On Linking Dispositions and Conditionals

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Analyses of dispositional ascriptions in terms of conditional statements famously confront the problems of *finks* and *masks*. We argue that conditional analyses of dispositions, even those tailored to avoid finks and masks, face five further problems. These are the problems of: (i) Achilles' heels, (ii) accidental closeness, (iii) comparatives, (iv) explaining context sensitivity, and (v) absent stimulus conditions. We conclude by offering a proposal that avoids all seven of these problems.

1. The conditional analysis: a brief history

Dispositional ascriptions are associated, in some interesting way, with conditional statements. This observation is neither original nor controversial. As Elizabeth Prior notes:

> What is commonly accepted by *all* those who discuss dispositions is that there exists a conceptual connection between a statement attributing a disposition to an item and a particular conditional. The acceptance of the existence of this conceptual connection is a pre-theoretic common ground. (1985, p. 5)[1]

More specifically, every disposition is associated with a type of event that would count as a manifestation of that disposition: fragility is associated with *breaking*; solubility with *dissolving*, and irascibility with *anger*. In addition, it is commonly assumed that every disposition is associated with a stimulus condition under which it is manifested: fragility is associated with *being dropped or struck or stressed*, solubility with *being placed in a solvent*, and irascibility with *provocation*.[2] Putting these two pieces together, we might say that an object has a disposition to respond in a certain way to a given stimulus condition just in case it *would* give that response *were* that condition to obtain. Quine thus writes:

[1] In fact, it is the 'evident link with conditionals that makes the semantics of dispositions both interesting and problematic' (Mellor 2000, p. 758).

[2] As we will see in Sect. 4, this assumption is false.

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> The subjunctive conditional is seen at its most respectable in the disposition terms. To say that an object *a* is (water-) *soluble* at time *t* is to say that if *a* were in water at *t*, *a* would dissolve at *t*. To say that *a* is fragile at *t* is to say that if *a* were struck smartly at *t*, *a* would break at *t*. (1960, pp. 222–3)

Following Lewis (1997), we can think of the connection as involving two steps. First, we connect the implicit dispositional ascription to an explicit counterpart (e.g. something is fragile if and only if it is disposed to break when struck). Second, we connect the explicit dispositional ascription to a conditional statement (e.g. something is disposed to break when struck if and only if it would break if struck). If we focus for the moment on the second task, we can achieve a certain measure of precision and generality. In particular, we can direct our attention to *The Simple Conditional Analysis*:

(SCA) *N* is disposed to *M* when *C* iff *N* would *M* if *C*.[3]

Despite its early popularity—versions of the view were defended by Ryle (1949), Goodman (1954), and Quine (1960), among others—we now know that the simple account is far too simple. It founders on C. B. Martin's *problem of finks* (Martin 1994, Johnston 1992, Lewis 1997, and Bird 1998). The problem involves objects that actually lack the intrinsic disposition to M in C, but because of an external agent, they would *acquire* that disposition were C to obtain. As a result, the dispositional claim is false but the conditional claim is true. Martin invites us to consider an 'electro-fink'—a device that attaches to a dead wire and monitors whether a conductor is about to touch the wire. Where such contact to occur, the fink would instantaneously render the wire live: that is, the fink would confer on it the disposition to conduct electricity if touched by a conductor. And the wire would then conduct electricity. The problem is that, before the fink reacts, the dead wire does not have the disposition to conduct electricity if touched, but it is such that it *would* conduct electricity if touched.

The reverse can also occur, as illustrated by the case of the live copper wire attached to a 'reverse-cycle electro-fink'. If a conductor were to touch the wire, the fink would immediately remove the disposition to conduct electricity by altering its internal structure. Before the fink intervenes, the wire has the disposition to conduct when touched; but if

[3] Instances of this form have a noun phrase in place of 'N', a verb phrase in place of 'M', and a sentence in place of 'C'. We will often leave temporal modifiers implicit.

Note that (SCA) merely asserts a modal link between dispositions ascriptions and conditional statements. In principle, one could accept (SCA) while denying that counterfactual facts are more basic or fundamental than dispositional facts.

it were touched it would not conduct. This is *the problem of reverse finks*.[4]

Martin's reverse-fink works by removing the intrinsic causal basis of the disposition. Thus, one natural reply is to require that the causal basis remain intact. To simplify a suggestion of David Lewis, for example:[5]

(LCA) *N* is disposed to *M* when *C* iff *N* has some intrinsic property *B* in virtue of which, were it to retain *B*, it would *M* if *C*.

The live wire from our example has some intrinsic property (say the property of *having free electrons*) in virtue of which it would conduct electricity if touched *while retaining that property*. Of course, if someone touched it, we know the wire would *not* retain that property, since the reverse-cycle electro-fink would remove the free electrons to render the wire dead. But (LCA) makes this fact irrelevant and correctly tells us that the live wire has the disposition to conduct. (LCA) also solves the original problem of finks: Martin's dead wire does not have an intrinsic property in virtue of which it would conduct if touched. So even though it would conduct if touched, (LCA) rightly tells us that it lacks the disposition prior to the action of the fink.

Unfortunately, not all counterexamples to the conditional analysis involve the threat of intrinsic change. As Mark Johnston (1992, pp. 233–4) points out, a disposition can be 'masked' in such a way that it is not manifested even when the appropriate stimulus conditions are present *and* the causal basis remains intact.[6] Johnston invites us to consider a glass cup protected by special internal packing. Being fragile, the cup is

[4] This discussion of finks assumes the intrinsicness of the disposition to conduct electricity. If one denies this, one might say that simply being attached to an electro-fink removes the disposition to conduct, before any intrinsic change has taken place. (One would then have to reject the way we have described the manner of the fink's intervention: on this view, it alters the wire but it does not remove the disposition to conduct, because the wire already lacks that.) This option is often ignored, since it is generally agreed that the disposition in question is intrinsic (see Smith 1977). The thesis that *all* dispositions are intrinsic has recently come under deserved criticism (see McKitrick 2003), but the intuition that *some* dispositions are intrinsic is still quite strong (consider *fragility*, for example). In any case, we assume that there are some intrinsic dispositions that are subject to finks, in which case Martin's problem remains.

[5] Lewis 1997, p. 149. In detail, the account is this: 'Something *x* is disposed at time *t* to give response *r* to stimulus *s*, iff, for some intrinsic property *B* that *x* has at *t*, for some time *t'* after *t*, if *x* were to undergo stimulus *s* at time *t* and retain property *B* until *t'*, *s* and *x*'s having of *B* would jointly be an *x*-complete cause of *x*'s giving response *r*.' Here an *x*-complete cause is 'a cause complete in so far as havings of properties intrinsic to *x* are concerned'.

