Dispositions and subjunctives

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Abstract It is generally agreed that dispositions cannot be analyzed in terms of simple subjunctive conditionals (because of what are called "masked dispositions" and "finkish dispositions"). I here defend a qualified subjunctive account of dispositions according to which an object is disposed to Φ when conditions C obtain if and only if, if conditions C were to obtain, then the object would Φ *ceteris paribus*. I argue that this account does not fall prey to the objections that have been raised in the literature.

Keywords Disposition · Mask · Fink · Subjunctive · Counterfactual ·
Ceteris paribus

1 Dispositions, finks and masks

When we say of an object that it has a particular dispositional property it might seem that we are making a conditional claim. That is, for example, when we say of Tony that he is disposed to get angry when his car does not start, we seem to mean something like: if Tony's car does not start, then Tony will get angry. Similarly, when we say of a spoonful of sugar that it is disposed to dissolve in coffee, we seem to mean something like: if the sugar is put in coffee, then it will dissolve. But, as many have pointed out, we ought not think of the conditional as a material conditional.[1] A golf club is not disposed to dissolve in water simply because it is never put in water. So perhaps we ought to analyze dispositions instead in terms of

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[1] See, for example, Carnap (1936), Mackie (1974).

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subjunctive conditionals. After all, when we ascribe a disposition to something, we are not simply saying how that thing is in fact behaving, but how it *would* behave under certain circumstances.

However, it is generally agreed that dispositions cannot be analyzed in terms of simple subjunctive conditionals. That is, the following analysis (what might be dubbed, *The Simple Subjunctive Conditional Analysis*) appears to fail:

> An object has the disposition to Φ under conditions C if and only if, if C were to obtain, then the object would Φ.

Examples have been put forward to show that an object can have a particular disposition, while the corresponding subjunctive conditional is false. And, conversely, there appear to be cases in which an object lacks a particular disposition, while the corresponding subjunctive conditional is true. Martin (1994) provides a pair of examples to show that the biconditional below fails in both directions.

> The wire is disposed to conduct electricity when touched by a conductor if and only if the wire would conduct electricity if it were touched by a conductor.

Martin imagines a wire that is dead—it is not disposed to conduct electricity if it were to be touched by a conductor. He then imagines that this wire is connected to an *electro-fink*, a device that (reliably) senses when the wire is about to be touched by a conductor. The electro-fink causes the wire to conduct electricity in such circumstances. So, if the wire were to be touched by a conductor, the wire would conduct electricity. Of course, as stipulated in this example, the wire is dead and merely becomes live when touched by a conductor as a result of the electro-fink. The point is that the wire is (by hypothesis) not disposed to conduct electricity, and yet it is true that *if* a conductor touched it, then it *would* conduct electricity. This point might be clearer if we suppose that there is never a time at which a conductor touches the wire—the wire is always dead, and the electro-fink is merely a sort of counterfactual intervener that never has the opportunity to activate. However, it is still true that if a conductor *were* to come in contact with the wire, then the wire *would* conduct electricity. So the above subjunctive conditional is true, while the disposition ascription is false (i.e., even though the wire is not disposed to conduct electricity).

Martin's second example is similar to his first. Imagine a wire that is live and is attached to what might be called a *reverse-electro-fink* (a circuit-breaker). According to this example, if a conductor touched the "live" wire, the reverse-electro-fink would (reliably) cause the wire to be dead—that is, it would make it such that the wire did not conduct electricity. This appears to be a case in which the wire has a certain dispositional property (i.e., it is disposed to conduct electricity when touched by a conductor) and yet the corresponding subjunctive is false (i.e., it is *not* the case that if it were touched by a conductor, it would conduct electricity). As Martin puts it, "the conditional is not logically necessary for the power ascription which it is meant to be the analysans… the permanently untouched wire is live, yet the conditional is false of it!" (1994, p. 3).

The Simple Subjunctive Conditional Analysis also seems to succumb to a different sort of example than cases like the above (what are now known as "finkish dispositions"). There appear to be numerous commonplace examples in which an object is prevented from manifesting a disposition because the manifestation process is inhibited or masked. In such cases, there is no alteration of the relevant disposition (or the causal basis for that disposition) like in Martin's cases above.

Mark Johnston considers the following example of a "masked disposition."

> Consider a fragile glass cup with internal packing to stabilize it against hard knocks. Packing companies know that the breaking of fragile glass cups involves three stages: first a few bonds break, then the cup deforms and then many bonds break, thereby breaking the cup. They find a support which when placed inside the glass cup prevents deformation so that the glass would not break when struck. Even though the cup would not break if struck the cup is still fragile (1992, p. 233).

Here we have another counterexample to the Simple Subjunctive Conditional Analysis. The cup is disposed to break when struck, and yet if it were struck, it would not break. What is interesting about this example is that the disposition of the cup to break when struck is masked or obstructed by the packing materials. The cup does not lose the disposition because of the presence of these protective materials; instead, there is a sort of "antidote" present that prevents the manifestation of the disposition to break when struck.

Bird (2004) offers another example that may shed further light on the problem of masking and how it differs from the problem involving finks. Bird points out that it is possible to ingest fatal poison and yet survive if one has also taken the antidote to the poison. He goes on to say that,

> One way an antidote might work is to change the body's physiology in such a way that the poison does not have the effect it would normally have. The poison is left unchanged, and *a fortiori* the causal basis of the poison's disposition to kill is left unchanged. Therefore, this is not a case of a finkish disposition. Rather, the environmental conditions are not appropriate for the poison to have the effect it would normally have. In such a case, the antidote to the poison is an 'antidote' in the philosophical sense, viz. something that interferes with the conditions that are normally appropriate to the functioning of the disposition (2004, p. 261).

