Dispositional Modality

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1. An example

When Geach talked of tendencies, explicating Aquinas's philosophy of nature, he gave the example of a heater in a room that is capable of warming it to 25° within an hour[2]. But even if the heater is switched on, it might not actually warm the room to that temperature. There might be a draft in the room. A window might have been left open. Or, as in Geach's example, there might also be a refrigerator unit – an air conditioner – in the room and if this is turned on at the same time, the room gets no warmer than 15°. Rarely, if ever, does a disposition operate in isolation, as many have seen both before and after Geach[3]. Many powers come together, making their individual contributions to an overall effect. Thus the actual room's temperature will be a result of a great many factors, some that tend towards the room warming and some that tend towards the room cooling: how high the heater was set, how well or badly the room is insulated, how many people are in the room, and so on.

There has been much discussion of powers or real dispositions in the past decade[4], but there remains an issue that has been inadequately treated. This concerns the precise modal value that comes with dispositionality. We contend in this paper that dispositionality involves a non-alethic, sui generis, irreducible modality. Dispositions only *tend* towards their manifestations; they do not necessitate them. Tendency is, of course, a dispositional term itself, so this last statement offers little by way of illumination. But given our thesis on the irreducible nature of dispositionality, we maintain that it cannot be explicated correctly in non-dispositional terms. Nevertheless, we all have experience of dispositionality at work, through the exercise or our own powers and the action of other powers upon us. The notion of dispositionality that we acquire is one that invol-

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[2] P.T. Geach, ›Aquinas‹, 102.

[3] J. St. Mill, *A System of Logic*, 292; N. Cartwright, *The Dappled World*, ch. 3; G. Molnar, *Powers*, 194 ff.

[4] S. Mumford, *Dispositions;* G. Molnar, *Powers*; A. Bird, *Nature's Metaphysics*, to name but a few.

ves a modality stronger than pure contingency but weaker than necessity. The recognition of this distinct modal value for dispositionality is one of the biggest oversights in the growing literature in the area. Yet it is there for all to see in even the most mundane example. The power of Geach's heater, to warm the room to 25°, is really there. It is a real tendency towards one kind of outcome from the many that are logically possible. But although it tends towards this kind of outcome, it never necessitates it, even in the cases where it does succeed in producing that outcome. The possibility of interference is always present. Dispositions can be counteracted even if, as a matter of fact, they are not.

2. Hume's characterization of powers

The most conspicuous attempt to treat dispositionality as something other than it is has been in terms of necessity. This in all likelihood is down to Hume's characterization of powers in the Treatise. Hume depicted a world of pure contingency, where any event or object could follow any other. A belief in powers, he saw, would be a challenge to this. But they would be, he thought, necessary connections in nature, and we have good reasons to reject them:

> [...] we must be able to place this power in some particular being, and conceive that being as endow'd with a real force or energy, by which such a particular effect necessarily results from its operation. We must distinctly and particularly conceive the connexion betwixt the cause and effect, and be able to pronounce, from a simple view of the one, that it must be follow'd or preceded by the other.[5]

He was then able to argue that ›Such a connexion wou'd amount to a demonstration, and wou'd imply the absolute impossibility for the one object not to follow, or to be conceiv'd not to follow upon the other‹[6]. There was no such thing, he concluded. It was always possible for the power's effect not to follow, which indeed seems to be the case. But should we really conclude from this that there are no powers? Hume's argument against powers works against them only if they are conceived of as necessary connections in nature. But they are not necessities at all. They are dispositions or tendencies towards an outcome only. That they can fail to manifest in some possible situations is no argument against them when understood along these lines. Hume has effectively sent his opponents astray, making them think that the only alternative to his world of pure contingency is a world of natural necessities. But powers are neither. They are something in between what is merely possible and what *has* to be the case. This particular argument of Hume's against powers is thus ineffective. It is an argument against necessary connections in the natural processes of nature, not against the existence of

[5] D. Hume, *A Treatise of Human Nature,* 161.
[6] D. Hume, *A Treatise of Human Nature,* 161 f.

powers. It is an argument we will endorse but only to motivate the account that dispositionality is something else.