[6] To be fair, there is some evidence that Ryle (1949) was already aware of this problem in his initial statement of the conditional analysis. See, in particular, the qualifications added to his dispositional analysis of *knowing how* (pp. 123–4). See also A. D. Smith's example of Z-rays, which are a kind of reverse mask (1977, pp. 440).

disposed to break when dropped; but thanks to the protective packing, it would not break if dropped, even though it would retain the intrinsic causal basis of its fragility (say, the property of *having weak crystalline bonds*). Or, to update an example from Lewis, we can imagine a fragile glass that lacks protective packing, but boasts a protective sorcerer. The sorcerer plans to protect the glass by altering extrinsic features of the environment—if the glass is dropped, for example, the concrete floor below will magically turn to mattresses. Assuming that fragility and the disposition to break when dropped are intrinsic, these are retained despite the presence of the sorcerer. Lewis's more complicated conditionals are still not sufficient for the truth of the corresponding dispositional ascription. This is *the problem of masks*.

Not surprisingly, there are also cases of 'reverse-masks' or *mimicking*, where an object would M in C even though it currently lacks the disposition to M in C and even if it would not acquire that disposition in the presence of C. Imagine a sturdy concrete block despised by the glass-loving sorcerer. Unlike the glass, the block is not disposed to break when dropped. But if the block were dropped, the sorcerer would turn the floor to diamond and raise it quickly into the air. The block *is* disposed to break when dropped in the path of a rapidly moving slap of diamond. Let *B* be the intrinsic causal basis of this disposition. Then there is some intrinsic property—*B*—such that the block would break if dropped, provided it retained that property. Given the presence of the wrathful sorcerer, (LCA) incorrectly tells us that the block is not only disposed to break *when dropped onto a rapidly approaching slab of diamond*, but that it is also disposed to break when dropped *simpliciter*. The sturdy block is merely mimicking fragility.[7]

Masking and mimicking cases need not be magical; most are altogether mundane. As Michael Fara emphasizes:

> 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.

[7] Johnston initially suggests that the key to these cases is the interfering causal activity of an extrinsic agent (the packing and the sorcerer, respectively) and that to avoid the problem of masking we must revise (LCA) to rule out cases in which 'something extrinsic to [N] and the circumstances C is the cause of the manifestation … [or] a cause of a manifestation inconsistent with the manifestation [M]' (p. 233). We are unsure of what it means to say that something is *extrinsic to a kind of circumstance*. Imagine a fragile glass held a millimetre off of the ground. The glass is disposed to break when dropped, but it would not break if dropped under these conditions. We do not see how one can dismiss the height from which something is dropped as being 'extrinsic' to the circumstances of its being dropped—whatever, exactly, that means. Nor do we see in this case any interfering causal activity on the part of extrinsic agents.

> A piece of wood in a vacuum chamber is no less disposed to burn when heated than is its aerated counterpart (if dispositions are intrinsic properties then this has to be granted); but wood won't burn if heated in a vacuum. The masking of dispositions is such a humdrum occurrence that any adequate account of disposition ascriptions must accommodate it. (2005, p. 50)

We concur. So how might the defender of the conditional account accommodate masking? The standard reply is: *by getting more specific*.

2. Getting specific

In his brief discussion of masking, Lewis (1997) suggests that the solution will involve 'specifying the stimulus and the response correctly' in the dispositional ascription (p. 144). For example, after noting that antidotes can mask poison's disposition to kill, he writes:

> We might offhand define a poison as a substance that is disposed to cause death if ingested. But that is rough: the specifications 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. (1997, p. 145)

Lewis wants us not to be distracted by the difficulty of analyzing simple dispositional predicates like 'poison', and to focus instead on very specific dispositions like the *disposition to cause death if ingested without its antidote*. (Presumably the other 'corrections' he alludes to would make the disposition even more specific.) The idea is that, with a sufficiently specific dispositional ascription in hand, we will indeed find that it is equivalent to a subjunctive conditional. If we think of the link between dispositions and conditionals as holding between *precise* dispositions and *precise* conditionals, the problem of masks can be overcome.

Let us follow Lewis and replace '*N* is disposed to break when dropped' with something like:

(SD) *N is disposed to break when dropped on Earth from one metre up onto a solid surface with a Shore durometer measurement of 90A, through a substance with a density of 1.2 kg/m*^{3}.

The extra specificity in this ascription makes many masks irrelevant. Drop a fragile from a millimetre off of the ground (or over a mattress, or over a column of honey). Suppose that it does not break. This tells us nothing about whether the glass has the highly specific disposition at issue, since this would not be a case in which it is dropped in the right stimulus conditions. Of course, not even this disposition is immune to

all masks. Johnston's original example is still problematic, for example, since a vase filled with anti-deformation packing might have this very specific disposition and yet be dropped on Earth from a metre up onto a solid surface, etc., and still not break. But for the sake of argument, let us ignore these remaining masks and pretend that the ascription in question is precise enough for something like Lewis's account to deliver the correct result. In short, let us pretend that with (SD) on the left hand side, we can achieve a true instance of the schema (LCA).

So far, so good. But what does this have to do with ordinary predicates like 'fragile' or 'disposed to break if dropped'? Our initial intuitions concerning the link between dispositions and conditionals were, after all, intuitions about ordinary dispositions and their ascriptions. If we ignore these, we have yet to cast any light on the connection that we were primarily interested in illuminating.

Lewis's proposal about the ordinary term 'poison' is that it actually *expresses* a precise dispositional property, though articulating its stimulus conditions may not be a trivial task. While we may have thought that the stimulus condition for poison is simply *being ingested*, or that the stimulus condition for fragility is *being struck*, these are actually only approximations of the real stimulus conditions. There are indeed a set of paradigmatic circumstances under which fragility is revealed—but they are far more specific than previously thought. Perhaps they can be fully specified with an exhaustive conceptual analysis on the term 'fragile', or perhaps we just know them when we see them. But if were able to state them, we would be in a position to state the conditional that is equivalent to 'N is fragile'.

A similar thought seems to lie behind the idea that there are normal or 'ideal' circumstances associated with ordinary dispositional ascriptions that exclude masking scenarios. Stephen Mumford, for example, writes that:

> The possible interfering background conditions [i.e. mask] cannot be excluded in a finite list that is appended to the conditional. This is because there is no finite list that could name all such possible conditions in which the manifestation is prevented … What is usually implied by a true disposition ascription is that there are background conditions, let us call these 'ideal conditions', in which such manifestations do follow from the stimulus. (1998, p. 88)

So, for example, a fragile object is such that it would break if dropped under ideal circumstances. Since finks and masks are not ideal, they can be safely ignored. Of course, it would be uncharitable to interpret this speech as though 'ideal circumstances' meant something like 'circum-

stances that ensure breaking', since *everything* is such that it would break if dropped under circumstances that ensure breaking. A better interpretation is this: we know roughly what conditions count as 'ideal' for a given dispositional ascription, and something counts as 'fragile' if and only if it would break if dropped under those conditions. *Those conditions* will, of course, exclude cases in which something is packed with anti-deformation packing or protected by a guardian sorcerer or ... . (See also Prior 1985, pp. 48–9 and Mellor 2000, p. 263.)