The point of this example is that when an object is disposed to do something under certain conditions, that object might not manifest the disposition when those conditions obtain because of the presence of an antidote (i.e., mask). The antidote interferes with the conditions that, in conjunction with the disposition's causal basis (e.g., the cup's physical structure, the poison's chemical properties), would normally bring about the manifestation of the disposition. In other words, the masking of a disposition involves an interference with, or blocking of, the process of manifestation such that, although the conditions of manifestation obtain (e.g., the cup is struck, the poison is ingested), the object does not manifest the disposition that it in fact has. These sorts of scenarios are different from cases of finkish

dispositions in that finks alter the disposition's causal basis and so *eradicate the disposition*, rather than *interfering with its manifestation*.

As Michael Fara points out, masking is a rather common phenomenon. He writes,

> Dispositions 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… The masking of a disposition is such a humdrum occurrence that any adequate account of disposition ascriptions must accommodate it (2005, p. 50).

So, if we are to have a satisfactory subjunctive conditional analysis of dispositions, that analysis must be able to withstand problems associated with finks and masks. Consequently, it seems that we need a more sophisticated subjunctive conditional analysis of dispositions that ensures that disposition ascriptions entail their corresponding subjunctive conditionals (and vice versa) only in the absences of masks and finks.

2 More sophisticated subjunctive accounts of dispositions

At this point, one suggestion might be that we ought to view the conditions of manifestation of a disposition more fine-grainedly. That is, we might say that the cup is disposed to break *when struck under certain conditions C**—where C* might involve, for example, the glass's being struck with such and such a force and at such and such an angle.[2] Also included in C* would be conditions like: the glass has not been tempered; the glass is not coated by a layer of steel; the glass is not being protected by a watchful sorcerer; etc. The important thing to stress is that finks and masks (including protection by packing materials) would count as conditions that are excluded by C*.

This analysis seems to evade the problems associated with finks and masks because, in cases where a fink or mask is present, the (more fine-grained) conditions of manifestation would not obtain. The glass might be struck, but because it is filled with packing materials, we have not satisfied the conditions C* under which the glass will manifest its fragility. As a result, cases of masks and finks would not constitute counterexamples to the present, more sophisticated analysis.

One fairly obvious problem with such an account is that it is extremely difficult to specify C*. Since the conditions under which a cup might not break when struck are so varied, an exhaustive specification of C* seems impossible. Consider another example. The strings on my guitar are disposed to ring when plucked. This disposition will not be manifested when the strings are plucked if: (a) I mute the strings with my palm; (b) the atmospheric pressure in the room is sufficiently low; (c) the strings are prevented from ringing by a guitar-hating demon; (d) the guitar is submerged in maple syrup; etc.

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[2] This sort of line can be found in, for example, Prior (1985a, b), Mellor (2000).

The problem is that the only thing that these conditions have in common is that they *are* cases of finks or masks that prevent the strings from ringing when plucked. In trying to embed this into an analysis of "guitar strings are disposed to ring when plucked," it would seem illicit to say that the strings are disposed to ring when plucked in certain conditions, where those conditions *simply are* all of those conditions in which masks and finks are not present. Such an analysis of "disposed to ring when plucked" would be trivialized thus:

> Guitar strings are disposed to ring when plucked if and only if if the strings are plucked in conditions in which the strings will ring when plucked, then the strings will ring.

So this attempt at explicating "certain conditions C*" apparently fails miserably.

A close alternative to the above strategy of modifying the Simple Subjunctive Conditional Analysis in such a way that it avoids the problem of finks and masks is to appeal to *ideal conditions*. According to Mumford (1998), we can analyze dispositions as follows.

> An object is disposed to Φ when conditions C obtain if and only if, if the object were in *ideal conditions* and if C obtains, then the object would Φ.

Putting this in terms of the present example,

> Guitar strings are disposed to ring when plucked if and only if, if the strings were in *ideal conditions* and if they were plucked, then the strings would ring.

Lamentably, Mumford's account might not appear to be any better than the account just considered. The "ideal conditions" referenced in Mumford's account are just those conditions in which the object would manifest the disposition should the conditions of manifestation obtain. Fara makes this very point when he says,

> If a sugar-cube were submerged in water in some conditions R, and yet failed to dissolve, then those conditions R can't have been ideal with respect to the sugar-cube's disposition to dissolve when put in water… (2005, p. 52).

The problem is that if we understand "ideal conditions" in the ordinary way, then Mumford's analysis ends up being reduced to the following:

> An object is disposed to Φ when conditions C obtain if and only if, if the object were in *ideal conditions* (i.e., conditions in which the object would Φ were it the case that conditions C obtain) and if conditions C obtain, then the object would Φ.

To make the point more acute, consider:

> The glass is disposed to break when struck if and only if the glass will break when struck in conditions in which it will break when struck.

Again, it appears that we have an analysis of dispositions that handles cases of finks and masks, but it does so at the expense of being trivially true.

Interestingly, any analysis that is trivially true in the above way appears to be straightforwardly susceptible to counterexample. This is because, on such an

analysis, an object that intuitively does not have a particular disposition would satisfy the corresponding qualified subjunctive conditional. A granite block would typically not be deemed to be fragile, but would nevertheless shatter when struck under conditions in which it would shatter when struck. A bar of soap would typically not be seen as disposed to ring when plucked, but it would ring when plucked under conditions in which it would ring when plucked. Further, it seems that *every* physical object is fragile at a low enough temperature, and that *every* substance is soluble at a high enough temperature. So the problem is not just that such analyses are trivial and force us to ascribe dispositions to things that obviously lack those dispositions; the problem is also that we seem to be forced to ascribe *every disposition* to every object!

