activation* principle in place:

(AV) If x's disposition to M when C is activated, then either x immediately Ms or there is some process such that if the process were to continue without interruption, x would M.

I claim that (AV) is counterexample free. Before offering support for this claim, I need to clarify a distinction (AV) relies upon. This is the distinction between a disposition being activated and the stimulus condition for the disposition obtaining.

Certain masking cases illustrate the distinction. Distinguish between two types of masking cases: those in which a disposition is *manifesting* but does not *manifest* because of a mask, and those in which a mask prevents even a partial manifestation of the disposition even though the stimulus condition obtains. Call the former "Type-1" masking cases and the latter "Type-2" masking cases. The case of the poison that is killing you but doesn't kill you because of the antidote is an example of a Type-1 masking case. For an example of a Type-2 masking case, consider a vase disposed to break when dropped but wrapped in bubble-wrap. It's dropped and doesn't break. It seems plausible that the bubble-wrap not only prevented a manifestation of the disposition but also a partial manifestation of the disposition. Furthermore, it seems plausible that the bubble-wrap prevented even a partial manifestation of the disposition because it prevented the disposition from being activated in the first place. The disposition remained dormant even though the stimulus condition obtained. Similar remarks apply to my CPU's disposition to overheat when running a large number of processes. The fans and heatsink prevent the disposition from being activated when the CPU is running a large number of processes. Generalizing, Type-2 masking cases are cases where the stimulus condition obtains, the disposition remains, but the disposition is not activated.

Cases involving finks also illustrate the distinction. When does the electro-fink running on reverse cycle make the wire lose its disposition to conduct electricity when touched by a conductor? Well, when the wire is touched by a conductor. But does the fink do its work instantaneously?[23] If so, the instant the wire is touched by a conductor, it is not disposed to conduct electricity. If not, there is some an instant or interval of time where the wire is touched by a conductor and disposed to conduct electricity when touched by a conductor. In the first case, the disposition is not activated because it's no longer present. In the second case, it's not clear whether the disposition is momentarily activated before the fink does its work. If it isn't, then we have a case where the stimulus condition obtains but the disposition isn't activated.[24] Generalizing, it seems that (reverse) finks can work in one of three ways. They can make it so that the disposition goes away the instant the stimulus condition obtains, and so the disposition is not activated because it's no longer

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[23]Lewis (1997) calls this "a dilemma about timing."
[24]My intuitions, though not entirely clear, are that the disposition isn't activated.

there. They can make it so that the disposition goes away when the stimulus condition obtains but before the disposition is activated. And they can make it so that the disposition goes way after the disposition is activated but before the disposition manifests. Instances of the first two ways bring out the distinction between a disposition being activated and the stimulus condition of the disposition obtaining.

It should be clear, then, that there is a distinction between a disposition being activated and the stimulus condition of the disposition obtaining. Of course, there is a connection between the two. For a disposition to be activated, its stimulus condition must obtain. Likewise, though perhaps this is obvious, the activation of the disposition requires that the disposition is present.

Let's return to (AV). I claim that (AV) is counterexample free. Type-1 masking cases pose no threat. In such cases, the disposition is activated but doesn't manifest because of the mask. Nonetheless, when the disposition was activated, there was thereby a process such that were that process to continue without interruption, there would be a manifestation of the disposition. Type-2 masking cases pose no threat. In such cases, the disposition isn't activated. Finks pose no threat. Either the fink makes it so that the disposition isn't activated when the stimulus condition obtains or it makes it so that the disposition goes away after it has been activated but before it manifests. In the first case, there is obviously no threat to (AV). In the second case, there is no threat to (AV) because if it weren't the fink the disposition would have manifested. And this is so because when the disposition was activated, there was thereby a process such that if the process were to continue without interruption, there would be a manifestation of the disposition. So, (AV) has no problems with the problem of finks or the problem of masks.

What about Achilles' heels? My intuitions suggest that the concrete block with the Achilles' heel has two dispositions. Because it is sturdy, it is disposed to remain intact when struck. Because of its Achilles' heel, there is a particular spot s and a particular amount of force f such that the block is disposed to shatter when struck with force f in spot s. Suppose the block is struck with force f in spot s and its disposition to shatter when struck with force f in spot s manifests. My intuitions suggest that even though the block was struck, its disposition to remain intact when struck wasn't activated. What was activated was its Achilles' heel.

But some may have the intuition that if the block is disposed to shatter when struck with force f in spot s, then it can't be disposed to remain intact when struck. To them, I say consider Achilles. The greatest warrior of the Trojan War was not disposed to fall

when struck. He was disposed to withstand harm when struck. However, because of his Achilles' heel, he was also disposed to fall when struck in the just the right spot. When Achilles was struck in just the right spot, his disposition to fall when struck in the just the right spot was activated and subsequently manifested. Was his disposition to withstand harm when struck activated? My intuitions suggest that it wasn't. If I'm right, there is no threat to (AV). If I'm wrong, there is a threat to (AV) only if when Achilles was struck in just the right spot, there wasn't thereby a process such that if the process were to continue without interruption, Achilles' disposition to withstand harm when struck would manifest. My intuitions aren't entirely because I don't have the intuition that Achilles' disposition to withstand harm when struck was activated in the first place. But it does seem to me that *if* this disposition was activated, there was such a process. And what interfered with it was the activation of Achilles' Achilles' heel. So, in either case, there is no threat to (AV). Generalizing, we can think of cases involving Achilles' heels as special cases of masking. If the case is a Type-1 masking case, then the relevant disposition is *manifesting* but doesn't *manifest* because of the activation of an Achilles' heel. If the case is a Type-2 masking case, then the activation of an Achilles' heel prevents the relevant disposition from being activated in the first place. In either case, there is no threat to (AV).