This proposal is natural for ordinary explicit dispositional predicates like 'is disposed to break if dropped' as well as for implicit ones like 'is fragile'. Suppose you say, 'My glass is disposed to break when dropped, so it would break if dropped'. Your friend points out that the glass is currently being held over a soft bed, so that it would not break if dropped. You are tempted to reply that what you *meant* is that the glass is disposed to break when dropped on a *hard surface*, and that it would break if dropped on such a surface. Your obstinate friend then holds the glass over a hard surface, but only a millimetre above. When you add the requirement that it be dropped from at least a metre up, your friend holds it high, but slides a column of honey between the glass and the ground. Again, these were not the circumstances you had in mind, so you continue to get more specific. In this example, it seems plausible that you were not wrong to begin with: at each stage you are simply making more explicit what you had meant all along, and all the apparent masks will be ruled out when you fully articulate what you had expressed with the ordinary predicate.

In short, the proposal on the table is that ordinary claims of the form 'N is fragile' and 'N is disposed to break when dropped' actually ascribe dispositions as specific as the one ascribed in (SD). This idea will have to be complicated somewhat if dispositional ascriptions are context-sensitive, which they seem to be. The engineer discussing a concrete structure will have very different standards for 'fragility' than the chemist working with glass electrodes. Accordingly, the predicate 'fragile' will express very different properties in the mouths of the two speakers—a slab of concrete rejected by the engineer might have one of these properties but not the other.[8] (See Prior 1985, pp. 7–9 and 45–9, Mumford 1998, pp. 87–91, and Mellor 2000, pp. 758–60.) Given the context-sensitivity of at least some dispositional ascriptions, the 'getting specific' proposal will be that

[8] Note that the context-sensitivity of 'fragile' is compatible with the intrinsic nature of *fragility*: the property ascribed to an object by a given use of 'fragile' does not come and go with the object's environment. Instead, which property is ascribed by that predicate on a given occasion depends on the context of the *ascriber*. The difference between subject-sensitivity and ascriber-sensitivity is especially important in debates over the semantics of 'knows': see Hawthorne 2003.

a given *utterance* of 'N is fragile' will express a very precise dispositional property. So in every context, 'N is fragile' will be equivalent to a highly specific conditional, though *which* conditional will vary with context, because which precise disposition is expressed will vary.

One might be concerned that ordinary languages and ordinary contexts are not rich enough to pick out a single specific disposition like the one ascribed in (SD). But we will assume that this issue can be resolved by an adequate theory of vagueness. The supervaluationist, for example, will say that it is indeterminate which of the candidate precise dispositions (D_1, D_2, D_3) is expressed by a given use of 'fragile', but if an object has all the admissible candidates, an ascription of fragility will be supertrue. Likewise, it will be indeterminate *which* precise conditional is associated with the predicate, but it will be supertrue that *there is* such a conditional. Typically, one would hope, objects that instantiate one of the properties will also instantiate the others, so that the vagueness of the ordinary predicate is relatively harmless. In contrast, if we are epistemicists, we will reject the premiss of the complaint; namely, that ordinary language contexts cannot single out a highly specific disposition.

3. A dilemma

The strategy of getting specific ultimately fails, because a disposition can be masked or mimicked even in conditions that are paradigmatic for the manifestation of that disposition—that is, conditions that will not be ruled out by getting more specific. This is the basic insight of our first objection, but to flesh it out we need to consider some variations of the 'getting specific' proposal.

Let us grant that an utterance of 'N is fragile' or 'N is disposed to break if dropped' in a given context manages to ascribe a highly specific disposition to N. We now face the question whether that disposition is associated with a single precise stimulus condition, or a precise range of stimulus conditions.[9] In the former case, the conditional analysis yields the result that an utterance of 'N is disposed to break if dropped' will be equivalent to a conditional something like:

(EC) *N* would break if dropped on Earth from *exactly* one metre onto a surface with a Shore measurement of *exactly* 90A, through a substance with a density of *exactly* 1.2 kg/m^3.

[9] This distinction is not simply a feature of the example we happen to be focusing on; *viz.* the disposition to break if dropped. Consider 'poisonous' and the range of doses of a substance required to kill someone, or 'irascible' and the varying degree of annoyance required to make an individual angry.

But if the ascription specifies a precise range of stimulus conditions, it will be equivalent to something like:

(IC) *N* would break if dropped on Earth from *over* half a metre onto a surface with a Shore measurements *greater* than 50A, through a substance with a density *less than* 50 kg/m^3.

The first kind of conditional provides a single-case *litmus test* for whether something has the relevant disposition—it would break if dropped in exactly this situation, where all causally relevant elements of the environment are *just so*. The second kind of conditional attempts to rule out masks while still allowing for a *range* of circumstances in which the antecedent would be true. The question is: with which type of conditional is an ordinary dispositional ascription equivalent? Problems await either way.

3.1 Litmus tests and Achilles' heels

Begin with the 'litmus test' view according to which the properties expressed by ordinary dispositional ascriptions are associated with absolutely specific test-case scenarios, as in (EC).[10]

The problem with employing a conditional like (EC) is illustrated by the case of Achilles. Legend tells us that every part of Achilles that had been submerged in the river Styx was invulnerable; only his heel remained unprotected. Now consider a sturdy concrete block that, like Achilles, is almost entirely immune to harm. On many occasions it has been tossed onto the floor or run over by a truck or struck with a sledgehammer. Yet it shows no sign of wear. But, like Achilles, the block has a weak spot. If it is dropped onto a *particular* corner at *just* the right angle with *exactly* the right amount of force, an amazing chain reaction will cause it to break.[11] The block has an Achilles' heel, but it will be (determinately) false in any ordinary context to say 'it is fragile' or 'it is disposed to break when dropped'. It merely *mimics* fragility in a very specific circumstance.

[10] Of course, while dispositions themselves are precise in this way, it may be indeterminate which one is being ascribed by a given use of a vague dispositional ascription—see the end of Sect. 2.

[11] We assume that the precise conditional will, in its antecedent, specify an angle at which (say) a square block strikes the surface. If it does not, then it is easy to see that the property ascribed by 'is fragile' (or 'is disposed to break if dropped') will no longer be an intrinsic property. For *any* object that would break if struck at one angle but not if struck at another will sometimes satisfy the conditional, sometimes not, depending on what angle it is currently being held aloft at. So clearly, no 'precise conditional' that allows a range of angles at which a thing is dropped can be used to analyse an intrinsic disposition. Further, even setting aside the issue of intrinsicness, it is obviously wrong to count our block with an Achilles' heel as fragile, even when it happens to be held aloft just right. See Sect. 3.2.