At this point, it is worth making explicit three different issues that arise in giving an adequate subjunctive analysis of dispositions. First, there appears to be a serious difficulty in providing an analysis that is not susceptible to counterexamples involving finks or masks and that, at the same time, is not trivial. Second, if a proposed analysis is trivial in the above way, then that analysis will fail because it forces us to ascribe dispositions to things that lack those dispositions. Third, in attempting to spell out conditions that exclude cases of finks and masks (what might be called "qualifying conditions"), it seems that one must be able to adequately specify what those conditions would be.

Such problems have led some philosophers to abandon the attempt to analyze dispositions in terms of subjunctive conditionals. But many of attempts to analyze dispositions without appeal to subjunctive conditionals are, frankly, rather bizarre. One such attempt is to analyze dispositions in terms of a special kind of conditional—conditionals for which *modus ponens* is not valid. Such conditionals have been called "fainthearted conditionals."[3] Fara (2005), Martin (1994), and others have argued rather convincingly against such a maneuver.

I think it is hasty to abandon the attempt to analyze dispositions in terms of subjunctive conditionals simply on the basis of the problems raised above. Indeed, I think these problems can be overcome. Perhaps it is a good idea to stick to our first inclination and see if there is a way to breathe life back into the qualified subjunctive conditional analyses.[4]

3 Responding to the objections

Although there may be some differences between the qualified subjunctive conditional analyses discussed above (i.e., put in terms of conditions C* and ideal conditions), I think they basically amount to the same thing. They represent attempts to modify the Simple Subjunctive Conditional Analysis via a qualifying clause in order to handle cases of finks and masks. It is worth noting that we could

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[3] See Maurreau (1997).

[4] Lewis (1997) offers another sophisticated account of dispositions that has received some attention in the literature. For the sake of brevity, I will not consider it here. See Kvanvig (1999), Fara (2005) for objections to Lewis's account.

replace these qualifying clauses with other clauses like: *normal conditions*, *suitable conditions*, *ceteris paribus*, etc. Presumably these clauses would do the same sort of work—namely, they might be appended to the simple subjunctive analysis in the hopes of having an account that is immune to cases of finks and masks.

Perhaps it is worth trying to unpack the operative notions of "ideal conditions," "in certain conditions C*," "suitable conditions," etc. One suggestion might be that such clauses ought to be fleshed out in terms of implicit "if" clauses. So, for example, we might say that the glass will break when struck in ideal conditions— where this implicitly involves the following sorts of conditions: *if* it is not packed with protective material, *if* a sorcerer is not protecting it, *if* it is not tempered, *if* it is not coated in steel, etc. The same could be said of the other qualifying clauses.

Here is how we would unpack, for example, Mumford's analysis.

An object is disposed to Φ when conditions C obtain if and only if, if the object were in <u>ideal conditions</u> (e.g., in the case of a glass's fragility, if it is struck with such and such force, if it is not packed with protective material, if a sorcerer is not protecting it, if it is not tempered, if it is not coated in steel, etc.) and if the conditions C obtain, then the object would Φ.

In what follows, I will investigate how such a response can handle the objections raised above. I will argue that qualified subjunctive analyses do not succumb to these problems and that such analyses are on much better footing than initially thought.

3.1 Response to problem one

To the triviality objection, one might initially respond that when we understand a clause like "ideal conditions" in terms of implicit "if" clauses, then qualified subjunctive accounts are not trivial. That is, for example, Mumford's account would have it that:

The glass is disposed to break when struck if and only if if the glass were in ideal conditions (e.g., if it is struck with such and such force, if it is not packed with protective material, if a sorcerer is not protecting it, if it is not tempered, if it is not coated in steel, etc.) and if the glass were struck, then the glass would break.

Here we see no illicit clause like we saw in our preliminary discussion of such analyses (e.g., nothing like "the glass will break when struck in conditions in which it will break when struck").

One might wonder exactly what the charge of triviality really amounts to. The charge appears to have something to do with *circularity*. But it is not as if the *analysandum* is part of the *analysans*. But, for example, there is no mention of the word "disposition" in the *analysans*. So the triviality charge must not be a charge of providing a circular definition. Instead, it might be charged that such trivial analyses are *uninformative*. They do not elucidate the concept being analyzed. This is something minimally required of an analysis of dispositions; and so we rightfully should reject any analysis that is trivial in this sense. As I will go on to argue,

however, I do not think that qualified analyses should be rejected on the grounds that they are trivially uninformative.

It is worth pointing out that many scientific and ordinary ascriptions of dispositions or other sorts of generalizations (a disposition, as many have noted, is plausibly a modal generalization) are "ceteris paribus" or "standard conditions" or "ideal conditions" defeasible. The beach will, *ceteris paribus*, be packed on weekends during the summer—that is, *if* there is not a freak snowstorm; *if* we are not being invaded by aliens; *if* there have not been man-hungry sharks present in the water; etc. Using an example first offered by Fodor (1987), Schwitzgebel considers the following case, "Rivers erode their outside bank at a bend *if* the river is not frozen, *if* the bank is made of an erodible material, *if* there isn't a powerful fan in place preventing the river from touching the outside bank, etc." (2002, p. 254).[5] Analyzing the generalization that "rivers erode their outside bank at a bend" in terms of normal conditions or *ceteris paribus* conditions (where this is taken to involve implicit "if" clauses as above), does not make that generalization trivial/uninformative; nor does it hinder the generalization's productive use.[6] So if the objection involving triviality comes down to the presumed uninformative nature of such analyses, I would urge that analyses that involve qualifications understood as involving implicit "if" clauses evade such an objection.