3. Reductive analyses of dispositions

There have been a number of attempts to reductively analyse dispositions in non-dispositional terms. One strategy was ontological[7], based on the idea that every disposition is in fact reducible to a categorical or non-dispositional property. But the form of reduction that concerns us here is one that could be called semantic because it involves the claim that disposition ascriptions can be semantically reduced to non-dispositional ascriptions. The idea, which was first suggested seriously by Ryle[8], although Carnap[9] had the same ambition, is that a disposition ascription is correctly analysable as a conditional sentence in which all the predicates are occurrent. To say that particular *a* is soluble, for instance, is on this account to say that if *a* is immersed in liquid than *a* will dissolve. This view is known as the simple conditional analysis (SCA), which in general terms can be stated in its simplest form as:

(SCA): $\forall x$ (Dx $\leftrightarrow$ ($Fx \rightarrow Gx$))

But this is straightforwardly false because of the possibility of masking or interference. There are many possible cases where a disposition can be stimulated, by being F, but fail to manifest the appropriate manifestation G. These will be cases where the disposition is fully present, as is the stimulus, but something else is added that gets in the way of the production of G. Geach's heater shows how this can be the case. The heater has the appropriate disposition and it is ›stimulated‹, which in this case means just being turned on. On many occasions the disposition succeeds in warming the room to 25°. It manifests its capacity to do so. But there are other cases where the heater is turned on, is fully functional, but the room does not warm to 25°, for instance, because an air conditioner has been turned on at the same time. SCA is false, therefore, because the analysans could be true when D*x*, but the analysis ($Fx \rightarrow Gx$) be false for some *x*.

Lewis proposed what is known as the reformed conditional analysis (RCA). This was designed to avoid Martin's[10] objection to the simple conditional analysis. Martin's objection was that dispositions could be ›finked‹, where a fink is some mechanism that removes a disposition at the very moment it is stimulated. Lewis proposed in response that when we make a disposition ascription we also make reference to a causal base B for that disposition and assert that the manifestation occurs only if that causal base for the disposition remains through to the time of manifestation. Simplifying:

[7] D.M. Armstrong, *A Combinatorial Theory of Possibility.*
[8] G. Ryle, *The Concept of Mind.*
[9] R. Carnap, ›Testability and Meaning I‹.
[10] C.B. Martin, ›Dispositions and Conditionals‹.

(RCA): $\forall x$ (D$x \leftrightarrow$ (Bx & Fx & (Fx and Bx are jointly a complete cause of Gx)))

But this reformed conditional analysis does not work against the current problem. A fink works by taking something away from the situation, such as removing the disposition's causal base. But this is not being done in the case of the heater. The reason the room doesn't warm to 25° is because something is added to the situation, not taken away. This is exactly how Bird's[11] antidote cases work and defeat RCA, which illustrates a phenomenon known as masking. The causal base of the disposition can remain in place, and the correct stimulus occurs, but an antidote is added as well, as a result of which the manifestation fails to occur. Poison might be disposed to kill a human, for instance, and succeed in doing so in many cases. But if poison is ingested and soon enough an antidote, then the poison's disposition can be counteracted.

A conditional analysis is particularly appealing for the Humean programme. Conditionals are an attempt to analyse away such dispositional terms in a way that involves only non-dispositional terms (being in water, being dissolved, and so on) and only extensional connectives. Even Lewis's counterfactuals remain extensional and accommodate the feature of counterfactuality by extending over truth in other worlds as well as our own. If this kind of conditional analysis goes through then Humeanism triumphs over dispositionalism.

One might nevertheless think that the only problem with a conditional analysis is that it refuses to be modally realist, not in Lewis's sense but in the sense of taking modal strength to be a real feature of the world. A reaction to this could be to offer a modally strengthened conditional analysis (MSCA). The thought behind this is that, if all the conditions are right, a disposition necessitates its manifestation. Ellis says something along these lines[12] and so does Bird himself[13], offering a modally strengthened conditional analysis:

(MSCA): $\Box\forall x$ (D$x \leftrightarrow$ (F$x \mathrel{\Box\!\!\rightarrow}$ Gx))