So, since I can think of no other potential threat to (AV), I conjecture that (AV) is counterexample free.[25] However, there is still an issue that needs to be resolved.

The issue is that (AV) is an "escape-clause" account of the relationship between dispositions, their activation, and their manifestation. To give a few simple examples:

- If D is activated, then, *ceteris paribus*, it manifests.

- In normal/ideal/typical circumstances, if D activated, it manifests.

- If D is activated, then, provided nothing interferes, it manifests.

Moline's remark about such proposals bears repeating.

> [T]hey are fundamentally dodges…They amount to muddled ways of disguising from ourselves more or less serious ignorance of the dispositional properties of individual things or persons and of types of things or persons. (Moline 1975, p. 244-5)

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[25]Jenkins and Nolan (2011) argue that its possible for there to be dispositions with impossible manifestations. However, their alleged examples pose no threat to (AV). They offer no example of disposition such that it's possible for the disposition to be activated but impossible for there to be even a partial manifestation of the disposition.

As I said above, I agree, *ceteris paribus.* With respect to (AV), this means that if we don't have some reason for thinking that it is legitimate to appeal to the notion of a process continuing without interruption, (AV) is simply a way to disguise more or less serious ignorance of the relationship between dispositions, their activation, and their manifestation.

(AV), however, can be legitimized by appealing to teleology. Consider the following passage from Makin (2006).

> [I]f it is appropriate to view a [process] teleologically, it is therefore also appropriate to apply other notions: interference, interruption, hindrance, and a normal outcome. It makes sense to talk of a teleological process being interrupted...That is because a teleological process has a privileged stage to which it runs in normal conditions, unless interfered with or hindered: the [end] to which it is directed.[26]

Makin is offering an explanation of why Aristotle often appeals to teleological notions in discussing the nature of his distinction between potentiality and actuality and, in particular, why actuality is prior to potentiality. Putting Aristotle aside, it shouldn't be too difficult to see how Makin's insight is relevant to (AV).

Makin's insight is that if a process is a teleological process, then it is legitimate to appeal to the notion of the process continuing without interruption. It's legitimate because of the following principle governing teleological processes.

(TP) If a process p is directed at end E, then: *in virtue of p being directed at end E*, if p were to continue without interruption, E would be the case.

(AV) follows from the conjunction of (TP) and (T1).

(T1) If x's disposition to M when C is activated, then either (a) x immediately Ms, or (b) there is some process directed at the end that x Ms.

Given (T1), we thus have good reason for thinking (AV) isn't fundamentally a dodge. On the contrary, it's a consequence of (T1), which is a substantive thesis about the relationship between dispositions, their activation, and their manifestation.

So I offer (T1) to those looking for an interesting and counterexample free connection between dispositions and conditionals. If you accept my offer, you'll get (CDC).

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[26]Makin (2006), p. 194.

(CDC) Necessarily: if x is disposed to M when C, x's disposition to M when C is activated, and x doesn't immediately M, then there is some process such that:

($\star$) *if* the process were to continue without interruption, x would M.

(T1) may seem like a steep price to pay for an interesting and counterexample free connection between dispositions and conditionals. However, the point remains that by appealing to teleology, we can actually provide an interesting and counterexample free connection between dispositions and conditionals. Thus, those who think that the directedness of dispositions can be explained, in some deflationary way, by some interesting connection between dispositions and conditionals have a worry to contend with if we can offer an account of dispositions that explains the directedness of dispositions and, in doing so, explains why (T1) holds. The worry is that the directedness of dispositions is what explains why there is some interesting connection between dispositions and conditionals.

The stage is now set for a teleological account of dispositions.

3.3 The proposal

Following Molnar (2003), I claim that directedness is what sets dispositions apart from non-dispositional properties. There seems to be no sense in which a triangular object is, in virtue of being triangular, in a state directed at the occurrence of some event.[27] On the other hand, there seems to be some sense in which a vase disposed to break when struck is, in virtue of being so disposed, in a state directed at the occurrence of an event in which the vase breaks. Such intuitions provide some initial justification for the claim that directedness is what sets dispositions apart from non-dispositional properties. But, of course, more needs be said about exactly what type of directedness is alleged to distinguish dispositions from non-dispositional properties.

I say that *teleological* directedness is what sets dispositions apart from non-dispositional properties. (T2) spells out the details.

(T2) Necessarily: a property P is a disposition iff there is a condition C and event-type M such that necessarily, P is the property of being in a state directed at the end that one Ms when C.

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[27]Inspired by Mellor (1974), some might claim that a triangular object is, in virtue of being triangular, in a state directed at the occurrence of an event in which its sides are counted and the result is three. I don't have this intuition.

(T2.1) follows from (T2).

(T2.1) Necessarily: a property P is a disposition iff there is a condition C and event-type M such that: necessarily, x has P iff x is in a state directed at the end that x Ms when C.