Note the contrast with standard mimicking cases, which operate by exploiting nearby circumstances in which breaking is intuitively irrelevant to whether something is fragile—such as the case where a vengeful sorcerer would swiftly raise the floor. The strategy of getting specific rules out these cases because the specific conditions implicit in an ascription of fragility would, intuitively, rule out such a case. However, the circumstance under which an object with an Achilles' heel would break can be absolutely paradigmatic for fragility (or the disposition to break if dropped). Indeed, it can be among Mumford's 'ideal' conditions—*precisely* the sort of conditions that we would not want to rule out by tinkering with the antecedent of the conditional any further. For this reason, Achilles' heels provide a recipe for generating counterexamples to any analysis that invokes a conditional like (EC).[12] For every fully precise condition relevant to the manifestation of fragility, there will be a possible block with an Achilles' heel that would break in exactly that scenario without being fragile.[13]

3.2 The trouble with intervals

Let us therefore suppose that the defender of the 'getting specific' strategy will allow for a range of specific stimulus conditions to be associated with ordinary dispositional ascriptions. On this view, an ordinary dispositional ascription will be equivalent to something like (IC), which specifies intervals such as *heights over half a metre up* and *densities of less than 50 kg/m*^{3}. On this view, an object is disposed to break when dropped *simpliciter* if and only if it would break if dropped from a height falling within the first interval, through a medium with a density falling within the second interval, and so on.

There are three ways this idea could be fleshed out in detail. To take only one of the various intervals specified in (IC), we could construct a conditional in one of the following ways:

(A) If *N* were dropped from some height or other over half a metre, *N* would break.

(B) Some height over half a metre is such that, if *N* were dropped from it, *N* would break.

[12] Any approach that appeals to (EC) will also face the problem of reverse-Achilles heels, which is discussed below in connection with (IC).

[13] As a result, these examples avoid Johnston's attempt at explicit exclusion (n. 7); they cannot be construed as involving the unwanted causal activity of something 'extrinsic' to the object and the specified stimulus conditions.

(C) Every height over half a metre is such that, if *N* were dropped from it, *N* would break.

Clearly, these claims have different truth conditions.

The problem is—no matter which way we spell out (IC), it faces a fatal objection. First, a conditional of the form illustrated by (B) will obviously be far too weak for the sort of work required by (IC). Such a conditional will require only that, for at least one highly specific circumstance within the range specified by the various intervals, the object would break if dropped from that circumstance. But our block with an Achilles' heel will satisfy such a conditional, not to mention an ordinary concrete block that would break if it were dropped from fifty metres up, through air, onto a very hard surface. Clearly this is not sufficient for its being fragile or being disposed to break if dropped *simpliciter*.

While (B) is too easy to satisfy, (C) is too demanding. It requires that, for *every* circumstance within the range specified by the various intervals, *N* would break if dropped in that circumstance. But among the objects that will not count as disposed to break if dropped on this analysis is an incredibly delicate crystal glass that breaks in all but one of the precise circumstances at issue. If you tap this glass with your finger it will shatter. If you blow on it directly, it will crack. But the glass has a *reverse Achilles' heel*: it can withstand a surprisingly strong force, provided that the force is applied at *exactly* the right angle and at *exactly* the right point. Despite the reverse Achilles' heel, the glass is extremely fragile. It is disposed to break if dropped, but the current analysis says otherwise, since it is not true that the glass would break if dropped in every situation representing a combination of the variables.[14]

Note the contrast with standard masking cases, which operate by exploiting circumstances in which failing to break is intuitively irrelevant to whether something is fragile—such as being protected by packing or dropped onto mattresses. The strategy of getting specific can simply rule these out. But the kind of circumstance in which our glass breaks is precisely the sort of situation in which we would expect a fragile thing to break. Indeed, for every fully precise dropping circumstance relevant to the manifestation of fragility, there will be a possible glass with a reverse Achilles' heel that would fail to break in exactly that scenario. (Note that Achilles' heel cases need not be far-fetched: many of

[14] At best, the proposal will fail to count a determinately fragile object as determinately fragile. (For example, if we are supervaluationists, and we allow several candidate conditionals as precisifications.)

us have dropped a fragile glass while cleaning the dishes, only to see it bounce harmlessly off the floor because it landed in just the right way.)

The last option is to construe (IC) along the lines of (A). Here the idea is that something has the disposition to break if dropped iff it is such that it would break if dropped in one or another of the circumstances within the specified intervals. That is, on the standard possible worlds treatment of counterfactuals, it breaks in the closest world/s in which it is dropped in a paradigmatic circumstance. But on this view again our sturdy block with the Achilles heel will count as fragile—as long as it is dropped *just so* in the closest world in which it is dropped.

Moreover, this view faces *the problem of accidental closeness.* Consider any ordinary concrete block that is not disposed to break when dropped. Suppose such a block is disposed to break if dropped from any height of at least twenty metres onto the specified type of surface, but it would not break if dropped from any lesser height. Now suppose that the block happens to be sitting on a windowsill twenty metres above ground. Then the closest world in which it is dropped from over half a metre is a world in which it is dropped from twenty metres. (That is, if it were dropped from some height or other over half a metre, it would be dropped from twenty metres.) Moreover, the block would break; so the present proposal wrongly tells us that it is fragile. And note that the block would *not* satisfy the conditional if it were sitting on a windowsill only nineteen metres above the ground instead. But clearly the block need not undergo intrinsic change as it is lowered, so on the present approach fragility cannot be an intrinsic disposition. This contradicts the common ground that at least some of the ordinary dispositions at issue—fragility in particular—are intrinsic features of their bearers (at least holding fixed the physical laws). (See n. 4.)

At this point it is tempting to cap the relevant interval with an upper bar. For instance, we could replace the height interval in (IC) with 'between one and three metres up', and put an upper bar on surface hardness, etc. But it is easy to see that exactly the same problems will crop up: (i) If we interpret this as requiring merely that some height in this interval is such that the object will break if dropped from it, we get the result that a sturdy object with an Achilles' heel at exactly three metres is fragile; (ii) If we interpret it as requiring that every height in this interval is such that the object will break if dropped from it, we get the result that an object with a reverse Achilles' heel at one metre is not fragile; (iii) If we interpret it as requiring that the object would break if it were dropped from some height or other in the interval, we get the result that fragility is not intrinsic, and an object with an Achilles heel

at exactly two metres will count as fragile only when it happens to be held at exactly two metres up.[15]

4. Three more problems

Up to this point we have been focusing on counterexamples to conditional analyses of dispositions. (SCA) faces the problem of finks. And (LCA) faces the problem of masks, except when it comes to highly specific explicit dispositions such as (SD). We then examined the claim that ordinary utterances of dispositional claims are actually equivalent to claims like (SD), and therefore to highly specific conditional claims. This 'getting specific' proposal was defeated by the problems of Achilles heels and accidental closeness.