But MSCA remains problematic. It is vulnerable to Bird's own antidote case. Bird attempts to handle this by saying that MSCA is true generally only ceteris paribus, or all else being equal. But there are reasons to think that ceteris paribus (cp-) clauses cannot save a conditional analysis. There has always been a problem of how we complete the cp-clause. What exactly does it mean and how does it exclude all the interferers that would make the conditional false. If the cp-clause is replaced with a finite list of interferers, there remains the possibility of some further interferer that renders even this conditional false. And attempts to exclude all interferers by some kind of catch-all phrase run the real risk of rendering any such conditional trivial. When it comes to causal and nomological claims, it seems that the most plausible way of understanding

[11] A. Bird, ›Dispositions and antidotes‹.
[12] B.D. Ellis, *Scientific Essentialism*, 7.
[13] A. Bird, *Nature's Metaphysics*, 43.

the cp-clause is to take it as indicative of the dispositional nature of the claim[14]. Fs cause Gs, cp, would mean that being F disposes or tends towards G, rather than necessitates it, for instance. But this understanding of cp is clearly of no use to any putative conditional analysis of dispositions themselves. The conditional would be true only in a dispositional sense, and would thus fail to analyse dispositions.

Bird's own account, however, concerns only the sparse, real properties that are to be found at the microphysical level. A naturalist and reductivist view of properties suggests that these are the only ones we should really concern ourselves with. And here, Bird concludes, the modally strengthened conditional analysis works because cp-clauses are not required. At the fundamental level, the hypothesis goes, there are no exceptions to worry about. But there are reasons to be sceptical about this. Certainly the charge on an electron will always be the same negative unit, for each and every electron. But charge is itself a dispositional notion, and doesn't tell us about the electron's actual movement. That movement could be determined by other things as well, such as its mass and attraction to other particles. What is necessary is that every electron has negative unit charge. But the necessity does not primarily concern dispositionality. It concerns what it is to be an electron, where it looks like an essential property for membership of this kind that this dispositional property be possessed. How we get from that property to actual behaviour is another matter, however, that seems just as open to the possibility of masking as a macrophysical property.

We should conclude, therefore, that the modally strengthened conditional analysis fails also. It is implausible that a disposition necessitates its manifestation when stimulated because there remains the possibility of prevention and interference. A cp-clause does not circumvent this difficulty unless an adequate account of cp-clauses is forthcoming that does not itself invoke a notion of dispositionality, and it looks like all disposition conditionals would need such a cp-clause.

Those who attempt to reductively analyse disposition terms by means of conditionals have thus far failed to acknowledge the importance of the possibility of masking and interference. A disposition can be present, and its stimulus occur, but it can still fail to manifest itself because of the presence of some further factor. This problem has been treated as if it were a minor technical detail for the analysis. There is, after all, *some* kind of conditional relationship between stimulating a disposition and it manifesting. But the problem comes in analysing this relationship without using the notion of a disposition. That usually presents us with a sufficiency claim that if the stimulus occurs, the manifestation will occur. But this is just plain wrong. The only true way of expressing the relationship is in terms of the disposition tending towards its manifestation when stimulated. And as tendency is itself a dispositional term, this only goes to show that the modality involved is irreducibly and irrevocably dispositional.

[14] P. Lipton, ›All Else Being Equal‹; S. Mumford, ›Laws and Their Exceptions‹.

It should be noted, however, that a reductive analysis in terms of conditionals is not the only semantic analysis that there could be. Fara[15], for instance, would accept the arguments given above against the various forms of conditional analysis. He offers an alternative, which while not presented as an explicitly reductive analysis, might be used by someone as one. The idea would be that dispositions are reduced to so-called habituals.

Fara offers a dispositional operator DISP and says[16] that DISP (N Ms when C) is true only if particular N Ms when C, for example: if a barrel is disposed to roll when pushed then it rolls when pushed. On its own, this is false, because the barrel could be disposed to roll when pushed but fail to do so because of some prevention or masking. Given that Fara has already discussed and accepted masking cases earlier in his paper, one has to assume that he means N Ms when C to be taken as a habitual statement only, and thus not vulnerable, he argues, to masking cases. This is because habituals, on his account, say only what normally or generally happens and they can thus tolerate ›permissible exceptions‹. This leaves a couple of problems for his account. One is what is meant by a permissible exception and there is a question mark over whether this has to be understood in terms of N disposing towards M when C. But then habituals have to be understood in terms of dispositions rather than vice versa. It looks like Fara tries to address this problem[17], but his account is not clear. There are two ways a reductive analysis can fail: falsehood and circularity. In both the conditional analysis and habituals account a prima facie false account is bolstered by some further clause: a ceteris paribus clause in one case and a habitual clause in the other. But if these notions can be understood only in terms of dispositionality then there is apparent circularity and failure of analysis.