So, what makes a disposition a disposition is that the property *just is* the property of being in a state directed at a certain teleological end. Consequently, to have a disposition *just is* to be in a state directed a certain teleological end.

(T2) does not specify the relation between the property of being disposed to M when C and the property of being in a state directed at the end that one Ms when C. Sure enough, the property of being disposed to M when C is a disposition. But all that follows from (T2) is that there is *some* C^* and M^* such that the property of being disposed to M when C is the property of being in a state directed at the end that one M^*s when C^*.

I propose that the identity relation holds between the property of being disposed to M when C and the property of being in a state directed at the end that one Ms when C.

(T3) Necessarily: the property of being disposed to M when C *just is* the property being in a state directed at the end that one Ms when C.

It follows from (T3) that necessarily, x is disposed to M when C just in case x is in a state directed at the end that x Ms when C.

With (T3) in hand, we turn to the question: what happens when C obtains and x is disposed to M when C?

My answer is that what happens depends on whether x's disposition is activated when C obtains. If x's disposition isn't activated, then nothing of interest happens with respect to x being disposed to M when C. That is, the disposition remains dormant. However, if x's disposition is activated, something of interest does happen. In particular, *in virtue of* x being disposed to M when C, either x immediately Ms or there is a process directed at the end that x Ms. Given (T3), we thus get (T4).

(T4) If x's disposition to M when C is activated, then *in virtue of x being in a state directed at the end that x Ms when C*, either x immediately Ms or there is a process directed at the end that x Ms.

So, the teleological directedness of a disposition does *some work* when the disposition is activated. It also explains why (T1) holds.

The conjunction of (T2), (T3), and (T4) constitute my teleological account of dispositions: (TAD), for short.

A concrete example may help clarify (TAD). Consider the property of being disposed to dissolve when in water. (T3) tells us that this property *just is* the property of being in a state directed at the end that one dissolves when in water. (T2), then, tells us the property of being disposed to dissolve when in water is a disposition. (Nothing new.) But it also tells us that *what makes* this property a disposition is that it *is* the property of being in a state directed at the end that one dissolves when in water. Now consider a chuck of salt disposed to dissolve when in water. Suppose the salt is placed in water and it's disposition is activated. (T4) tells that in virtue of the salt being in a state directed at the end that it dissolves when in water, either the salt immediately dissolves or there is a process directed at the end that the salt dissolves. Supposing the salt does not instantaneously dissolve, there is then a process directed at the end that the salt dissolves. If this *telos* of the process were to obtain, there would be a manifestation of the salt's disposition. If this *telos* doesn't obtain, there is no manifestation in this particular circumstance (but if the process had continued its normal course without interruption, the *telos* would have obtained).

The argument for (TAD) is that it explains the directedness of dispositions, and in doing so, provides an interesting and counterexample free connection between dispositions and conditionals. This wouldn't be much of an argument if a competing account of dispositions provides both a better explanation of the directedness of dispositions and an interesting and counterexample free connection between dispositions and conditionals. So, we'll have to see what the competition has to offer.

Before comparing (TAD) to its rivals, though, we should address a concern that I'm sure has gnawing away at some.

4   A detour

4.1   Seriously?

The concern can be put like this: "You can't be serious." We can categorize those with such a concern into three groups.

First, there are those who, setting aside the analogy, would dogmatically agree with Francis Bacon's remark that "inquiry into final causes is sterile, and, like a virgin conse-

crated to God, produces nothing."[28] Second, there are those who think that inquiry into final causes has a place, provided that place concerns the goals of agents or the purposes of the artifacts they design. For them, a teleological account of dispositions is committed to projecting mental states to properties or treating them as artifacts, and so is absurd. Third, there are those who allow for so-called "natural teleology" but restrict it to the function or proper function of features of organisms. For them, a teleological account of dispositions is, at best, committed to treating dispositions as biological functions, and so is hardly worth considering.

The dogmatists can be ignored since nothing can be said to make them change their minds. The simple response to the other two groups is that while teleology is often tied up in talk of goals, purposes, design, function, proper function, and sometimes talk of certain outcomes being better than others, there is no reason to assume that teleology must be tied up in such talk. So, don't make this assumption when considering (TAD). There is a general notion of teleological directedness that outstrips talk of goals, purposes, design, and function. It is this general notion at play in (TAD).

Some might not be convinced by the simple response. They might want some reason, independent of my argument for (TAD), to take seriously a general notion of teleological directedness that outstrips talk of goals, purposes, design, and function.

To this end, we take a detour from dispositions and turn to sentences in the progressive aspect.

4.2   The progressive aspect and events in progress

Here are some examples of sentences in the progressive aspect.

(3)   a.   Steve is driving to Boston.

      b.   A chunk of salt is dissolving.

      c.   The universe is expanding.

(3a) says that there is an event of Steve driving to Boston in progress, (3b) says that there is an event of some salt dissolving in progress, and (3c) says that there is an event of the universe expanding in progress. So it is in general: a sentence in the progressive aspect says that there is an event of some type in progress. Indeed, this is the core semantic intuition about the progressive aspect.

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[28]*De Augmentis Scientiarum*, Bk. iii, Ch. 5, quoted in Woodfield (1976, p. 3) and Hawthorne (2006, p. 268).