Let us now set aside counterexamples and consider three more fundamental objections that strike at the very form of standard conditional analyses, whether highly specific or otherwise. These objections are independent of the preceding discussion and involve data that no extant theory of the link between dispositions and conditionals can explain. Moreover, we consider them decisive.

First, there is the problem of *comparative dispositional ascriptions*. The literature on dispositions and conditionals ignores locutions like 'Glass A is more fragile than Glass B' and 'Glass A is more disposed to break than Glass B'. But these are clearly problematic for any analysis of a disposition in terms of a single conditional. A single conditional can provide no scale along which objects can be compared, but such a scale is required by the semantics of comparatives. For example, while fragility comes in degrees, a single counterfactual like 'this glass would break if dropped' is either true or false, no matter how much we tinker with its antecedent. (For further discussion of dispositions, conditionals, and comparatives, see Manley and Wasserman 2007.)

Second, there is the problem of specifying a *mechanism for context dependence*. We have seen that 'fragile' expresses a different property in the mouth of the aerospace engineer than it does in the mouth of the chemist, because standards for 'fragility' vary from context to context.

[15] Finally, it will not help if we interpret (IC) along the lines of (A) but treat it as a nomically necessary material conditional, rather than a counterfactual. Suppose we say that *N* is disposed to *M* when *C* if and only if it is nomically necessary that, all intrinsic duplicates of *N* would *M* if *C*. But either the conditional allows for a range of stimulus conditions, or not. If it does not allow for a range, it will fall prey to the original problem of Achilles' heels from Sect. 3.1; if it does allow for a range, it will fall prey to the problem of reverse Achilles' heels from Sect. 3.2. For there will be a duplicate of our glass with an Achilles' heel that fails to break in at least one of the many nomically possible worlds where duplicates count as undergoing *C*.

Speakers can, of course, determine a standard explicitly by fixing a comparison class—one might say 'fragile for an electrode' or 'fragile for a support beam'. In the absence of specific comparisons, presumably context does the job. But as far as we know, there has been no specific proposal concerning the mechanism whereby the semantic value of the predicate shifts from context to context. So how does it work? Intuitively, the standards in question specify *how fragile something must be* to satisfy 'fragile' in a given context. But this assumes that fragility comes in degrees, which in turn requires that some things are more fragile than others. In short, 'fragile' appears to function like any other context-dependent gradable predicate ('cold', 'loud', 'heavy', 'rich', 'tall', etc.). Each has a corresponding comparative that establishes a scale, and the context selects some point or interval along that scale, above (or below) which an object has to fall in order to satisfy the positive in that context.[16] Given the general failure to consider comparative dispositional ascriptions, it is unsurprising that no one has suggested a plausible mechanism for the context dependence of dispositional predicates.

A third difficulty for conditional analyses is the problem of *absent stimulus conditions*. It is commonly assumed that every disposition is associated with a particular set of stimulus conditions: *fragility* with *being stressed* and so on. We have so far gone along with this assumption, but we submit that it is plausible only given a paltry diet of examples. In fact there are plenty of dispositions that do not have any particular stimulus conditions. Suppose someone is highly disposed to talk, but there is no particular kind of situation that elicits this response in him. He is disposed to talk when happy, when sad, with others or by himself—he is just generally loquacious. Or take someone whose frequent bouts of anger are not particularly tied to provocation; surely it is relevant to one's degree of irascibility if one gets angry for no reason. The point is that talking in any situation at all can manifest loquaciousness, and anger in any situation at all can manifest irascibility. Perhaps even fragility is just the disposition to break—after all, breaking for no reason at all would be relevant to a thing's degree of fragility. Now, clearly there is a problem with providing a counterfactual account of such dispositions: we are at a loss for what to put in the antecedent of the counterfactual. We are not given an ascription of the form 'N is disposed to give M in C', we are only given 'N is disposed to M', and even context seems not to

[16] For more on the semantics of gradable predicates and comparatives, see Cresswell 1977, von Stechow 1984, and Kennedy 1999. For the use of intervals rather than degrees, see Schwarzschild and Wilkinson 2002. Some semantic proposals for comparatives involve quantification over comparison classes (Klein 1980, Ludlow 1989), but the conditional analysis will be just as unable to illuminate what it means for something to be 'fragile' relative to one comparison class as opposed to another.

specify any stimulus conditions. So with nothing to put in place of 'C', how can we construct a conditional of the form 'N would M if C'? The conditional 'If he were in any situation at all, he would talk' has two readings, neither of which will serve our purposes. On one reading it is too strong (requiring that every situation is such that he would talk in it) and another it is too weak (requiring only that he talk in the closest world in which any situation obtains; i.e. the actual world).

5. Starting over

What should we conclude from this series of problems for the conditional analysis? Should we conclude that ordinary dispositional facts are fundamental, irreducible features of the world? Perhaps, but even if the promise of a conditional analysis is illusory, it is hard to believe that there is *no* interesting connection between conditionals and ordinary dispositional ascriptions. (This would be especially surprising if we accept that some explicit dispositional ascriptions—the highly specific ones—are actually equivalent to conditionals.) The connection need not be reductive, but it should at least explain, for example, the way that ordinary beliefs about dispositions guide action. When we learn that something is fragile, we treat it with care because we know that many kinds of rough behaviour would lead to breaking. A theory of dispositions that dismisses this connection is simply abnegating its explanatory burden.

Perhaps instead we should take these results as motivating accounts of dispositions that do not invoke conditionals. For instance, there is Fara's (2005) analysis of dispositional ascriptions in terms of habitual statements. On this view, *N* is disposed to *M* when *C* if and only if *N* has some intrinsic feature in virtue of which it *M*s when *C* (p. 70). Since habituals ('*N M*s when *C*') tolerate exceptions, the presence of finks or masks is consistent with the truth of the habitual statement. For example, it might be true that John smokes when he drinks (and is thus disposed to smoke when he drinks), even if the nearest bar just happens to be smoke-free, so that as a matter of fact he would not smoke if he were to drink. We think there are serious problems for the habitual account,[17] but even if it is correct it leaves us empty-handed when it

[17] Consider, for example, a standard masking case in which a fragile glass is repeatedly dropped without breaking, due to the presence of anti-deformation packing. It makes perfect sense to say that *the glass is disposed to break when dropped, but it does not break when dropped* (because of the packing). However, if Fara is correct, the glass is disposed to break when dropped only if it breaks when dropped; and hence it would follow that *the glass breaks when dropped, but it does not break when dropped* (because of the packing). Something has gone wrong. Relatedly, it makes sense to say that an object has a disposition that is never manifest. If the habitual account is correct, this would be equivalent to saying that there are habits that are never acted out—in other words, it

comes to the connection between habituals and dispositions, on the one hand, and subjunctive conditionals, on the other. A theory like Fara's can supplement, but cannot substitute for, an account of the link between dispositions and conditionals.