Our own account is admittedly circular. We can only say that a disposition tends towards its manifestation, where tendency is itself a disposition concept. But we do not offer this as an analysis. We say that dispositionality is unanalysable. If we have to choose between saying something false and something circular about dispositions, we prefer to say something circular but true. In sections 6 and 7, however, we will try to offer something that is at least positive about dispositionality. This may count as a theory of dispositionality even if it is not an analysis.

4. Dispositions and necessity

Thus far we have claimed that dispositionality is a distinctive, non-alethic, sui generis modal value but we have not given the argument for that view in any detail. We now try to rectify that omission. In the next section we will explain how dispositionality relates to pure possibility while in this section we explain how it relates to necessity.

[15] M. Fara, ›Dispositions and Habituals‹.
[16] M. Fara, ›Dispositions and Habituals‹, 69.
[17] M. Fara, ›Dispositions and Habituals‹, 68.

The goal is to show that it is not the same as either necessity or pure possibility but that it involves a kind of modality that is in between.

Given what has already been said, the case of necessity and dispositionality is easiest. Dispositionality is clearly not the same as necessity because each of the following four claims is defensible (where DF*a* means that *a* is disposed to be F):

a) Not (if DF*a*, then □F*a*). Disposition don't always manifest.
b) If DF*a*, then ¬□F*a*. Dispositions can always be prevented.
c) Not (if □F*a*, then DF*a*). Cases of necessity are not always cases of dispositionality.
d) If □F*a*, then ¬DF*a*. Cases of necessity are never cases of dispositionality.

Claim a) is the weakest and easiest to defend. It simply says that it is not the case that if *a* is disposed to be F then necessarily *a* is F, and this is simply the case if there are some unmanifested dispositions. Objects may be fragile without breaking; people can be fertile without producing offspring and substances can be soluble without dissolving. Acceptance of a) is still controversial for some Humeans, however, who would want to deny that there are any such things. All properties, they urge, are occurrent or categorical, and this may slide into the Megaric view that a thing ›can‹ act only when it does act[18]. But regardless of our ontological commitments, it seems hard to deny a) as at least a conceptual claim about the intended meaning of our disposition concepts, and even a Humean would have a hard time denying that we use such disposition concepts.

Claim b) is the one already advanced that dispositions can be prevented or masked: if *a* is disposed to be F, then it is not the case that necessarily *a* is F. The argument against necessity can be understood in terms of antecedent strengthening[19]. If A necessitates B, then whenever we have A we should have B. This means that a genuine case of necessity would entail a conditional that was robust under antecedent strengthening. Whenever A, then B even if C, for any C, if A necessitates B. But effectively we have shown that dispositionality fails the antecedent strengthening test, and is thus not a case of necessity. Antidotes, preventers and interferers are all antecedent strengtheners that, we have argued, can render disposition conditionals false (i.e. conditionals whose antecedent names the stimulus for a disposition and consequent names its manifestation). Dispositionality does not entail necessity, therefore. Necessity would support monotonic reasoning: whenever we have the antecedent, we can infer the consequent. But dispositional reasoning should be non-monotonic. Being F may dispose towards being G, but that does not mean that being F plus being H disposes (overall) towards being G.