The orthodox approach to capturing the core intuition is to offer a modal analysis of the progressive.[29] The appeal to modality usually starts with the observation that an event in progress need not culminate.[30] Steve could be driving to Boston but be forced to turn around due to car troubles. A chunk salt could be dissolving but be taken out of water before it (fully) dissolves. In such cases, there is an event in progress that doesn't culminate. But what if Steve's drive hadn't been interrupted by car troubles? Presumably, he would have drove to Boston. And what if the salt hadn't been taken out of water? Presumably, it would have (fully) dissolved. Generalizing, the basic idea is that while an event in progress need not culminate, it nonetheless *would* culminate if it were to continue without interruption. As far as I can tell, this "no-interruption" intuition is what spurs modal analyses of the progressive.

Bypassing the details of a semantics for the progressive the captures the no-interruption intuition, let's just focus on the account of events in progress suggested by the no-interruption intuition. It's helpful here to appeal to resultant states. So, let me say a word about resultant states, and then offer the account of events in progress suggested by the no-interruption intuition.

A resultant state of an event is a state of the event having occurred or taken place. For example, suppose Mirah drew a circle. As a result of this event taking place, a state of Mirah having drawn a circle obtains. This state of Mirah having drawn a circle is a resultant state of the event.

If this example doesn't help, here is a heuristic that may. Take a sentence in the simple past which describes an event and form its present perfect correlate. Then, think of the present perfect sentence as describing the (relevant) resultant state of the event described by the simple past sentence. For example, in the sentences that follow think of each b-sentence as describing the (relevant) resultant state of the event described by the a-sentence.

(4)   a.   Steve drove to Boston.

      b.   Steve has driven to Boston.

(5)   a.   A chunk of salt (fully) dissolved.

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[29]See Dowty (1979), Asher (1992), Landman (1992), Bonomi (1997), Portner (1998), Higginbotham (2009), and Hallman (2009).

[30]This observation is one way of putting what is called the "imperfective paradox" in the literature on the progressive. Another way of putting the imperfective paradox is that a past progressive does not, in general, entail its perfective correlate. For instance, 'Steve was driving to Boston' does not entail 'Steve drove to Boston'.

      b.   A chunk of salt has (fully) dissolved.

(6)   a.   The universe expanded.

      b.   The universe has expanded.

To put it yet another way, think of (4b) as saying that a state of Steve having driven to Boston now holds, think of (5b) as saying that a state of the chunk of salt having (fully) dissolved now holds, and think of (6b) as saying that a state of the universe having expanded now holds. Such states are resultant states of particular events.[31]

    With resultant states suitably clarified, we can now offer the account of events in progress suggested by the no-interruption intuition.

(NI) Necessarily, e is a φ event in progress at t iff e would bring about a resultant of a φ event if it were to continue past t without interruption.

For instance, an event is an event of the universe expanding in progress (at t) just in case the event would bring about a state of the universe having expanded if it were to continue (past t) without interruption.

    There are, however, two problems with (NI). The first is the right-to-left direction is subject to counterexample. The second is that the left-to-right direction is subject to a worry about informativeness.

    Our counterexample is a variant of a scenario due to Landman (1992). Suppose Mary is delusional and thinks she needs to swim to the other side of the Atlantic to save her soul. Mary is not only delusional but also a very bad swimmer. So, she enters the Atlantic around Boston, swims for a hour, and then drowns. Mary was *trying* to swim to the other side of the Atlantic but she wasn't actually swimming to the other side of the Atlantic. Indeed, this case is a nice example of the difference between trying to do something and actually doing what you are are trying to do. But what if Mary's swim had continued *without interruption*. Well, she wouldn't have drown. Likewise, she wouldn't be eaten by a shark or be saved by a fishing boat. In short, the swim would have continued on until she miraculously reaches some place on the other side. So, we have an event that is not an event in progress of Mary swimming to the other side of the Atlantic but is one that would bring about a state of Mary having swum to the other side of the Atlantic if it

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[31]There are analyses of the perfect that involve quantification over resultant states, and so take the above paraphrases to be semantically significant. See Parsons (1990), Kratzer (2000), and Higginbotham (2009).

were to continue *without interruption.* Thus, we have a counterexample to the right-to-left direction of (NI).

The worry about informativeness is that unless more is said about what counts as an interruption of a φ event in progress, we have no reason not to think of an interruption of a φ event in progress as simply something that prevents it from bringing about the resultant state of a φ event. We should just as well treat an interruption of an event in progress of Steve driving to Boston as simply something that prevents the event from bringing about a state of Steve having driven to Boston. So, the claim that an event in progress of Steve driving to Boston would bring about a state of Steve having driven to Boston if it were to continue without interruption amounts to the uninformative claim that this event in progress would bring about such a state unless something prevented it from doing so. In short, unless something more is said about what counts as an interruption of a φ event in progress, the left-to-right direction of (NI) amounts to the uninformative claim that a φ event in progress would bring about a resultant state of a φ event unless some prevents from it doing so.

Perhaps there is a way to modify (NI) so that it avoids the threat of counterexample and the worry about informativeness. Suffice it to say that as in the case of conditional analyses of dispositions, there is no modal analysis of the progressive that is widely recognized to be informative and counterexample free.[32] So, someone who is sympathetic to a modal account of events in progress has her work cut out for her.