5.1 A proposal

Perhaps the link can be mended after all. When we are told that an object is fragile, we know that there are many striking and dropping scenarios in which it would break, but we might not know *which* ones, exactly, would lead to breaking. The object might, after all, have a reverse Achilles' heel. It need not be such that it would break in *all* of the paradigmatic conditions for breaking, but on the other hand it is not enough for it to be such that it would break in only some of them. A happy medium suggests itself: perhaps what we know about the object is that it would break in *many* or even *most* such conditions.

To put it differently, the 'getting specific' proposal claimed that highly specific dispositional ascriptions are equivalent to conditionals. We now face the question: how are ordinary dispositions connected to those highly specific ones? If something has the disposition to break if dropped *simpliciter*, what does that tell us about the presence of much more specific dispositions to break if dropped? We know it need not have them all, and it will clearly have more than just one. Suppose we were to require only that the object has many or most of them? Thus instead of (A), (B), or (C), we might suggest as a first pass:

(D) Most heights over half a metre are such that, if *N* were dropped from them, *N* would break.[18]

To expand the account beyond height, we can introduce the term 'stimulus condition case' or '*C*-case' for every precise combination of values

would require things to be in the *habit* of doing things that they have never done. This fact can be made particularly vivid when we focus on specific, short-lived dispositions: for example, suppose that a minute ago, for the first and last time, Mary was disposed to kick John in the shins, but she restrained herself. It is very difficult to see how this truth could be expressed using a habitual. For more on these and other worries, see Manley and Wasserman, manuscript.

[18] This should be read as involving a restricted quantifier. It is therefore not equivalent to a sentence containing both a material conditional and a subjunctive conditional: 'Most heights *h* are such that, if *h* is over half a metre, then if *n* were dropped from *h*, *n* would break.' Compare:

(M*) [Most heights over half a metre: *h*] (D*nh* $\Box\!\!\rightarrow$ *n* breaks)

(M**) [Most *h*]((*h* over half a metre) $\rightarrow$ (D*nh* $\Box\!\!\rightarrow$ *n* breaks))

The second of these has the effect of requiring that most heights satisfy this material conditional (containing an embedded counterfactual). This will allow heights under half a metre, which trivially satisfy the material conditional, to count towards this preponderance. But the intended reading, which is the first, simply requires that most heights over half a metre satisfy a counterfactual.

for heights, Shore measurements, densities of the medium, and so on. So the antecedent of every precise conditional like (EC) describes a particular *C*-case.[19] We can then say that something is disposed to break when dropped if and only if most dropping cases are such that the object would break in them. Generalizing:

(MOST) *N* is disposed to *M* when *C* if and only if *N* would *M* in most *C*-cases.

(Note that the second half of this bi-conditional does not require that *N* satisfy some counterfactual of the form *N* would *M* if it were in C-case$_1$ *or* C-case$_2$, *or* ... , C-case$_n$, where that counterfactual mentions most *C*-cases. Any attempt to use a single disjunctive conditional like this would succumb to the accidental closeness problem articulated in section 3.2. Instead, the second half of (MOST) requires that *N* satisfy most of a huge list of counterfactuals of the form *N* would *M* if it were in C-case$_n$. It should be clear from the earlier discussion that the difference between these two suggestions is crucial, given the logic of counterfactuals.)

The trouble with (MOST) is that many dispositional predicates do not require that an object would respond in most stimulus-circumstances. We might say that Fred is disposed to become violent in the evening, even if this only happens a third of the time. Likewise, an illness might be disposed to spread upon contact even if it would not be contracted in most situations of contact with an afflicted person. The illness need only be such that it would be contracted in some suitably broad range of cases of contact. (We note in passing that these cases provide easy counterexamples to standard conditional analyses, even as enhanced by the 'getting specific' proposal.)[20] In short, different dispo-

[19] *C*-cases are to be construed less coarsely than worlds: a world may contain many dropping-cases.

[20] If Fred only gets angry in the evening a third of the time, the conditional 'If it were evening, Fred would be angry' will frequently be false, even though Fred does not gain and lose the disposition to get angry in the evening. To appeal to the 'getting specific' strategy would be to suggest that 'Fred is disposed to be angry in the evening' actually expresses some highly specific disposition. But what would that be? Suppose there are unknown factors $F_1 \ldots F_n$, any one of which puts Fred over the edge. It would be entirely implausible to suggest that the ordinary dispositional ascription actually expresses the specific disposition to be violent in the evening when one of $F_1 \ldots F_n$ obtains. After all, it may be that no one has any idea what these factors are. They are certainly not particularly paradigmatic stimulus conditions for the disposition, a fact attested to by Fred's brother Bob, who shares the disposition but gets put over the edge by an entirely different set of factors. Surely we can say they are both disposed to be violent in the evening, despite the complete lack of overlap in the extra factors that set them off. The ordinary dispositional ascription does not implicitly tell us *which evening conditions* are such that Fred will get angry in them; it tells us *that there are* some. (In effect, these are cases in which a disposition is *usually* masked, and in which the masking circumstances are paradigmatic. Given our terminology in Sect. 3, they are thus a type of reverse Achilles' heel.)

sitional predicates may be associated with different *proportions* of the range of relevant *C*-cases. This suggests a more flexible approach:

(PROP) *N* is disposed to *M* when *C* if and only if *N* would *M* in some suitable proportion of *C*-cases.

How big a proportion is 'suitable' will depend not only on the dispositional predicate involved but also on the context of utterance. For instance, we saw that engineers working with slabs of concrete and chemists working with glass electrodes may ascribe different properties with the predicate 'fragile'. We can think of the contexts as providing the standards for 'fragility' by establishing a requisite proportion of *C*-cases in which an object would break, for example. In particular, for something to count as 'fragile' in the mouth of the chemist it must break under a much larger proportion of the sorts of stress conditions relevant to fragility.

Two brief remarks on *C*-cases. First, only those governed by the actual physical laws are relevant. Perhaps some worlds have laws that conspire to make concrete blocks break at the slightest provocation; but what actual blocks would do in such worlds is irrelevant to whether they are actually fragile.[21] Second, the conditions specified by *C*-cases are extrinsic. They may of course bring about intrinsic change to the object (e.g. by breaking it!), but they will not specify that the object has been different all along. So, for example, while being dropped from a metre up is a factor incorporated by a *C*-case, being made of glass is not. It is irrelevant to a wooden chair's fragility (or lack thereof) whether it would break if it were made of glass and then dropped. What is relevant is whether it would break if it were dropped *as is*. So we consider what objects would do under various extrinsic conditions in which they are (at the outset) as they actually are intrinsically.

We will consider two objections to (PROP) in section 5.3. But let us begin with the good news.

5.2 Benefits

Consider how the current proposal avoids each of the seven problems we have considered.