At this point, it might be worth pushing this line a bit further. Many philosophers of science have noted that certain putative "laws" in the special sciences (and even many "laws" of nature) are not strictly true unless qualified by a proviso or clause like "ceteris paribus" or "ideal conditions." Consider the following sort of "law":

> When demand for a product increases while supply remains constant, the price of that product will increase.

> Earman and Roberts put the problem with such a generalization as follows.

Stated thus baldly, the generalization is too strong, for there are numerous possible situations in which it would fail to obtain, such as cases of mass irrational behavior, widespread ignorance of the demand on the part of vendors, natural disasters that interfere with the normal working of the market, etc. It seems that the most we can say is that when demand increases while supply remains constant, price will increase, unless something interferes, i.e., "so long as other things are equal." But in this case, there seems to be little hope of finitely characterizing the class of events that would count as an interference. So it seems that our "law" is stuck with an irredeemably vague clause, something that one might have thought has no place in the statement of a law of nature (1999, 439).

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[5] Fodor (1991) offers other examples of *ceteris paribus* or "hedged" laws—"The moon looks larger on the horizon than it does overhead" and "English speakers can hear 'They are flying planes' as ambiguous." He says that an obvious feature of such laws is that they are subject to exception. Somewhere there is a person for whom the moon illusion does not work, and there are some people that may not detect the ambiguity in the sentence.

[6] In a similar vein, Cartwright (1983) and Pietroski and Rey (1995) have defended the view that such *ceteris paribus* (or "normal conditions") clauses do not make for useless and vacuous analyses. It is also worth noting that Fodor (1983, 1987, 1991) has argued that *ceteris paribus* conditions are *necessary* if we are to make sense of psychological laws and laws in cognitive science. Lange (2002) too offers arguments along these lines.

So the baldly stated "law" above is no law after all. What one apparently needs to do is simply qualify the generalization with a *ceteris paribus* clause to get a generalization that is true and holds without exception. But the supposed problem with *ceteris paribus* clauses is that they are vague and ultimately cannot be specified—as a result, they seemingly render any "law" of which they are a part uninformative and useless.

There are a number of routes one can take in responding to the above charge. The two most common have been the following. First, one could try (rather ambitiously) to provide truth conditions for *ceteris paribus* laws. And second, one could decline to provide truth conditions for *ceteris paribus* laws, and yet argue that such laws are neither vacuous nor uninformative. I am inclined to take the second option.

The following generalizations seem to be quite handy and rather informative truths of geology, economics, sociology and psychology.

(a)   Rivers erode their outside bank at a bend, *ceteris paribus*.
(b)   When demand for a product increases while supply remains constant, the price of that product will increase, *ceteris paribus*.
(c)   The beach will, *ceteris paribus*, be packed on weekends during the summer.
(d)   If a person desires x and believes that Φ-ing is the best way to get x, then the person will Φ, *ceteris paribus*.

Such generalizations are informative in that once a person becomes apprised of their truth, then he or she is able to predict with a fair degree of accuracy where a river will erode, whether the price of certain products will increase, when the beach will be crowded, and whether a person is likely to behave in a certain way. Such generalizations appear to be informative in the sense that one is able to make *good inferences* in regard to what will happen in the future. And this is seemingly what we want from our laws (or law-like generalizations) in soft-sciences like geology, economics, sociology, and psychology. As Fodor (see especially his 1990) and others have noted, what we need from our generalizations is that they have *predictive force*. And it seems that the above generalizations have just that.

Interestingly, Fodor (1990, Chapter 5 of 1991) has argued that if we did not have such "laws" as (d) above, we would not *have a science of psychology*.[7] In order to continue to develop a science of psychology, we need generalizations that help explain and predict human behavior. As Fodor argues, such generalizations cannot be adequately formulated without *ceteris paribus* clauses. There is always the possibility of some defeater to whatever psychological law that we take to be true; and so, he argues, we should not be reluctant to append a *ceteris paribus* clause in order to account for such defeaters, and to obtain a generalization that is true—that is, a generalization that does not have exceptions and one that can be used to predict and explain behavior.

In a similar vein, Hausman (1981, 1988) has argued that economists make generalizations that *require ceteris paribus* clauses. When the government imposes price controls, shortages arise. People want more wealth. People buy more of a product when the price decreases. Peoples' purchasing preferences are transitive.

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[7]   Wallis (1994) makes a similar point.

These generalizations hold only *ceteris paribus*. But without such *ceteris paribus* generalizations, so Hausman argues, economists would not be able to do the things that they do; like predict prices, predict how the public's buying habits will change in the future, or set fiscal policy. Hausman admits that the *ceteris paribus* generalizations are "inexact or imprecise," but he argues that the *ceteris paribus* clause is *ineliminable* (1988, p. 309). We need such clauses if we are to have the sorts of laws (or law-like generalizations) required in soft-sciences like economics. So Fodor and Hausman argue that, not only are *ceteris paribus* generalizations informative (in the sense that they help us to make reliable predictions), but also that such generalizations are necessary for the soft-sciences to be soft-*sciences*.