There is, however, an account of events in progress that not only explains the no-interruption intuition but also explains another intuition about events in progress. This is the intuition that an event in progress is *in some sense* directed at bringing about a certain state-of-affairs. Surely, an event in progress of Steve driving to Boston is *in some sense* directed at bringing about a state-of-affairs in which Steve has driven to Boston. Surely, an event in progress of a chunk of salt dissolving is *in some sense* directed at bringing about a state-of-affairs in which the salt has (fully) dissolved. Surely, an event in progress of the universe expanding is *in some sense* directed at bringing about a state-of-affairs in which the universe has expanded. So, it is in general: events in progress have some kind of directedness.

I claim that the directedness of events in progress is a teleological directedness: for an event in progress to be directed at a certain state-of-affairs is for the relevant state-

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[32]See Szabó (2004), Szabó (2008), and Kroll (2015) for arguments against modal analyses of the progressive.

of-affairs to be a *telos* of the event in progress. More specifically, I propose the following teleological account of events in progress.

(EIP) Necessarily, e is a φ event in progress at t iff e is, at t, directed at the end that it cause the resultant state of a φ event to obtain at some $t' > t$.

So, for example, an event is an event in progress of Steve driving to Boston (at t) iff it is an event that is (at t) directed at the end that it cause a state of Steve having driven to Boston to obtain (at some later t').[33]

(EIP) explains the directedness intuition about events in progress. It also explains the no-interruption intuition. Recall Makin's insight.

(TP) If a process p is directed at end E, then: *in virtue of p being directed at end E, if p were to continue without interruption, E would be the case.*

(EIP) treats events in progress as teleological processes. Thus, (E1) follows from (EIP).

(E1) If e is a φ event in progress at t, then e would bring about a resultant state of a φ event if it were to continue past t without interruption.[34]

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[33](EIP) should not be understood as a complicated way of saying that an event in progress is directed at the end that it culminate. To see why, let e be a sufficiently extended event in progress of the universe expanding. For each expansion of the universe during this time, there is a corresponding resultant state of the universe having expanded that is brought about by e. But e doesn't culminate each time it brings about a state of the universe having expanded. Indeed, as an event in progress of universe expanding, e is not associated with any kind of culmination. What (EIP) basically tells us is that even if e brings about a state of the universe having expanded at some moment t, it is still, at t, directed at bringing about a *later* state of the universe having expanded. So, while e is not directed at any kind of culmination, it is still, at each moment, directed at bringing about further expansion of the universe. In short, some events in progress are (teleologically) directed at culminating, other aren't, but all are (teleologically) directed at bringing about a *later* resultant state.

[34](E1) is simply the left-to-right direction of (NI). So, I am committed to this direction of (NI) being counterexample free. The only alleged counterexample I aware of is due to Szabó (2008). Szabó asks us to consider a young boy, Frank, who starts enumerating prime numbers in sequence: two, three, five, seven, eleven, thirteen, and so on. According to Szabó, uttering 'Frank is enumerating the primes' is an accurate description of what Frank is doing. But it's not possible for Frank to enumerate the primes. So, it's not possible to there to be a resultant state of an event in which Frank enumerates the primes. Thus, if 'Frank is enumerating the primes' is an accurate description of what Frank is doing, we would appear to have a counterexample to (E1).

I'm not convinced. Suppose Frank's mother utters 'Frank is enumerating the primes' to describe what Frank is doing and you overhear the utterance. Suppose you ask: "All of the primes or some of the primes?" If the mother were to respond with "All of the primes," she would be saying something false. On the other hand, if the mother were to respond with "Some of the primes," she would by saying something true. It seems, then, that taking the mother to be saying something true when she utters 'Frank is enumerating the primes' rests on taking her to be communicating the proposition that Frank was enumerating some of the

So, (EIP) explains the intuition that spurs modal accounts of events in progress. Further-more, the informativeness worry is no longer a worry. (E1) is a consequence of (EIP), which is a substantive thesis about events in progress.

Here, then, is an argument, independent of my argument for (TAD), to take seriously a general notion of teleological directedness that outstrips talk of goals, purposes, design, and function. (EIP) is an account of events in progress that explains the directedness intuition and explains the intuition that motivates its rivals (i.e., modal accounts). So, we have good reason to take (EIP) seriously. The notion of teleological directedness in (EIP) is a general notion that outstrips talk of goals, purposes, design, and function. For example, bringing about a state of the universe having expanded is not a goal, purpose, or function of an event in progress of the universe expanding, and I see no reason to think such an event in progress was designed to bring about such a state.

So, since we have reason to take (EIP) seriously, we have reason to take seriously a general notion of teleological directedness that outstrips talk of goals, purposes, design, and function.

I have not provided a detailed defense of (EIP) over its rivals.[35] But the purpose of our detour isn't to provide a detailed defense of (EIP). It's to provide some independent reason to take seriously a general notion of teleological directedness. Let us, then, return to dispositions by comparing (TAD) to its rivals.

4.3   Against the competition

The competition falls into two camps. The first camp consists of accounts of dispositions that rest upon a conditional analysis of dispositions. The second camp consists of accounts of dispositions that appeal to a different type of directedness.[36]

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primes. If this is right (and I think it is), then the scenario is not a counterexample to (E1). To be such a scenario Frank would have to be enumerating all of the primes, which he obviously is not doing. Rather, the scenario is one where Frank is enumerating some of the primes, and he obviously can enumerate some of the primes.