(1) *Finks and masks*: It is easy to see that this proposal avoids the two traditional problems for conditional analyses. For the right-hand side of our bi-conditional holds even if an object happens to be in 'bad' case where its disposition is finked or masked. All that is required is that the

[21] If those worlds really contain duplicate concrete blocks, and we are tempted to say they are fragile in those worlds, it follows that fragility is only intrinsic *modulo* the laws.

object would break in a suitable proportion of stimulus cases, where these will include any finkish or masking cases; and it makes no difference whether these are actual.

(2) *Achilles' heels and accidental closeness*: In effect, these are cases of masking that are nevertheless paradigm stimulus scenarios, so they cannot be ruled out of hand. (PROP) has no trouble with these because there is no need to 'specify away' any scenarios that are intuitively stimulus conditions for the disposition, even if the object at hand is such that it would not manifest its disposition in some of them. All situations in which *M*ing would count as a manifestation of the disposition to *M* in *C* are included in the domain. Thus it will be irrelevant if, for instance, a sturdy block has an Achilles' heel and happens to be such that it would shatter in the nearest world in which it is dropped. Having the disposition of fragility requires much more than being such that one would break in *that* particular scenario.

(3) *Comparative dispositional ascriptions*: In the framework of (PROP), is clear how to treat dispositional comparatives, because considering proportions of *C*-cases gives us the resources to establish a scale along which a disposition can come in degrees:

(MORE) N_1 is more disposed than N_2 to *M* when *C* if and only if N_1 would *M* in more *C*-cases than N_2.

To assess the relative fragility of two objects, for example, we ask how many *C*-cases each one would break in.

(4) *A mechanism for context dependence*: With a scale in place, we can treat 'fragile' just like any other gradable predicate ('cold', 'loud', 'heavy', 'rich', 'tall', etc.). Each has a corresponding comparative that establishes a scale, and the context selects some point or interval along that scale, above (or below) which an object has to fall in order to satisfy the positive predicate in that context. In the case of 'fragile', context selects a threshold along a scale of degrees of fragility established by the comparative.

(5) *Absent stimulus conditions*: Because the *C*-cases in our domain need not be restricted in any way, absent stimulus conditions are not a problem for (PROP). We can simply allow that N is loquacious just in case N would talk in a suitable proportion of situations—any situations at all.

5.3 Concerns

Having provided a battery of reasons in favour of (PROP), we turn now to some possible objections.

First, let us assume that we can justify talk of proportions of *C*-cases: we will examine that assumption in a moment. Even so, it seems that (PROP) mistakenly treats every *C*-case as equally important when it comes to a thing's degree of fragility (for example). But how much it matters whether a thing would break in a given *C*-case can vary in several ways:

(1) *Degree of manifestation*: If an object would crack under certain conditions, that counts towards its degree fragility. But if it would *shatter* under the very same conditions, that counts more. Likewise, if a man would, under certain conditions, manifest his irascibility by strangling someone, that counts more towards his irascibility than if he would merely raise his voice in anger. This kind of difference cannot replace the difference in proportions of *C*-cases in which the disposition is manifested, but it must be taken into account.

(2) *Probability of manifestation*: Consider a view where the laws are indeterministic, and for some *C*-cases the most we can say is that *N* would *probably M* in them (rather than that it would *M* in them). To modify our account for such a view, it would not be enough to replace 'would' with 'would probably' in (PROP) and (MORE); after all, it should count more towards a thing's degree of fragility if it would break with a very high degree of probability in a given *C*-case than if it would only break with a moderately high degree of probability.

(3) *Closeness (for extrinsic dispositions)*: Whether a castle is vulnerable (or disposed to be conquered) depends on its environment, including the lay of the land and the position of the enemy. For example, two castles that are intrinsic duplicates might differ in whether they are vulnerable because one is on the front lines, while the other is deep in friendly territory. Hence this disposition is extrinsic. (The example is from McKitrick 2003.) But if we treat all *C*-cases equally, we will find that the two castles just mentioned will count as equally vulnerable. This is because whether they would be conquered will be evaluated at all the same *C*-cases, which have enemy lines in various positions. Clearly, it matters most whether the castles are conquered in *nearby C*-cases—that is, those in worlds most like the actual world. In general, for extrinsic dispositions, the closer the *C*-case, the more it matters.

(4) *Contextual factors*:[22] Take two objects. Suppose that humans, with our paltry strength, are incapable of breaking the first, but that it would take little or no effort for a giant to break it. The second object, however, is strange—it will break under very light pressure, but it is imper-

[22] Thanks to Ernest Sosa and to an anonymous referee for raising related objections that reinforced the need for contextual weighting of *C*-cases.

vious to the destructive efforts of giants who are incapable of applying light pressure. Now, it may well be that, given a suitable notion of proportion, these two objects break in an equal *proportion* of cases involving the application of stress. The trouble is that we are likely to call the second object 'fragile' but not the first, while the giants will have opposite inclinations. Clearly we are not only concerned with the *proportion* of stress-inducing situations in which an object would break, because some of those situations matter more to us than others. And these situations are different from the ones that matter to giants.

Note that these four points involve pieces of data that any view must account for. And they all have to do with the degree to which a thing's behaviour in various counterfactual contexts is relevant to its degree of fragility. But recall that extant conditional theories of dispositions have no way of accounting for the degree-theoretic nature of dispositions at all. They avoid these issues the way a man with no teeth avoids cavities.

But the present account does have the resources to account for these facts. What they require is that we revise (PROP) and (MORE) so that they consider *weighted* proportions of *C*-cases. All four of the factors will affect how a *C*-case is weighted: and in the case of the fourth factor, its contribution will be context-dependent. For humans, *C*-cases involving low-stress situations are weighted more heavily; for giants, the reverse holds true. (We do not want to say that our own context *ignores* the high-stress situations: they can matter to a thing's degree of fragility, but they just matter *less* for us than do low-stress situations.) But this raises a further problem: how much weight does each of these factors get? For example, what degree of likelihood that a thing would break in an indeterministic *C*-case does it take to outweigh the fact that it would only crack rather than shatter? This is closely related to the problem we are about to address.

The remaining concern is a significant one. The view requires that we can make sense of claims like 'N_1 would break in more *C*-cases than N_2'. But presumably in ordinary cases where one thing is more fragile than another, there are (at least) continuum-many *C*-cases in which both objects would break. How are we to interpret 'more' when we are comparing sets of the same cardinality?