These arguments lend themselves very nicely to supporting the claim that not only are qualified subjunctive conditional analyses of dispositions informative, but that such analyses must be qualified (with a clause like "ceteris paribus" or "ideal conditions") if they are to be reliable and exceptionless generalizations with predictive force.

3.2 Response to problem two

Can a qualified subjunctive analysis handle the second sort of problem encountered in giving a subjunctive analysis of dispositions? As discussed above, a serious problem with analyses that are trivial is that they are forced to deem that a thing has a disposition when it clearly is not so disposed. On such an analysis, a stone is fragile (or, more precisely, is disposed to break when struck) simply because it is disposed to break when struck in conditions in which it will break when struck. One might argue that even if qualified analyses are not uninformative (because they have predictive force), they still face this second problem. This might be because if a stone is in ideal conditions and if it were struck, then it would break—and so it seems one is forced to say of stones that they are fragile if an account like Mumford's is right.

In response to such a worry, one could argue that the truth of a disposition ascription is determined, in part, by context. With this in mind, consider the following context-sensitive ascription: (i) That table is flat. As many have noted, whether (i) is true depends not only upon the way in which the molecules making up the table are situated, but also upon certain context-sensitive factors.[8] That is, whether (i) is true depends, in part, upon what the purposes of the ascriber are— what sorts of things are salient to the ascription in a given context. If I were looking for a place to set my book upon, the table might be flat enough such that the book will not tumble off onto the floor. However, if I were trying to do a physics experiment involving rolling marbles to study inertia, the table might not be flat enough for that purpose. So, a single table can be truly called flat relative to certain contexts and *not* truly be called flat relative to other contexts.

Disposition ascriptions also seem to be context-sensitive. Consider a disposition like durability. If I were making a castle, I would want it to be made out of a durable material like limestone because limestone could withstand cannon fire (to some

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[8] See Dretske (1981) for a discussion of examples of context-sensitivity.

degree or other). Limestone would also be able to withstand years of weathering and other common environmental conditions—other sorts of stones are not so disposed. It seems, then, that we can accurately ascribe the dispositional property of durability to limestone. However, suppose I wanted to house radioactive nuclear waste. I would not choose limestone to encase the waste because limestone is not durable enough for the purposes of ensuring that the waste does not leak. In addition, limestone would only weather so well, and common environmental conditions would be such that limestone could not stand normal stresses over the required years (nuclear waste has something around a 5,000 year half-life). It seems, then, that we can accurately say (in a context where nuclear waste is a salient factor) that limestone lacks the dispositional property of durability. Again, the point is that the truth of disposition ascriptions like, "Limestone is durable" are context-sensitive.

The same could be said of other sorts of disposition ascriptions. Whether we want to say of someone that he is humorous depends upon the context of ascription. If we are looking for a comedian to host an awards ceremony, Travis might not be funny (enough), but if we are at a convention for accountants or insurance salesmen, Travis might be the most humorous person around. To be clear, the truth-value of "Travis is humorous" is dependent, in part, upon the context of ascription. With these sorts of examples in mind, it should be clear that whether an object possesses a particular disposition depends, in part, upon the context of ascription.[9]

What does this have to do with the objection that qualified subjunctive accounts are forced to deem that a thing has a disposition when it clearly is not so disposed? As already noted, when we say of a particular object that it is fragile, whether what we have said is true or false depends (in part) upon the context. It could be that although most contexts are such that, for example, we do not want to say that a stone is fragile, there may be some contexts in which it is true to say that a stone is fragile. What this suggests is that the problem just raised dissolves in the end. Qualified subjunctive accounts are not "forced" to deem that a thing has a disposition when it clearly is not so disposed. Again, the stone is only truly said to be "disposed to break when struck" relative to certain contexts. And it is not so disposed relative to others—indeed, most contexts! If we were considering what sorts of things need careful packing when we are moving, then the stone would not be an item that would need to be carefully wrapped up.

3.3 Response to problem three

It is not immediately evident how one might defend qualified subjunctive conditional accounts against the objection involving the impossibility of specifying what qualifying conditions like "ideal conditions" are (or what the tacit "if" clauses would be). In light of the above discussion, it seems that we have an even more difficult task in specifying qualifying conditions because of the fact that dispositions

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[9] Fara (2005) offers some reasons for thinking that a context sensitive semantics for disposition ascriptions will not do. I think his arguments fail. It is worth nothing that disposition ascriptions seem to satisfy a number of the "hallmarks" of context sensitivity mentioned in Dretsky (1981). In addition, other authors have argued for the *need* to treat dispositions ascriptions as being context sensitive (see, for example, Manley and Wasserman (2007).

ascriptions are context-sensitive. That is, if the truth of a disposition ascription is determined in part by context of ascription, then an account of such qualifying conditions needs to be provided in such a way that acknowledges that these conditions vary depending upon context. It is not as if one could give conditions for being an "ideal condition" *simpliciter*. Rather, a condition is ideal only relative to a particular context. So when one asks, "What is an ideal condition anyway?" the correct response must start with something like the following query: "An ideal condition relative to what context?"

This caveat aside, we might try to fill out a more robust response to the problem at hand. One response that might be made is that the unspecifiability of such qualifying conditions is not really that serious of a problem. Analogous problems of specification arise when trying to give an account of, for example, what it is to be a chair or to be a bachelor. We might begin a list of common characteristics of chairs—characteristics that might serve as criteria for being a chair. Chairs are frequently *made for sitting upon*, so they *have a flat surface*. Typically, the flat surface *has legs or some sort of supporting structure*. But surely we could go on like this and not have an *exhaustive* list of all the criteria for chairhood. In fact, we have good reason to doubt that such a list is even possible.

