

DISPOSITIONS AND ANTIDOTES

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1. *Dispositions*

In 'Finkish Dispositions'¹ David Lewis proposes an analysis of dispositions which improves on the simple conditional analysis. In this paper I show that Lewis' analysis still fails. I also argue that repairs are of no avail, and suggest why this is so.

Thanks to Charlie Martin, the simple conditional analysis

Something x is disposed at time t to give response r to stimulus s iff, if x were to undergo stimulus s at time t , x would give response r

has long been known to be incorrect. Martin's counter-examples² involve the possibility of *finkish dispositions*. Dispositions can be made to go away. A finkish disposition is one which is made to go away by the same stimulus s as the stimulus to which the disposition is a disposition to respond. So when x undergoes stimulus s the disposition disappears and so r does not arise. In Lewis' example, a sorcerer resolves to protect a fragile glass by ensuring that whenever the glass is struck a spell changes the glass in such a way that its fragility is lost. He does this before any shattering can take place, and thus prevents this from occurring. At the time of striking the glass is fragile, but it does not go on to shatter, as is required by the simple conditional analysis. (A fink is the industrial opposite of an *agent provocateur* – he is a worker in the secret pay of an employer whose job is to dissuade his co-workers from striking. He removes the disposition to strike.)

Lewis argues that what is required for something to have a disposition is for it to have a certain sort of intrinsic property, its causal basis. He points out that dispositions sometimes (always?) take time to do their thing. What happens in the finkish cases is that this intrinsic property (the causal basis) is lost, after the object suffers the stimulus but before the response comes into being. What is needed for the response to occur is for the causal basis to remain for a sufficient time. And so Lewis' analysis goes thus:

Something x is disposed at time t to give response r to stimulus s iff,
 for some intrinsic property B that x has at t and for some time t' after t ,
 if x were to undergo stimulus s at time t and retain property B until time t' ,
 s and x 's having of B would jointly be an x -complete cause of x 's giving response r .

¹ *The Philosophical Quarterly*, 47 (1997), pp. 143–58, hereafter FD.

² Eventually published in C.B. Martin, 'Dispositions and Conditionals', *The Philosophical Quarterly*, 44 (1994), pp. 1–8, hereafter DC.

(An x -complete cause of y includes all the intrinsic properties of x which causally contribute to y 's occurrence. This reference is necessary to rule out certain other finkish counter-examples which are not directly relevant to this discussion.)

2. *Antidotes*

Many dispositions have what I call *antidotes*. An object x is disposed to display response r under stimulus s . At time t it receives stimulus s and so in the normal course of things, at some later time t' , x gives response r . The time gap between t and t' is what allows, in finkish cases, for the loss of a disposition. An antidote to the above disposition would be something which, when applied before t' , has the effect of breaking the causal chain leading to r , so that r does not in fact occur. Thus one can ingest a lethal dose of poison, yet not die if a suitable antidote is administered soon enough. (For instance, the antidote to arsenic poisoning is dimercaprol, which, incidentally, is also known as British Anti-Lewisite.) I suggest that the existence of antidotes provides counter-examples to Lewis' analysis.

When the sorcerer protects his glass, his strategy is finkishly to remove its fragility as soon as it is struck. Another way of protecting the glass once it is struck is to find an antidote to striking. The sorcerer, being a brilliant physicist, may be able to administer shock waves to the struck glass which precisely cancel out the shock of the original striking, hence saving the glass from destruction. Just as in the original finkish removal of fragility, the causal chain leading to breakage may have started – shock waves have begun to travel through the glass and minute fractures to appear. But before the glass breaks something interrupts the chain. In the finkish case, which Lewis has now provided for, it is the disappearance of the disposition. But I do not think he has provided for the administering of an antidote. For the point of the antidote case, unlike the finkish case, is that the disposition remains.