Claim c) should be uncontroversial. Not every case of necessity is a case of dispositionality. Different things can be meant by necessity, of course. Some think that the only genuine cases of necessity are analytic truths, as the Ayer[20] of *Language, Truth and*

[18] Aristotle *Met.* Θ 3 1046b28–32.
[19] R.L. Anjum/S. Mumford, ›A Powerful Theory of Causation‹.
[20] A.J. Ayer, *Language, Truth and Logic.*

Logic argued. Since Kripke[21], however, the idea that there are worldly necessities and essences has come back into vogue. Suppose some particular *a* necessarily is F. Does that entail that it is disposed to be F? That does not seem to be the way we have to treat such cases. If Socrates is necessarily human, it does not seem quite right to say that he is therefore disposed to be human. Such a disposition would seem redundant: why would something need a disposition towards F if it is necessarily (or essentially F) in any case? And does our unease in invoking a disposition towards F in such a case stem from our view that a disposition should always be, at least in principle, capable of prevention, which cases of necessity are not?

Claim d) might be the most controversial because it says that cases of necessity are never cases of dispositionality, so a disposition never necessitates its manifestation. Some might think this goes too far, presumably because they think that some but not all dispositions are capable of prevention and that it ought to be at least allowed that a disposition could necessitate its manifestation. But d) is just the contrapositive of b), so we should be able to defend it if b) is defensible. The first argument is again that dispositions can be prevented but how do we know that this is the case for all? Might there not be in nature some disposition that simply has to manifest under certain conditions, and will do so no matter what is added to those conditions? Here we would say, however, that there has always to be at least the possibility of prevention even if, as a matter of fact, there is no such actual preventer. There may, of course, be some undiscovered preventer lying somewhere else in the universe, or right under our noses but never brought to bear on the disposition in question. But suppose that, whether known or unknown, there is just nothing that can prevent this disposition. The logic of dispositions nevertheless allows that if there were, counterfactually, some such process of prevention, then this disposition need not manifest itself. It looks, in a sense, contingent that there is no such preventer and thus prevention looks as if it is still a possibility. Why insist that prevention is part of the ›logic of dispositions‹? One argument is that unless there is the possibility of prevention of manifestation, then we do not have a disposition at all but, rather, a categorical property[22]. A necessarily manifest property looks to be, if anything is, a categorical property, and this rules out the case of a disposition involving manifestation.

Does saying this exclude the possibility of determinism being true? It would seem wrong if it did so. Our theory of dispositions alone should not commit to either the truth or falsity of determinism. But it doesn't. There are other ways of spelling out determinism. It could be a thesis about the total state of the world at time t_1 allowing only one possible state of the world at time t_2. That would be better than spelling it out in terms of the work that dispositions do. After all, determinism seems also consistent with the possibility of there being some uncaused events, for instance where an event occurs that is not the manifestation of any disposition.

[21] S.A. Kripke, *Naming and Necessity*.
[22] S. Mumford, ›The Ungrounded Argument‹, 481.

5. Dispositions and possibility

Dispositionality never involves necessity. It does involve possibility but it is not the same thing as possibility. This is because while it is the case that *a* being disposed towards F means that F is possible for *a*, the opposite entailment does not hold.

It ought to be uncontroversial that *a* disposing towards F entails that it is possible that *a* be F. If someone is fertile, then it is possible that they bear offspring; if a glass is fragile, then it is possible that it becomes broken, and if a substance is poisonous then it is possible that it kills someone. An apparent counterexample would be finkish. Martin's aforementioned fink removes a disposition at the very moment that it receives its appropriate stimulus. Let us not worry about the details of how it does this. The point of the example in this context is that while something may have a disposition, it might be in circumstances where it cannot manifest it. It is not a disposition that is simply masked. A fink arguably places a disposition in circumstances where it could never be manifested.

While finks complicate the case, we cannot accept that they render the disposition's manifestation impossible. For it to do so, we would have to assume that the fink itself was able to necessitate its manifestation. According to the dispositionalist, a fink is to be understood as a device characterised in functional terms, namely, as something that is able to take away a disposition D_1 at the moment D_1 is stimulated. But to understand it in functional terms is to understand it as having a disposition of removing D_1 when D_1 is stimulated. This gives the fink a disposition, D_2, to remove another disposition, D_1. But it is only a *disposition* to remove D_1, which means that it could, like any other disposition, be masked or prevented or fail. Mellor gave one of the first published examples of finkishness. He spoke of how the safety mechanisms at a nuclear reactor would shut the reactor down if it was about to go critical[23]. The safety mechanisms finked the reactor's disposition to explode. But clearly they could not render the explosion impossible, as was shown with the Chernobyl disaster of 1986 when the safely mechanisms indeed failed. So we will let it stand that if *a* is disposed to F, it is possible that *a* be F.