[35]See Kroll (2015) for such a defense of (EIP).

[36]There is a possible third camp. Following Fara (2005), one might reject conditional analyses but offer a "habitual" account of dispositions in which being disposed to M when C *just is* having an intrinsic property in virtue of which one Ms when C. I do not consider this possible third camp to provide *actual* competition to (TAD) because the counterexamples I offered to (PROP) serve as counterexamples to a habitual account of dispositions: my CPU does not have an intrinsic property in virtue of which it overheats when running a large number of processes, yet it is disposed to overheat when running a large number of processes (that's why the heatsink and fans are there). If you are skeptical of my counterexamples to (PROP), see Wasserman (2011) for reasons to be skeptical of the prospects of a habitual account of dispositions.

We have yet to see a satisfactory (i.e., counterexample free and informative) conditional analysis of dispositions. This is a problem for the first camp. It also makes comparing (TAD) to the competition from the first camp rather difficult. Furthermore, there doesn't seem to be much motivation for continuing the search for a satisfactory conditional analysis if we can offer an account of dispositions that explains both the directedness of dispositions and provides a connection between dispositions and conditionals. (TAD) is such an account of dispositions.

Those sympathetic to conditional analyses might respond by claiming that we want a deflationary account of dispositions, and we get what we want only if there is a counterexample free and informative conditional analysis of dispositions. They might remind me of something else Goodman said–namely, that it would be ideal to explain what dispositions are without "any reference to occult powers."[37] I have two things to say in response.

First, a conditional analysis of dispositions does not tell us what dispositions are.[38] All it provides is a schematic biconditonal whose instances are alleged to be truths. Recall (SCA).

(SCA) Necessarily: x is disposed to M when C iff x would M if C were the case.

As Manley (2012) notes, you could accept (SCA) and hold a reductive functionalist account of dispositions in which the property of being disposed to M when C *just is* the second-order property of having a non-dispositional property P in virtue of which one would M if C were the case. Or you could hold a similar but non-reductive functionalist account of the dispositions. Or you could accept (SCA) yet hold that the disposition to M when C *just is* the property of being such that one would M if C were the case. Of course, it would be a mistake to accept (SCA). But the point is that if you are worried about occult powers, a conditional analysis of dispositions by itself isn't enough to relieve your worries. You need an account of dispositions that does not require occult powers.

Second, we don't want a deflationary account of dispositions if a deflationary account of dispositions is one that rejects the *possibility* of a disposition being fundamental property (i.e., a property that "carves the world at its joints"). Dispositional essentialists argue that any account of dispositions that rejects the possibility of fundamental dispositions is badly mistaken.[39] According to such theorists, our best science tells that at least some fundamental properties of the *actual world* are dispositions. Just consider spin, charge,

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[37]Goodman (1954, p. 40).

[38]Manley (2012) stresses the importance of this point, and, I should say, inspired this first response.

[39]See Ellis (2001), Molnar (2003), and Bird (2007).

and mass. Our best science tells us that these properties are fundamental properties. And surely spin, charge, and mass are dispositions. Witness Ellis and Lierse (1994):

> With few exceptions, the most fundamental properties that we know about are all dispositional...Therefore, we must either suppose that these basic properties are not truly fundamental...or else we must concede that categorical realism is false.[40]

We'll understand *categorical realism* is the view that no disposition is a fundamental property (i.e., no property that carves the *actual* world by its joints is a disposition). Ellis and Lierse's challenge to the categorical realist is straightforward. Either show that charge, for instance, is not a disposition or show that it's not a fundamental property. Good luck with either disjunct.

I will not take a stand on whether or not luck is on the categorical realist's side. Maybe our best science will change. Or maybe there is some interpretation of our current best science in which charge is not a fundamental property or at least not a disposition.

I will, however, take a stand on the possibility of there being something like charge that is a disposition and a fundamental property. Let's stipulate d-charge is the property the fundamental particles of the actual world would have if what the dispositional essentialist says about charge is correct. In other words, if the dispositional essentialist is right about charge, then d-charge is charge. Could there be a world w in which the fundamental entities of w have d-charge as a fundamental property? The dispositional essentialist says the actual world is such a world. I say that such a world is possible and so its possible for there to be a disposition that is a fundamental property.

Let's now put aside whether (TAD) undermines the motivation for analyzing dispositions in terms of conditionals. We'll just suppose that we have a counterexample free and informative conditional analysis. I argue that even with such an analysis, there is reason to favor (TAD), and the reason comes from the possibility of a basic or fundamental disposition.

For the sake of concreteness, suppose (PROP) is a counterexample free and informative analysis of dispositions. Now suppose that x is disposed to M when C. Then, (7) follows from (PROP).

(7) x would M in a suitable proportion of C-cases.

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[40]Ellis and Lierse (1994, p. 32).

Further suppose that the property of being disposed to M when C is a basic or fundamental property. Presumedly, then, there is something about the disposition itself that explains why (7) is the case. What could it be?

One option is that the property of being disposed to M when C *just is* the property of being such that one would M in a suitable proportion of C-cases.[41] Taking this approach, we would be committed to primitive counterfactual facts, and so would be committed to denying the plausible principle that what something would do depends on how it is. But maybe that principle needs to be rejected once we consider the possibility of fundamental dispositions.