In this case, the disposition and its causal basis remain throughout. The object in question receives the appropriate stimulus, but does not give the expected response. These cases constitute counter-examples to Lewis' analysis. The *analysandum* is satisfied, but the *analysans* is not. The latter takes the form of a conditional:

For some intrinsic property B and time t'
 if x were to undergo stimulus s at time t and retain property B until time t'
 then s and x 's having of B would jointly be an x -complete cause of x 's
 giving response r .

In the antidote cases the antecedent is satisfied but not the consequent. For the causal basis of fragility remains and the glass is struck. But the causal basis and the striking are not jointly a glass-complete cause of breaking, since the glass does not break.

3. *Responses and rejoinders*

Can Lewis' account be defended against my criticism? Any defence would have to show, contrary to what I have said, one of three things:

- (i) that the *analysandum* is not satisfied
- (ii) given that the *analysandum* is satisfied, that the antecedent in the *analysans* is not true
- (iii) given that the *analysandum* is satisfied, that the consequent in the *analysans* is true.

I shall consider these in reverse order.

Response (iii) says that in the examples the stimulus and the causal basis are jointly a complete cause of the required response. Clearly this is not correct, since the required response does not occur, and so the stimulus and causal basis cannot be a cause of it. (I shall later consider a possible repair.)

Response (ii), denying the antecedent in the *analysans*, is tantamount to suggesting that the dispositions here are finkish, that their causal bases are lost during the time-gap. The idea is that we should see the antidote as somehow changing the intrinsic nature of the object. The sorcerer's fink strategy and his antidote strategy for protecting the glass would not really be different in kind (in which case the antidote might be seen as a way of achieving the finkish removal of fragility).

The following might appear to support this response. A nuclear pile which is above critical mass has a disposition to chain-react catastrophically. However, the pile has attached to it a fail-safe mechanism. Heat and radiation sensors detect large increases in radioactivity and allow boron moderating rods to penetrate the pile and by absorbing the radiation to prevent the catastrophic chain-reaction.

One might call the fail-safe mechanism an antidote, but, so the response goes, it acts by removing the disposition to chain-react. Once the boron rods are in place, there is (we hope) no possibility of an explosion. The disposition is removed, and this is achieved by changing the causal basis – the structure now consists not just of uranium-235 but also of boron. Hence the disposition is finkish.

At best, this case just shows that the dividing line between finkishness and antidotes is not clearly perceptible, or that there is an overlap. Even so, I think there is a clear sense in which the explosive disposition is retained – it is not as if every fissile U-235 atom has been changed into a harmless U-237 atom. The boron rods had better be kept in place, the reason for which is that the explosive disposition remains. It remains, but is *held in check* (which is a special case of an antidote). Holding a disposition in check does not eliminate it.

To see these cases correctly it is important to be precise about what object the disposition in question belongs to. In the nuclear reactor case we can distinguish three combinations:

- (a) the uranium pile alone
- (b) the uranium pile plus the boron rods
- (c) the uranium pile plus the boron rods plus the fail-safe mechanism (i.e., the complete reactor).

These possess quite different dispositions. The uranium pile, (a), retains the disposition to chain-react all the time. The combination of pile and boron rods, (b), does have a disposition to chain-react when the rods are outside the pile, but loses this

disposition when the rods are in the pile. Indeed, in the presence of the fail-safe mechanism (regarded as external to the pile-plus-rods), combination (b) with the rods out has its disposition to chain-react finkishly. Whenever this combination is about to chain-react, the fail-safe mechanism causes it to lose that disposition. The reactor as a whole, (c), i.e., including the fail-safe mechanism, as long as the mechanism is effective has no disposition to explode at all.

However one may want to respond to the reactor case, which I presented as one favourable to the objector, it seems perverse to describe the sorcerer's antidote for the struck glass as removing the disposition to shatter (or its causal basis). The normal causal process is being interfered with, but the interference does not remove the intrinsic properties which, in other cases, explain why a glass shatters. Another variant on the example should suffice. When a glass in normal circumstances is struck and shatters, it does so because fractures appear and spread until enough of them connect with one another for the glass to fall into pieces. If the sorcerer, acting very swiftly, follows each spreading fracture and repairs it a fraction of a second after it occurs, then although each of them occurs as it would in the normal case, the fractures do not all persist long enough for the glass to fall apart. We cannot say in this case that the causal basis of shattering has been removed, since the causal basis for shattering is the same as the causal basis for fracturing, and that, *ex hypothesi*, remains.