In a similar vein, one might point out that a bachelor is an unmarried male. But this is not all there is to being a bachelor—these are not the necessary and sufficient conditions for bachelorhood. Perhaps we would want to add that a thing must be a person to be a bachelor. In addition, the person must be above a certain age, not a member of the clergy, etc. But it seems clear that we cannot finish the list.

The problem of spelling out *all* the conditions for being a chair or being a bachelor is rather well recognized. Even non-philosophers have noted the problem.

> …think of arm chairs and reading chairs and dining-room chairs, and kitchen chairs, chairs that pass into benches, chairs that cross the boundary and become settees, dentist's chairs, thrones, opera stalls, seats of all sorts, those miraculous fungoid growths that cumber the floor of the arts and crafts exhibitions, and you will perceive what a lax bundle in fact is the simple straightforward term. In co-operation with an intelligent joiner I would undertake to defeat any definition of chair or chairishness that you gave me! (Wells 1908, p. 16)

In a similar vein, Pinker (1997, p. 13) provides the following illustrative examples of cases to demonstrate the problem of defining 'bachelor.'

> Arthur has been living happily with Alice for the last five years. They have a two-year old daughter and have never officially married.
> Bruce was going to be drafted, so he arranged with his friend Barbara to have a justice of the peace marry them so he would be exempt. They have never lived together. He dates a number of women, and plans to have the marriage annulled as soon as he finds someone he wants to marry.
> Charlie is 17 years old. He lives at home with his parents and is in high school.
> David is 17 years old. He left home at 13, started a small business, and is now a successful young entrepreneur leading a playboy's life style in his penthouse apartment.

Eli and Edgar are homosexual lovers who have been living together for many years.

Faisal is allowed by the law of his native Abu Dhabi to have three wives. He currently has two and is interested in meeting another potential fiancée.

Father Gregory is the bishop of the Catholic cathedral at Groton upon Thames.

This problem has led some philosophers to argue that instead of trying to specify necessary and sufficient conditions for, say, being a chair or being a bachelor, we ought to offer a different sort of analysis. Wittgenstein is famous (perhaps infamous) for pointing out that concepts like "game" are not easily cashed out in terms of necessary and sufficient conditions. Instead, he argues, we should think of them as involving "family resemblances." He writes,

> Consider… the proceedings that we call 'games'. I mean board games, card games, ball games, Olympic games, and so on. What is common to them all? – Don't say: "there must be something common, or they would not be called 'games'" – but look and see whether there is anything common to all. – For if you look at them you will not see something that is common to all, but similarities, relationships, and a whole series of them at that… [T]he result of this examination is: we see a complicated network of similarities overlapping and criss-crossing: sometimes overall similarities, sometimes similarities of detail. I can think of no better expression to characterize these similarities than 'family resemblances': for the various resemblances between members of a family: build, features, colour of eyes, gait, temperament, etc. etc. overlap and criss-cross in the same way – And I shall say: 'games' form a family… [I]n spinning a thread we twist fibre on fibre. And the strength of the thread does not reside in the fact that some one fibre runs through its whole length, but in the overlapping of many fibres. (1953, §§ 66–68).

The idea behind Wittgenstein's remarks is that many of our common concepts, which all of us understand rather well, simply *don't have* necessary and sufficient conditions for their application. As Wittgenstein argues, we understand them by knowing about certain central cases (what might be called "paradigms"), and about how peripheral cases are related to these central cases.

The point is that it might be illegitimate to require a list of necessary and sufficient conditions for being a chair or for being a bachelor and that it is similarly illegitimate to require an exhaustive list of the qualifying conditions for dispositional analyses. The "accounts" of chairs and bachelors suggested above seem adequate in the sense that if we were to explain to someone ignorant of chairs and bachelors what a chair or a bachelor was in the above way, she would have an adequate idea of what would count as a chair or a bachelor; and, for that matter, just as adequate an idea as the rest of us. Such an individual would be able to distinguish chairs from couches, divans, sofas, stools, and record players. She would be able to give reasons why a particular object was or was not a chair, and recognize problematic cases. In most situations, she would be able to identify a bachelor from a non-bachelor, and be able to invite the appropriate males to a singles party. So, the lack of an exhaustive list of conditions does not mean that the conditions that we do

specify are not informative, nor does it mean that these conditions do not capture (at least in great measure) what it is that is being analyzed.

So what should we make of the "unspecifiability" objection? One could urge that it is not essential to provide necessary and sufficient conditions in offering a qualified subjunctive conditional account of dispositions. After all, one need not exhaustively spell out *all* of the conditions required for 'chairhood' in order to have an adequate (i.e., useful, informative) account of what chairs are. And so it is with *ceteris paribus* conditions or other qualifying conditions to which we might appeal. All that is required of an account of qualifying conditions is that we provide a general idea of what might count as such a condition. So, for example, when asked what the ideal conditions are for a glass to break when dropped, we might start the list by pointing out that the glass ought: not be packed with protective material; not be looked after by a watchful wizard; not be dropped in zero gravity; etc. One could seemingly keep going *ad infinitum*. It is not possible for a finite being to exhaustively spell out the list.[10] However, one can provide a general idea of the sorts of conditions that would count as qualifying conditions. Additionally, it would be rather easy for someone to identify whether some condition C should be counted as a member of the set of qualifying conditions. For example, it is quite obvious that "being protected by a layer of lead" would also not count as an ideal condition for a glass to break upon being dropped. It is also worth noting that a person who understood the generalization "glasses are disposed to break when dropped *ceteris paribus*" would be able to identify conditions that must be satisfied (that the glass is not shielded by protective material) and be able to identify conditions that are irrelevant (that the glass is 37 miles from the nearest apple orchard).