Another option is to add (PROP) to (TAD) but deny that the property of being disposed to M when C *just is* the property of being such that one would M is a suitable proportion of C-cases. Taking this approach, we would be committed to primitive teleological facts that explain certain counterfactual facts. In other words, the position would be that (7) is the case in virtue of (8) being the case.

(8) x is in a state directed at the end that x Ms when C.

So, by appealing to (TAD), we don't have to reject the principle that what something would do depends on how it is. Thus, there is reason to favor the appeal to (TAD).

Generalizing, I make the following objection to the first camp. We want an account of dispositions that does not rule out the possibility of a disposition being a fundamental property. The first camp promises to provide a counterexample free and informative conditional analysis of dispositions. Suppose they provide such an analysis. There is still reason to favor (TAD) so long as (TAD) is compatible with the analysis. The reason is that (TAD) provides an account of dispositions that allows us to retain the principle that what something would do depends on how it is even in the case where that thing has a fundamental disposition.[42]

I conclude, then, there isn't much of a challenge from the first camp. First, they have

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[41]See Manley (2012).

[42]It should be noted that accepting (TAD) does not imply accepting the possibility of fundamental dispositions. Suppose we were to add (T5) to (TAD).

(T5) Necessarily: the property of being in a state directed at the end that one Ms when C *just is* the second-order property of having a non-dispositional property I in virtue of which: if C were to obtain, either x would immediately M or there would be a process directed at the end that x Ms.

(TAD) would now entail that it is impossible for a disposition to be a fundamental property. Of course, (T3) would be subject to counterexample, and (T4) would be subject to overdetermination worries. But that seems to go with the territory.

yet to provide a satisfactory conditional analysis from which they can issue a challenge. Second, even if they can provide such an analysis, there is a challenge only if they can show that the analysis is incompatible with (TAD) or show that it is impossible for a disposition to be a fundamental property.

Let's turn to the second camp. The competition from the second camp appeals to a different type of directedness in providing an account of dispositions. Whereas I claim that the directedness of dispositions is teleological, the second camp claims that the directedness of dispositions has something to do with intentionality. For lack of a better name, we'll call members of the second camp "intentionality-based" accounts of dispositions.[43]

Intentionality-based accounts of dispositions are inspired by some parallels between intentional mental states and dispositions. Suppose Johnny believes that Santa brings him presents, lives at the North Pole, has red cheeks, etc. There is a certain sense in which these beliefs of Johnny's are directed at Santa. Since Santa doesn't exist, there is also a certain sense in which these beliefs are directed at something that doesn't exist. And so it is for intentional mental states in general: there is a certain sense in which they are directed at something, and they can be directed at something that doesn't exist.[44] But dispositions have these two features as well: there is a certain sense in which a disposition is directed at its manifestation, and, since a disposition need not manifest, there is a certain sense in which a disposition can be directed at something that does not exist. So, since some dispositions are not mental properties, this suggests that intentionality might not be the mark of the mental. It also suggests that maybe we should try to offer an account of dispositions in which the directedness of dispositions is explained in terms of the directedness of intentionality. In other words, perhaps we should offer an intentionality-based account of dispositions.

There is an obvious objection to this line of thought. The sense in which an intentional mental state is directed at something is that the mental state is about or represents something. Johnny's belief that Santa brings him presents is directed at Santa in the sense that his belief is about or represents Santa. But dispositions are neither about nor represent their manifestations. Thus, the directedness of dispositions cannot be explained in terms of the directedness of intentionality.[45]

If it weren't for (TAD), I don't think this objection would be decisive. A defender of an

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[43]See Place (2005), Martin and Heil (1998), and Molnar (2003).

[44]This observation is famously due to Brentano (1874).

[45]Bird (2007) argues that other alleged parallels between intentional mental states and the directedness of dispositions are weak at best.

intentionality-based account of dispositions could respond by saying that the numerous failed attempts to provide a satisfactory conditional analysis of dispositions provide some motivation for looking in a different direction. Perhaps the parallel between the directedness of intentional mental states and the directedness of dispositions isn't perfect. But the parallel doesn't have to be perfect for us to grasp a more general notion of intentionality, one in which there is both mental intentionality and physical intentionality.

(TAD) undermines this response. It provides an explanation of the directedness of dispositions, and it is not motivated by appealing to any parallel between intentional mental states and dispositions. As illustrated by the above detour, part of the motivation for (TAD) is that there is some is some parallel between events in progress and dispositions. But this seems to be correct. Contrast the following:

(i) the sense in which an event in progress of Steve driving to Boston is directed at its culmination,

(ii) the sense in which a vase's disposition to break when struck is directed at its manifestation.

(iii) the sense in which Johnny's belief that Santa has red checks is is directed at Santa.

It strikes me that (i) and (ii) are very similar but (iii) is very different. So, I think it is safe to appeal to a parallel between events in progress and dispositions as part of the motivation for (TAD). In any case, (TAD) offers an explanation of the directedness of dispositions that does not require postulating a more general notion of intentionality. Thus, the burden is on the second camp to show that this explanation is inadequate but an explanation that rests on (ii) and (iii) being similar in some way is adequate. I'm skeptical.

The second camp might respond by claiming that my teleological notion of directedness falls under the general notion of intentionality. If this can be shown, then I join the second camp.