Let us now turn to response (i). According to this response, the objects in question, which are protected by an antidote, do not have the dispositions I have ascribed to them. Thus the glass which the sorcerer protects by counteracting the striking is not disposed to break when struck. The uranium pile with the boron rods lowered is not disposed to chain-react.

This I understand to be Lewis' view of antidotes (FD p. 153):

We might offhand define a poison as a substance that is disposed to cause death if ingested. But that is rough: the specification both of the response and of the stimulus stand in need of various corrections. To take just one of the latter corrections: we should really say 'if ingested without its antidote'. Yet the need for this correction to the analysis of 'poison' teaches no lesson about the analysis of dispositionality in general.

There are two ways of reading this.

First: ' x is a (deadly) poison iff, if no antidote is taken, then x is disposed to kill when ingested' gives the analysis of ' x is a poison', and Lewis' account gives the analysis of ' x is disposed to kill'. Here the reference to the antidote is outside the scope of the characterization of the disposition ('disposed to kill when ingested').

Second: ' x is a poison iff x is disposed to kill if no antidote is taken when ingested' gives the analysis of ' x is a poison'. The difference between this and the first reading is that the rider 'if no antidote is taken' is now part of the specification of the stimulus (or perhaps the response) and is within the scope of 'disposed to ...'.

According to the first reading, whether or not a poison is disposed to kill is a conditional or relative matter. The poison is disposed to kill people who have not taken antidotes, but is not disposed to kill those who have. Nor is it disposed at time t

to kill people who take the antidote after t (but soon enough to prevent death). And so, in general, x 's having a certain disposition at a time t may depend on (i) features extrinsic to x , and (ii) occurrences after t . In which case, dispositions cannot depend exclusively on intrinsic properties. This is inconsistent with Lewis' assertion (which I accept) that the possession of a disposition does concern only intrinsic properties.

The second reading has the advantage over the first that it does not make the presence of the disposition dependent on the absence of the antidote. But it does mean that the characterization of the disposition is more complex than was at first suggested. The disposition a glass has is not a disposition to break when struck, but rather a disposition to break when struck if not later interfered with *à la* sorcerer. This means that the dispositions there are in the world are not the ones we think there are, because antidotes are almost always possible. A sugar cube is not disposed to dissolve in hot water; rather, we have to say that the sugar has the disposition to dissolve when placed in hot water while Maxwell's demon does not interfere with the molecular processes.

Even the latter is not even satisfactory yet, because there may be all sorts of other antidotes to dissolving which have to be excluded in the *analysans*. We would therefore need to mention them too. But how could we know what all the possible antidotes to any given disposition are? We could not possibly properly characterize any real disposition.

Alternatively, we could exclude antidotes not explicitly, naming each one, but indirectly. So we would talk of something's being disposed to give response r to stimulus s while nothing acts to prevent r . The problem with this is that it allows more dispositions in the world than I think we are willing to admit. For now we would have to admit the disposition of a glass to break in response to far-off sneezes. This is because there are some possible circumstances c in which (via a butterfly effect) a sneeze brings about a major disturbance which, combined with the structure of the glass, causes it to shatter. Hence the sneeze and the glass's structure are a glass-complete cause of its shattering. Under normal circumstances this does not happen, but there is no reason why we should not regard normal circumstances as being circumstances which act to prevent the shattering from occurring. Another case is this. Cows' milk has the disposition to kill (ordinary) human beings, because those who lack the enzyme lactase are unable to metabolize cows' milk and the resulting lactic acid poisoning will make them ill and can kill them. Ordinary people are lucky that the antidote lactase is present in their bodies. To put the point more generally, if an intrinsic property B of x were under some (nominally, but bizarre and unusual) possible circumstance to combine with an event e to cause outcome o , then we would have to admit that x has a disposition to respond with o to stimulus e . For whatever it is about normal circumstances which explains why B and e do not usually cause o will fall under the catch-all 'and nothing acts to prevent o '.