What, though, of the opposite case? If it is possible that *a* be F, does that mean *a* is disposed to F? We say not. There is some sense of possibility in which it is possible when the match is struck, it turns into a chicken, but it is not disposed to do so. Similarly, it is possible that when a fair coin is tossed 100 times, it might land heads 99 of those times, but again, it is not disposed to do so with any significant probability. The probabilistic case raises some interesting questions about what it means to say that something is disposed towards something else. We want to allow cases of dispositions with an extremely low probability, but this is not the place to consider the details of how such dispositions would work so let us for now just assume that we ascribe a disposition to something only where it is a disposition with a non-negligible probability. If we mean something like this, in standard cases of disposition ascription, then we will say that there are

[23] D.H. Mellor, ›In Defense of Dispositions‹, 173.

many things that are merely possible without them being non-negligibly disposed to happen.

Dispositionality is not, therefore, the same as pure possibility. It is something more than that, as we will go on to say in the next section. But before we leave the subject of how dispositionality relates to possibility, it is worth commenting on a distinction that is sometimes drawn between ›natural possibility‹ and pure or logical possibility. Dispositionality could well be the thing that determines what it is for something to be naturally possible, and in that case, dispositionality and natural possibility would indeed be one and the same thing. What is naturally possible is what is disposed to be the case. But the notion of pure possibility is much broader than that, whether we are talking about possibility logically defined as involving no formal contradiction, possibility being truth at some other world[24] or possibilities being the recombinations of the existing elements[25]. There are many things that will count as possibilities in this broad sense without being natural possibilities on our account.

We have seen that the modality involved with dispositions is not the same as necessity and is not the same as pure possibility. But what, then, is it? Is there something positive we can say about it? In the next section, we will attempt to do just that.

6. The modality of dispositions

Our task is not an easy one because our position is that the modality involved in dispositions is sui generis and irreducible. We cannot speak truly of dispositionality unless we do so in dispositional terms. How then can we give a positive description of what it is and how, for that matter, can we have any knowledge of it at all?

In the next section we argue that dispositionality is a familiar notion that we can acquire directly through experience. In the current section we will offer some illuminating analogies with other cases that seem to display an intermediate, non-alethic modality. But we begin by noting that there are some formal ways in which we can understand dispositionality in relation to the standard alethic modalities familiar to philosophers. In sections 4 and 5, we outlined various relationships between dispositionality and the alethic modalities. We saw that if *a* is disposed to F then it is possible that *a* be F, and that if it is necessary that *a* is F then *a* is not disposed to F. This offers the hope, for those who require a formal account, of creating a formal three-valued modal system that incorporates dispositionality, though it is some time since anyone attempted this seriously[26].

Analogies with other similar and familiar examples will be a help and will lead us to an account of how dispositionality is more than pure contingency. The first analogy is normativity and the second is intentionality, while there are no doubt others.

[24] D. Lewis, *On The Plurality of Worlds*.
[25] D.M. Armstrong, *A Combinatorial Theory of Possibility*.
[26] A.W. Burks, ›Dispositional Statements‹.

In the case of normativity, we seem to have a good grasp of the special kind of modality involved, which again seems intermediate between pure possibility and necessity. Normativity concerns what ought to be or ought not to be the case. To understand a normative notion is to understand something of its logic. That something, X, ought to be the case, does of course not necessitate that it is the case. We ought to be kind to animals, for instance, but animal cruelty still occurs. But saying that X ought to be the case says more than that X is merely possible. Many things are possible where it is not the case that they ought to be. Where something ought to be, then it must be possible (setting aside cases where people might say that ›Y ought to be possible‹), but not vice versa. Saying that something ought to be is a sort of selection function. It selects from the many merely possible things, a subclass of those that ought to be the case. How exactly this selection function works is a matter for moral philosophy, where there is a range of options. Each moral theory will have its own account of how and why certain possibilities are normatively selected.