Sometimes there is a natural substitute for comparison of cardinality. For example, take the intuition that on a real line from 1 to 100 metres, there are in some sense 'fewer' points between 1 and 2 metres than there are between 2 and 100 metres; and that a point selected at random from the line is far more likely to be selected from the second interval. These intuitions can be appeased, but not by comparing the cardinal number

of points in each interval. Instead we can appeal to a natural measure on the set of points on the line, one that corresponds to the intuitive notion of length. This gives us a non-arbitrary standard by which to compare the 'size' of sets of points—at least, those that correspond to intervals on the line. The problem for (PROP) is that it is far from a trivial issue whether there is any analogous non-arbitrary measure on the set of *C*-cases that will allow us to justify our intuitions of proportion among its subsets. Because we must combine the several factors of height, density, etc., and there may be many equally good ways to do this, the worry is that we will end up with too many equally natural measures on the set of *C*-cases. And these competing measures would yield conflicting proportionality results.[23]

To make the worry vivid, take two objects o_1 and o_2. Let us idealize and suppose that, regardless of other factors, when the temperature is between 10 and 20 degrees Celsius, object o_1 would break if dropped from 5 metres up and object o_2 would break if dropped from 3 metres up. But when the temperature is between 20 and 50 degrees Celcius, object o_1 would break if dropped from 4 metres up, while object o_2 would break if dropped from 5 metres up. At all other temperatures, they do not differ from each other in whether they would break. To compare the 'size' of the sets of *C*-cases in which these objects would break, we need a way to compare the size of height intervals to the size of temperature intervals. For example, how does a range of 10 degrees Celsius compare to a range of 1 meter? Is there a non-arbitrary standard that decides the matter in a fashion that would match our intuitions of proportions of *C*-cases?

To address this complex problem fully would require examining candidate measures in detail, which is a complex project beyond the scope of this paper.[24] For the moment we will simply highlight a few points in response. First, a certain degree of vagueness in dispositional ascrip-

[23] See e.g. van Fraassen 1989, Ch. 12 on problems of measure selection in the context of applying the principle of indifference.

[24] Here are two measures that might do the necessary work:

(1) Physics provides a notion of the size of any measurable set of possible physical states in the form of the Liouville measure on phase space (with canonical coordinates determined by the symplectic structure of phase space). Moreover, it is highly probable that the Liouville measure will closely match the actual relative frequencies for the relevant macroscopic states. Whether this is sufficient to match our intuitions of proportion is a question worthy of further investigation. However, if the Liouville measure turned out to be the best candidate for making sense of our intuitions of proportion, it could ground the semantics of dispositions even if the result does not entirely vindicate our ordinary judgements, and even though (of course) the measure in all its technical glory is hardly a part of our ordinary conceptual structure. (Thanks to Frank Arntzenius here.)

tions is surely acceptable, so we would hardly need a single canonical measure. With adequately stringent criteria for the admissibility of measures, we could deem dispositional ascriptions to be determinately true if they come out true no matter which of admissible measures is employed to interpret claims of proportion. (One obvious criterion for admissibility is that natural measures must be at least minimally respected: so a measure according to which there are 'more' *C*-cases where a thing is dropped between 1 and 2 metres than *C*-cases where a thing is dropped between 2 and 10 metres—holding all other factors fixed—would be inadmissible.)

Second, whether the structure of reality yields a measure that will serve our purposes is independent from the question whether our dispositional predicates are conceptually connected to proportions of stimulus cases. For many pairs of objects we do have the intuition that there are 'more' situations in which the first would break than in which the second would break. And it is no coincidence that for every such pair we also have the intuition that the first is more fragile (modulo the four weighting factors just discussed). In short, our intuitions of dispositionality march in lockstep with intuitions about proportions of *C*-cases. And the case of o_1 and o_2 that was described is no exception: our intuitions of comparative fragility are ambivalent, and so are our intuitions about proportion. (Perhaps this is because it is indeterminate which object is more fragile.) But let us contrast that idealized example with another one: suppose that regardless of other factors, object o_1 breaks in *C*-cases where it is dropped from 10 metres or higher, and object o_2 breaks if dropped from only 1 metre or higher—*except* when the temperature is between 0.01 and 0.02 degrees Celsius. In that

(2) Some philosophers maintain that there is a completely objective sense of probability that is much more expansive than any physical sense of probability. The idea is that propositions are simply imbued with 'intrinsic plausibility' prior to investigation: for example, simple and elegant scientific theories are objectively more probable than their inelegant competitors. (See Williamson 1998.) Moreover, we suppose that proponents of such a notion would want it to respect natural measures wherever possible. (For instance, the probability that there is something that is dropped from a height between 1 and 2 metres will be less than the probability that there is something that is dropped from a height between 2 and 100 metres.) Given some reasonable assumptions, it is a straightforward matter to define a measure for the set of *C*-cases in terms of such a notion. Let us say that a proposition P corresponds to a set S of *C*-cases just in case: necessarily, P is true iff some *C*-case in S obtains. We can now say that a set of *C*-cases is twice as 'large' as another if the probability of its corresponding proposition is twice as great, and so on. The end result would be that N_1 is more disposed than N_2 to *M* in *C* just in case the objective probability of the proposition corresponding to the set of *C*-cases in which N_1 would break is greater than the objective probability of the proposition corresponding to the set of *C*-cases in which N_2 would break.

temperature range, o_1 breaks if dropped from 99 centimetres or higher and o_2 breaks if dropped from 1 metre or higher.[25]

In this case, we have two intuitions: (a) the intuition that o_2 is determinately more disposed to break if dropped than o_1; (b) the intuition that there is a greater range of dropping cases in which o_2 would break than in which o_1 would break. Admittedly, cashing out the second intuition requires making the judgement that the size of the range of temperatures at which o_2 breaks when dropped from more heights outweighs the size of the range of heights (i.e. from 0.99 to 1m.) dropped from which o_1 breaks in more temperatures. But given the presence of both intuitions, if the intuition of proportion cannot be justified by a non-arbitrary measure, why suppose that the corresponding dispositional judgement escapes unscathed? The fact that intuitions of comparative dispositionality and intuitions of proportion vary together is evidence that they are conceptually connected. (Not to mention the success of (PROP) and (MORE) in matching our dispositional concepts, as illustrated by the many arguments provided above.) So those who suspect that many of the relevant proportion intuitions are irreparably flawed—like many untutored intuitions about infinity—would have reason to think the same of the dispositional concepts to which they are tied. By the same token, to the degree we are confident that our dispositional intuitions are trustworthy, we should be confident that some non-arbitrary measure—or at least a set of admissibility criteria—can undergird our intuitions of proportion.

5. Conclusion

We have illustrated how the old problems of *finks* and *masks* forced the defenders of the conditional analysis to get specific, and how this lead to the new problems of *accidental closeness* and *Achilles' heels*. In addition, we noted that the standard conditional analysis does not have the resources to account for *comparative dispositional ascriptions*, provides no mechanism for the *context dependence* of dispositional ascriptions, and founders on the problem of *absent stimulus conditions*.

Our own proposal for how to link dispositions with conditionals avoids all seven of these problems. We think this is good reason—apart from sheer intuitive plausibility—to posit a connection between the notion of *being more disposed to break* and the notion of *being such that*

[25] Admittedly, at least one of these must be a strange object, but this kind of example helps to clarify what is at stake.

one would break in more situations. This in turn is a good reason to hope that the latter notion can be vindicated.[26]

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