4 *Repairs?*

I conclude that the *analysans* of Lewis' analysis does not accommodate antidotes, but neither can we exclude such cases by gerrymandering the specification of the

analysans. Are there repairs to Lewis' analysis which retain its spirit but which are not vulnerable to antidote counter-examples? An obvious proposal is to include within the analysis a clause designed to exclude them. Antidotes work by some extrinsic influence acting to prevent the stimulus and intrinsic properties from doing what they normally do. So the repair must state that nothing of this sort occurs.³ Hence we need (repair underlined):

Something x is disposed at time t to give response r to stimulus s iff
 for some intrinsic property B that x has at time t and for some time t' after t ,
 if x were to undergo stimulus s and retain B until time t' , and nothing
extrinsic to x and s were to act to prevent s and B causing r , s and B would
jointly be an x -complete cause of x 's giving response r .

Does this do the trick? I fear not. One response is Martin's objection that the notion of prevention is itself question-beggingly dispositional.⁴ It may be difficult to decide whether prevention is a dispositional or a causal concept (A prevents B from occurring = A causes B not to occur), but in any case Martin thinks that disposition is a more fundamental notion than cause.⁵ If that is right, then Lewis has from the very start erred in seeking a causal analysis of disposition.

Even if we are able to help ourselves untendentiously to these concepts, I believe that Martin (CD pp. 5–6) is right that problems are unavoidable for any proposed analysis of dispositional concepts. We saw that allowing for antidotes permitted too many dispositions, and the new analysis is still dogged by this consequence. An intrinsic property B may under some circumstances c combine with s to be an x -complete cause of r . So we may regard all other circumstances, c' , as preventing B and s from causing r . Hence x is disposed to give response r to stimulus s . But for many such properties B and stimuli s there will be such circumstances c , even if rare or bizarre, under which B and s cause r , as in the example of a glass which is caused to break by a sneeze and its intrinsic structure, thanks to the unlikely intervening chaotic events.

I can conceive of three immediate responses to my objection.

(a) We should think of dispositions as being more complex than we do, e.g., the disposition of the glass is to shatter in response to a sneeze-plus-the-relevant-(unlikely)-distribution-of-air-currents. We have already looked at this response (it is response (i), discussed above on pp. 230–1).

(b) It might be thought helpful to add an element to the *analysandum* which mentions the appropriate circumstances under which the stimulus will bring forth the required response. So my cases would be dealt with by specifying the circumstances in which the causal basis does combine with the stimulus to cause the response. In the case of the sneeze we can say that the glass is disposed to shatter

³ Something like this is suggested in M. Johnston, 'How to Speak of the Colors', *Philosophical Studies*, 68 (1992), pp. 221–63.

⁴ DC pp. 5–6; C.B. Martin and J. Heil, 'Rules and Powers', forthcoming in *Philosophical Perspectives*, 12 (1998).

⁵ C.B. Martin, D. Armstrong, U.T. Place and T. Crane (eds), *Dispositions: a Debate* (London: Routledge, 1996), pp. 81, 136.

in response to a sneeze in circumstances c , where c describes the strange atmospheric conditions referred to. This approach faces two by now familiar objections. First, we are still encumbered with these unusual dispositions while the more familiar dispositions are still more complex than initially envisaged. Second, it is certain that the circumstances c , whether rare or common, are not finitely specifiable. Usually we do not specify circumstances. I am going to suggest that something like normal circumstances are implied. Sometimes we do mention circumstances – we might say that a plate is disposed to break if washed in a dishwasher, when the water is very hot. But in such cases the specification of the circumstances is not complete and there is still room for antidotes. With such locutions, we can regard it as so much book-keeping whether this is adding an element to the *analysandum* or just refining the stimulus.