4.4   Taking stock

Let's take stock. The first camp needs to provide a satisfactory conditional analysis that is incompatible with (TAD) or they need to provide a satisfactory conditional analysis and show that it is *impossible* for a disposition to be fundamental property. The second camp needs to provide a convincing argument that a teleological explanation of the directedness of dispositions is inadequate but an explanation that appeals to similarities between

intentional mental states and dispositions is adequate. I've argued that neither camp has provided what it needs to provide.

I conclude we have good reason to favor (TAD) over the competition.

5   Concluding remark

I've argued that whenever something has a disposition, something is in a state with a *telos*. Along the way, I've also sketched an argument for the claim that whenever there is an event in progress, there is an event with a *telos*. Absent a strong argument that nothing has any disposition at any time and that nothing is ever happening at any time, I take it that there is thus good reason to think that Bacon was terribly mistaken about teleology. Inquiry into final causes is far from sterile. On the contrary, it reveals the nature of dispositions and events in progress. Or so I've argued.[46]

Acknowledgements

Appendix

Manley and Wasserman (2008) argue that a problem with competing conditional analyses is that they cannot account for the fact that dispositions come in degrees. Simplifying somewhat, their argument runs as follows. Take the adjectives 'fragile', 'sturdy', and 'soluble'. These adjectives denote dispositions. And these adjectives are clearly gradable adjectives. Witness: 'This vase is more fragile than that one', 'The concrete block is very sturdy', 'How soluble is salt?'. So, since gradable adjectives denote gradable properties, it follows that some dispositions are gradable properties. Thus, some dispositions come in

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[46]If we conjoin (TAD) with a dispositional essentialist account of the laws of nature, we also have an argument that teleology reveals something about the laws of nature. According to a dispositional essentialist account of the laws of nature, the laws, or at least some of the laws, are grounded in those dispositions that are fundamental properties. (See Ellis 2001 and Bird 2007.) Combining this account of laws with (TAD), it follows that at least some of the laws of nature are grounded in teleological properties. That is, it follows that at least some of the laws are teleological laws.

degrees. The problem, then, for conditional analyses like (SCA) and (LCA) is that while dispositions come in degrees, conditionals do not. (PROP), however, doesn't have this problem because proportions come in degrees.

One problem with this argument is that on what is perhaps the standard semantics for gradable adjectives, such adjectives do not denote properties of individuals. Rather, they denote measure functions: functions from individuals to degrees on a scale. (See Kennedy 2007.) For example, 'tall' is taken to denote a function from individuals to degrees on a scale of height and 'cold' is taken to denote a function from individuals to degrees on a scale of temperature. Comparative morphemes, then, are taken to establish an ordering relation between degrees on the relevant scale. Bypassing the compositional details, the upshot is that 'x is taller than y' is true just in case x's degree of height is greater than y's degree of height. A covert morpheme is postulated for the positive form of a gradable adjective (occurrences in clauses without any overt degree morphology like 'x is G' where 'G' is a gradable adjective). Semantically, this covert morpheme takes a measure function and returns a context sensitive function from individuals to truth values. Relative to a context, this function takes an individual and returns the value True just in case the the value of the measure function applied to the individual is a degree on the relevant scale that "stands out" in the context. Bypassing the compositional details, the upshot is that 'x is tall' is true relative to a context c just in case x's degree of height stands out in c.

Let's go back to the gradable adjective 'fragile'. Under the above semantics for gradable adjectives, 'fragile' does not denote a disposition. It denotes a measure function from individuals to degrees on a scale. But what is this scale measuring? Assuming that fragility has something to do with breaking and striking, it is probably further safe to assume that the scale is measuring the degree to which something is disposed to break when struck. Suppose the degrees on this scale are dispositions. At the bottom of the scale are things that are disposed to *withstand any damage* when struck. Going up, we find things that are disposed to *crack a little* when struck. Going further up, we finds things that are disposed to *shatter* when struck. So, x is more fragile than y just in case x's position on this scale is higher than y's position on this scale. Likewise, 'x is fragile' is true relative to a context c just in case $x's$ position on this scale stands out in c. The defender of (SCA) can now claim that the degrees of the scale (i.e., the dispositions) correspond to certain counterfactual properties. Anything at the bottom of the scale is such that it would withstand any damage if struck. Going further up, we find things that would crack a little if stuck. Further up yet, we find things that would shatter if struck. Generalizing, the degrees on the scale can

be mapped onto certain counterfactual properties, and so (SCA) has no problems with the fact that 'fragile' is a gradable adjective.

On the other hand, it could be that the degrees on the scale are dispositions, but towards the top of the scale are things that are disposed to break when struck *ever so lightly*. Going down are things disposed to break when struck not ever so lightly but with *a moderate amount of force*. Going further down are things disposed to break when stuck not with a moderate amount of force but with *a great deal of force*. At the bottom, we find the unbreakable: things that disposed to withstand any striking. So, x is more fragile than y just in case x position on this other scale is higher than y's position on this other scale. Likewise, 'x is fragile' is true relative to a context c just in case $x's$ position on this other scale stands out in c. And, once again, the defender of (SCA) can now claim that these degrees on this other scale correspond to certain counterfactual properties.

One can devise other scales, but so long as the degrees on this scale are dispositions, the defender of (SCA) will not have a problem. Similar remarks apply to any account of dispositions and any gradable adjective that is usually taken by philosophers to denote a disposition. So, Manley and Wasseman's objection has no force against (TAD).

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