Intentionality is understood in philosophy of mind as a directedness of mental states towards certain objects. These so called intentional objects may exist in thought only, as when one fears a burglar who exists only in one's imagination. Having an intentional object in one's mind does not, therefore, necessitate that it exist outside one's mind. Beliefs, desires, emotions, perceptual states and intentions all have intentional objects. But an intention to water the plants does not necessitate that one does indeed water the plants. Again, however, there is more than pure contingency. It is a subclass of all the possible actions I could perform that are the ones I intend to perform, just as it is a subclass of all the things that I could fear that I actually fear. The notion of a selection function can thus also be applied to the case of intentionality. We might want to call this an about-ness function, to express the idea of intentionality that our beliefs, desires, emotions, and so on, are *about* things. The function selects a subclass from all the many mere possibilities as those that the mental state is about. How the mind is able to do this is a matter for philosophy of mind to explain.

These phenomena, of normativity and intentionality, are analogous in their modal features to dispositionality. But we think that they are *only* analogous. It happens to be the case that both normativity and intentionality have been offered as the basis of accounts of dispositionality. Lowe[27], for instance, offers a normative account of nature in which the basic idea is that a ›good‹ acorn ›ought‹ to grow into an oak tree. Such an idea clearly has historical origins in Aristotelianism, where things have their proper place in nature, where they ought to be. Molnar[28], on the other hand, offers an intentionality account of dispositions. They are, he says, directed toward their manifestations. Some dispositions are purely physical phenomena but, he argues, a notion of physical intentionality can be supported. Intentionality is, indeed, the mark of the dispositional, for him, and mental phenomena are only intentional in so far as they are dispositional.

[27] E.J. Lowe, ›Laws, Dispositions and Sortal Logic'‹; E.J. Lowe, ›What Is The «Problem of Induction«?‹.

[28] G. Molnar, *Powers*, ch. 3.

What is attractive about both these account is that they acknowledge, while so few other accounts do, the special modal value involved with dispositions, which is neither necessity nor pure contingency. But the accounts are mistaken, we argue, to take what is only an analogy as a full-blown account. Dispositions are only analogous to intentional states and normative notions, they are not themselves either intentional or normative. These accounts are all similar in involving an intermediate modality but that similarity does not mean they are the same. If anything, we think it more likely that dispositionality will be a part of the explanation of normativity and intentionality rather than the other way round. A naturalised account of intentionality, for instance, will have dispositionality at its core. To have a belief about something is to be disposed to behave in a certain way towards it, for instance. And to intend to do P is to assume that one can P (even if P is something that cannot in reality be done) but also that it is possible not to P (one does not intend what is unavoidable). Likewise, normativity also employs the dispositional modality. That one ought to Q entails that one can Q but also that one can prevent or refrain from Q. If any of the three selection functions that have been discussed is basic, therefore, it is dispositionality.

Returning to the accounts developed above of normativity and intentionality, we can see that the difference between the three cases is that they employ different selection functions. What we should say of dispositionality is that it is a function that selects, from all the many possible things that could occur – in the broadest sense of could – the subclass of possibilities that is disposed to happen. Again, this does not entail that those possibilities must happen; it is *only* that they are disposed to happen. But we have more than pure contingency because it is only the selected possibilities that are disposed to happen. Armed with this account, we now understand better how it makes sense to speak of dispositions being the basis for our notion of natural possibility. What is naturally possible is a subclass of all the many things that are logically possible. And what better account can we give of what is naturally possible than what the things in nature are disposed to do. The function that selects for dispositionality is therefore picking out those things that are naturally possible. The reason some things are naturally possible is because there are dispositions for them.

7. Dispositionality is experienced

The failure of an analysis of dispositions is not automatically a cause for concern. Not all our concepts need to be reducible to others in order to be valid, even by the conventional empiricist lights of Locke and Hume. Some of our concepts can be basic, derived directly from experience. Arguably, there has to be some such basic concepts to make all our other, more complex concepts, empirically grounded.

How, then, might we acquire the idea of a disposition given, as we claim our account, that it has a special modal value? We suggest that the possibility of prevention, which was depicted as a troublesome side-issue for those engaged in the project of conditional analysis, and to be bracketed off in a cp-clause, is actually one of the key components.