To sum up, I think that qualified subjunctive accounts of dispositions do not suffer from the three problems that have been raised against subjunctive accounts of dispositions. In the end, it appears that these more sophisticated subjunctive accounts of dispositions are not as objectionable as they have been made out to be. Below, I will present what I take to be an adequate qualified subjunctive analysis of dispositions, but first let us entertain one more consideration in regard to the acceptability of *ceteris paribus* laws (or other sorts of qualified laws).

4 Yet another objection

Earman et al. (2002) argue that there are no legitimate laws with *ineliminable ceteris paribus* (or "ideal condition") clauses. If they are right, then the attempt here to provide an account of dispositions involving an ineliminable *ceteris paribus* clause (or other sort of qualifying condition) might be suspected. Of course, this will hinge on a decision regarding what is to be deemed a bona fide law, and whether something short of a "strict" law, (i.e., law-like generalization, quasi-law, hedged law, etc.) will satisfy conditions necessary for dispositional explanations to be testable, non-trivial, informative, and useful. These authors write,

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[10] Although it might be possible for an infinite being to exhaustively spell out the list—that is, it might be possible *in principle*.

(The)… problem with CP laws, their untestability, is decisive in our view. In order for a hypothesis to be testable, it must lead us to some prediction. The prediction may be statistical in character, and in general it will depend on a set of auxiliary hypotheses. Even when these important qualifications have been added, CP law statements still fail to make any testable predictions. Consider the putative law that CP, all Fs are Gs. The information that x is an F, together with any auxiliary hypotheses you like, *fails to entail* that x is a G, or even to entail that with probability p, x is a G. For, even given this information, other things could fail to be equal, and we are not even given a way of estimating the probability that they so fail. Two qualifications have to be made. First, our claim is true only if the auxiliary hypotheses don't entail the prediction all by themselves, in which case the CP law is inessential to the prediction and doesn't get tested by a check of that prediction. Second, our claim is true only if none of the auxiliary hypotheses is the hypothesis that "other things are equal", or "there are no interferences". What if the auxiliaries do include the claim that other things are equal? Then either this auxiliary can be stated in a form that allows us to check whether it is true, or it can't. If it can, then the original CP law can be turned into a strict law by substituting the testable auxiliary for the CP clause. If it can't, then the prediction relies on an auxiliary hypothesis that cannot be tested itself. But it is generally, and rightly, presumed that auxiliary hypotheses must be testable in principle if they are to be used in an honest test. Hence, we can't rely on a putative CP law to make any predictions about what will be observed, or about the probability that something will be observed. If we can't do that, then it seems that we can't subject the putative CP law to any kind of empirical test (2002, p. 283).

This argument in regard to the unacceptability of CP laws can be put simply as follows:

(1)   All laws must be testable.
(2)   For a law to be testable, it must give rise to some prediction.
(3)   CP laws fail to allow for any prediction.
(4)   Therefore, CP laws are not testable.
(5)   Therefore, CP laws are not laws.

Obviously, the crux of this argument lies in (3). Support for (3) appears to be as follows:

(a)   For any CP law of the form all Fs are Gs, information that an x is an F combined with other hypotheses (i.e., *ceteris paribus* conditions) *will not entail* that x is a G.
(b)   This is because other things may fail to be equal, and there is no way of estimating how these may fail to be equal.

Consider the hypothesis that children exposed to traumatic events will develop symptoms of posttraumatic stress disorder, *ceteris paribus*. Obviously, the *ceteris paribus* clause is needed because it is not likely that there is an absolute one-to-one correlation between exposure to trauma and developing symptoms. One could

imagine a study of school children exposed to Hurricane Katrina where 90% are found to have symptoms of posttraumatic stress disorder—a finding that would tend to support the hypothesis. As a next step in order to explain the variance in outcomes among those exposed to trauma, investigators would typically search for factors (factors to be included among those comprising the *ceteris paribus* conditions) among the 10% that did not develop symptoms. Such a search would likely lead to the identification of a cluster of characteristics shared by those who did not develop symptoms, while not present among those who did. These factors might include: being especially resilient; having a caring and supportive family; being genetically protected from anxiety; having received medication or psycho-therapy soon after exposure; having an effective coping repertoire; etc. As research proceeds, the delineation of such modifying conditions would increase the specificity and predictive power of the original hypothesis by progressively refining it in regard to those conditions to be subsumed within the *ceteris paribus* clause.

In this example, it is far from obvious that (3) is true—that is, that the original CP law fails to allow for any testable prediction. And this is in spite of the fact that the hypothesis does not *entail* that *all* children exposed to Hurricane Katrina will develop symptoms of posttraumatic stress disorder ("all Fs are Gs"). Such an entailment requirement simply does not fit the way hypotheses in psychology are formulated, tested and established. Further, as the example indicates, there is an empirical method of investigating a variety of ways in which "other things may fail to be equal," (that is, of progressive experimentation to identify factors that explain outcome variance). Such an enterprise then contributes to the further delineation of *ceteris paribus* conditions, and ultimately increases our knowledge of the relationship between exposure to trauma and the development of symptoms.