(c) There is a difference between, on the one hand, something's not actually causing something (which in other circumstances it could) and, on the other, its being prevented from causing that thing. Like the difference between omission and commission, there is a difference, but it is difficult to characterize. And I think the reason is that it is relative to what we normally find or expect. We do not normally expect sneezes to cause tornadoes, so we do not regard air conditions in which that does not occur as preventing that happening.

5. Conclusion

I have argued that neither Lewis' analysis nor the repaired version is entirely satisfactory. Not every concept need have an analysis, and so instead of looking for yet further improvements I shall conclude by suggesting an alternative approach.

Lewis' analysis combines two things: (a) the form of the old conditional analysis, and (b) the recognition of the importance of the causal basis. I suggest that it is the causal basis which is doing the work. If so, that can exist (and so make it true that there is a disposition), while at the same time it will always be possible to make the conditional false. That is because the existence of the causal basis plus stimulus will never be enough to guarantee the required response nor, if the response comes into being, that it came about in the right way. A causal chain can always be interfered with. The conditional element is a red herring; I suggest that its presence in the simple conditional analysis is due simply to the close relation between conditionals and causation. Once we have the latter we do not need the former.

A general form of the explanation of dispositional concepts is something like this:

- (E) something x is disposed at time t to give response r to stimulus s iff
- (i) at time t , x has an intrinsic property B
 - (ii) B is such that, in a certain class C of cases, B and s are jointly an x -complete cause of r .

Putting it this way is supposed to show that an explanation of dispositional concepts does two things: it says that having a disposition is a matter of possessing a certain intrinsic (efficacious) property and it also picks out which property that is. (The conditional element in the naïve analysis and Lewis' analysis derives from the fact of our identifying, in (ii) above, B by its causal role.)

The reference to the class *C* of cases in clause (ii) is what distinguishes (E) from Lewis' analysis. It is also this which prevents (E) from providing an analysis, for what constitutes *C* is variable and indexical, and so is not part of the meaning of 'disposition'. Typically in such an explanation *C* is just 'normal circumstances', though in other explanations we may have a certain observed regularity or a particular laboratory set-up in mind. *C* may depend on the interests of the speaker or hearer. We see one hundred identical glasses break easily when struck. We hypothesize that this is because the glasses have some intrinsic properties, a microstructure or whatever, which when combined with those strikings caused them to break. On this assumption, we say that they are disposed to break when struck. Here *C* will be these one hundred glasses and their breaking when struck.

C might include hypothetical as well as actual cases. Perhaps certain dispositions are always finkish or always attended by their antidotes, so we do not get any actual manifestations. We might consider what would happen if the fink or antidote were removed – for instance a knowledge of physics might tell us what would happen to a nuclear pile if the moderating rods were removed, even if we had not seen a nuclear explosion in this or any other pile. Hypothetical cases do not bring us back to the simple conditional analysis or to Lewis' account. There is still an indexical element – we are thinking of cases *like* this one (apart from the boron rods), *under the same circumstances*.

To conclude, I suggest that instead of seeking an analysis, a more fruitful approach might draw a connection between dispositions on the one hand and natural kind/theoretical terms on the other. In Putnam's example of water and twin-earth-water, it may be that XYZ seems just like water, but as long as XYZ is excluded from the cases we come across (which are all H₂O), what we refer to by 'water' is not XYZ but H₂O. This is analogous to something's mimicking a disposition. At the same time something could be water but not appear to be water (boiling at 95°C on the top of a mountain; tasting strange because of impurities; illness in the taster, etc.). This is similar to an antidote to a disposition. What we may conclude in the case of water is that we seek an analysis of the concept 'water' in vain, and that instead the extension of the concept is fixed by reference to certain archetypical examples of water (whence there is an unavoidable indexical element in the explanation of the concept). These are the conclusions I wish to draw regarding both concepts like 'fragility' and those like 'being disposed to shatter when struck'.⁶

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