One must have an idea of the manifestation towards which the disposition will result, but also the idea that such a manifestation can be prevented or altered. The former gives us the idea of the selection function. The manifestation is the possibility that is selected by the disposition and thus gives us a concept of something that is more than pure contingency. But the idea of prevention gives us the idea that there is less than necessity. A possibility being selected dispositionally does not guarantee that it occurs. With these two ideas, we acquire the notion of a disposition.

In practice, the most plausible epistemological story is one in which only a certain, rather few dispositions are experiences directly by us. But in experiencing just a few, we gain an idea of dispositionality in general, by abstraction, which we can then apply to other cases that we have not experienced. Which cases do we experience, then? Hume, as is well known, denied that we can ever see more than a constant conjunction of events and never a necessity between them. Although we have denied that dispositionality involves necessity, Hume's challenge clearly applies to our own account. But visual experience is probably not the easiest way for us to acquire knowledge of the dispositional modality. Our bodily experience is likely to be far more important. We are agents as well as patients. We exercise powers and have them act upon us. The following instance then sounds plausible. As infants, we walk to school in a gale. The wind is blowing our small bodies quite hard. We get the feeling that it could blow us over. This gives us that idea of the wind selecting a possibility out of the many there are. It selects the possibility of knocking us over. But we have just enough power in our infant bodies to resist the wind's power. We can lean into it and strain our muscles just enough to avoid being blown over. This gives us the idea that the possibility selected by the wind's power is one that can be resisted. It is not a necessity, therefore, but something that is only disposed to happen. It would happen if we did not resist, or if something else did not counteract it on our behalf, so there is no necessity in it doing so. We have thereby acquired the idea that the wind has a disposition, tendency or power to blow us over, complete with its sui generis modality. The way is open for us to abstract from this, and other similar cases we experience, to a general concept of dispositionality. We can then apply that concept to cases we have experienced in other ways, or which we have not directly experienced at all, or which have not acted at all. We can apply it, for instance, to cases that we have encountered only visually, such as Hume's billiard table. We see one ball crash into another and the second ball moves. But we can also see that were someone to be holding the object ball fast with their hand, it would not have moved when struck. And we can apply disposition concepts just on the basis of theoretical knowledge. We could see a wine glass and examine its structure – the thinness of the glass, and its shape – and apply the dispositional notion of fragility to it even though we have never seen it break or be suitably stimulated to do so. But we already have a notion of dispositionality, acquired through our experience of the world around us, that we are able to extend beyond the cases we have directly experienced.

One mistake of the conditional analysis, and the other instances where philosophers have attempted to treat dispositionality as something else, is that it assumes dispositionality is unfamiliar. It is a mistake to explain a disposition in terms of it necessitating

its manifestation, for instance, among other reasons because it is a mistake to think that we know necessity better than we know dispositionality. Dispositions did not need an analysis in the first place because enough of them were experienced directly through the powers on and of our own bodies. A conditional analysis was never needed in the first place and would never have been attempted but for the misconceived ideological drive of some philosophers to reduce every disposition term to an occurrent one. Dispositionality is one of our most basic concepts, learnt as soon as we begin to interact with the world. We all know what it is from a very early age, therefore, and only philosophers have thought themselves into a position where it is a problematic notion. Hume, for instance, observed his billiard table as a disinterested, almost heavenly and disembodied observer. Had his example involved himself interacting more, perhaps even playing the game rather than just watching it, the notion of a power would have been far clearer.

8. Conclusion

We have argued that dispositions involve a special sui generis modality that is reducible to neither necessity not pure contingency and which cannot be captured by non-trivial reductive analyses such as the conditional analysis. Essential to the notion of dispositionality is the idea that a certain subclass of all those that are merely possible is selected by a disposition, just as normativity and intentionality make their own selections. But equally important is the notion of prevention or masking. To be a disposition, something must be at least in principle preventable and thus less than necessary. Although the modality involved in dispositionality is thus sui generis, it is also something familiar to us through experience, in particular through our bodily experience. There are thus good prospects for an epistemology of dispositions.

With this in mind, it seems that disposition concepts are central in our understanding of the world around us. Rather than treat them as reducible, and in a sense, secondary phenomena, dispositions are the stuff of which the world around us is made.

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