So, on the one hand, these authors claim, I think plausibly, that if the *ceteris paribus* clause is stateable, then obviously we could eliminate the clause, and state the generalization unqualifiedly.[11] But they have not established that if the *ceteris paribus* clause is ineliminable, it leaves the *ceteris paribus* generalization untestable, and as a result, unacceptable.

To put the problem they seem to be raising in yet another way, one might wonder how one is to tell a legitimate (or correct) *ceteris paribus* generalization from an illegitimate (or incorrect) one. To borrow some examples from Hausman (1988, p. 309), it seems that it is not the case that, *ceteris paribus*, humans are all immortal; nor is it the case that, *ceteris paribus*, dogs have six legs. The issue is to determine what (if anything) makes such *ceteris paribus* generalizations illegitimate, and what (if anything) makes other *ceteris paribus* generalizations legitimate.

Hausman (1981, 1988) considers the conditions under which one would have reason to believe that a certain *ceteris paribus* generalization is a "true law." He argues that before one can be justified in regarding such a generalization a true law, the following conditions must be met:

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[11] As I have already suggested, it seems that the attempt to fully spell out a *ceteris paribus* clause—or stating the necessary and sufficient conditions for a *ceteris paribus* clause—is, for mere mortals at least, hopelessly ambitious.

(1) The generalization must be *law-like*, and not accidental.
(2) The generalization must be *reliable*. Without it's *ceteris paribus* clause or with only specific qualifications in its place, the generalization must (within an appropriately specified domain) usually have correct implications.
(3) The generalization must be *refineable*. Adding additional specific qualifications (in an ad hoc way), the reliability of the generalization in the given domain must increase.
(4) The generalization must be *excusable*. When it has a false implication, one should (with only rare exceptions that call for further research) be able to explain why (1988, pp. 310–311).

Hausman points out that these conditions are meant to be merely necessary (and not sufficient) for being justified in believing that a *ceteris paribus* generalization represents a true law. He says,

> The basic rationale behind them is that if any is not satisfied, then one's conviction is undermined that the ceteris paribus clause really is a place holder for some predicate that would make the qualified generalization into an exact law (1988, p. 311).

Hausman maintains that the above conditions help in explaining our intuitions about illegitimate *ceteris paribus* generalizations like "ceteris paribus, if demand for a product goes up, then the price will go down" (see also Kincaid 1990, who makes a similar point).

One might, of course, insist that Housman's acceptability conditions need clarification and elaboration.[12] The reliability criterion in particular needs to be expanded to accommodate cases where the antecedent of an ostensibly reliable generalization (minus the *ceteris parabus* clause) is never actually satisfied. For example, all samples of an extremely flammable substance might be kept in highly protected environments to prevent ignition. In such a circumstance, although the reliability of the relevant conditional is not established through observation, (indeed, it would appear that being extremely flammable makes something *less* likely to burn), good reasons can be provided to support its trustworthiness based on related conditionals whose reliability has been observed. It might also be suggested that additional criteria related to parsimony, fruitfulness in predicting regularities and discovering new facts, accuracy and precision of explanatory power, and coherence with a broader theory which it supports and is implied by, represent a number of other plausible candidates for the acceptability of *ceteris parabus* conditionals. This discussion, however, goes beyond the present paper. My point is just that something like the above conditions provide a framework for deciding whether such-and-such a *ceteris paribus* law is legitimate.

It is worth noting that Fodor (1990) is also well aware that *ceteris paribus* clauses are seemingly not stateable. Yet he argues that this does not render them poisonously vacuous because they are untestable. He points out that *ceteris paribus* generalizations can be satisfied without being enumerated. Fodor writes,

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[12] Thanks are due to an anonymous reviewer for stressing this point and for offering the example involving flammable substances below.

…determining that ceteris paribus stuff in the air causes maggots did not require that Pasteur be able to *enumerate* the ceteris paribus conditions, only that he be able to recognize some cases in which they were in fact satisfied. *Sufficient* conditions for the satisfaction of ceteris paribus clauses may be determinate and epistemically accessible even when *necessary and sufficient* conditions for their satisfaction aren't. …hedged laws whose ceteris paribus conditions cannot be enumerated may nevertheless be satisfied in particular cases (1990, p. 153).

In the end, Earman, Roberts and Smith's objection is seriously misguided. As I have argued, *ceteris paribus* generalizations are non-circular; they are informative in the sense that they enable us to make predictions about the future; and they permit investigation and identification of the sorts of conditions to be subsumed under the *ceteris paribus* clause. If, as Fodor and Hausman have argued, what we are looking for in our generalizations in the soft-sciences are simply generalizations with predictive force—generalizations that deliver accurate predictions with high-regularity—then it seems that *ceteris paribus* (or otherwise "hedged") generalizations do just that.

5 A satisfactory account

Given the above discussion I think it should be clear that qualified subjunctive accounts of dispositions are not as problematic as some have made them out to be. The task, then, is to settle upon a qualifying clause to append to the Simple Subjunctive Conditional Account. It might appear inconsequential which phrase one opts for, since they all presumably come to the same sort of account. However, I would recommend qualifying the subjunctive account with "ceteris paribus" simply because it has been a common qualifier employed in characterizing physical laws and regularities in other areas of philosophy and in the sciences. So, here is the analysis that I think holds the most promise for characterizing dispositions in terms of subjunctive conditionals.

An object is disposed to Φ when conditions C obtain if and only if, if conditions C were to obtain, then the object would Φ *ceteris paribus*.

As I hope is clear from the arguments made above, this analysis does not fall prey to the problems typically raised against subjunctive analyses of dispositions.

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