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The Conditional Analysis of Dispositions and the Intrinsic Dispositions Thesis

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The idea that dispositions are an intrinsic matter has been popular among contemporary philosophers of dispositions. In this paper I will first state this idea as exactly as possible. I will then examine whether it poses any threat to the two current versions of the conditional analysis of dispositions, namely, the simple and reformed conditional analysis of dispositions. The upshot is that the intrinsic nature of dispositions, when properly understood, doesn't spell trouble for either of the two versions of the conditional analysis of dispositions. Along the way, I will propose an extensionally correct and practically useful criterion for identifying nomically intrinsic dispositions and criticize one objection raised by Lewis against the simple conditional analysis of dispositions.

1. The Intrinsic Dispositions Thesis

There is a strong inclination to think that such dispositions as fragility and water-solubility do not depend on the extrinsic circumstances of their bearers. For this reason, the thesis that dispositions are an intrinsic matter, in its one form or another, has been widely endorsed by contemporary philosophers of dispositions including Lewis (1997), Armstrong (1973), and Molnar (1999). For instance, according to Lewis (1997, pp. 138–139; p. 147), dispositions of an object supervene on its intrinsic properties except in so far as they depend on the laws of nature: "If two (actual or merely possible) objects are exact intrinsic duplicates (and if they are subject to the same laws of nature) then they are disposed alike." For later references let me call this thesis 'the Intrinsic Dispositions Thesis.'

It will be useful to state the Intrinsic Dispositions Thesis as exactly as possible. To begin with, let me define what it is for a disposition to be nomically intrinsic to an object.

(1) A disposition D is nomically intrinsic to an object x iff every (actual or merely possible) nomic duplicate of x has D,

where a nomic duplicate of x is a perfect duplicate of x that is subject to the same laws of nature as x. Since the "nomic duplication" relation is reflexive, it follows from (1) that D is nomically intrinsic to x only if x has D.

It is worth mentioning the difference between being intrinsic *simpliciter* and being *nomically* intrinsic to an object. Note that laws of nature affect what an object is disposed to do. Therefore, even if the disposition to do M is nomically intrinsic to x, namely, even if every nomic duplicate of x has the disposition to do M, it is possible that a perfect duplicate of x that is not subject to the same laws of nature as x is not disposed to do M. However, a property is intrinsic *simpliciter* to x only if every (actual or merely possible) perfect duplicate of x has it. This means that a disposition that is nomically intrinsic to x may not be intrinsic *simpliciter* to x. In general, while a property that is intrinsic *simpliciter* to x is nomically intrinsic to x as well, a property that is nomically intrinsic to x may not be intrinsic *simpliciter* to x.[1]

We can define the concept of a nomically intrinsic disposition by using (1) in the following way:

(2) A disposition D is a nomically intrinsic disposition iff, for every (actual or merely possible) object x, if x has D then D is nomically intrinsic to x.

As noted above, if D is nomically intrinsic to x then x has D. Then the right-hand side of the biconditional can be restated: for every object x, x has D iff D is nomically intrinsic to x. Hence a nomically intrinsic disposition is such that x has it if and only if every nomic duplicate of x has it.

Now we can get an exact statement of the Intrinsic Dispositions Thesis by using the concept of a nomically intrinsic disposition:

[1] It is remarkable that there are a significant number of philosophers like Sydney Shoemaker (1984), Alexander Bird (2005), and Stephen Mumford (2004) who hold that laws of nature are metaphysically necessary. On their view, all actual or merely possible worlds are governed by the same set of laws of nature. But, on the assumption that laws of nature are metaphysically necessary, all perfect duplicates of x are nomic duplicates of x; and therefore, a disposition D is nomically intrinsic to x iff D is intrinsic *simpliciter* to x. That is, assuming the metaphysical necessity of laws of nature, the concept of intrinsicality *simpliciter* is coextensive with the concept of nomic intrinsicality.

The Intrinsic Dispositions Thesis. Every disposition is a nomically intrinsic disposition.

This statement of the Intrinsic Dispositions Thesis is equivalent to Lewis's. It is clear that the following is deducible from (1) and (2):

(3) A disposition D is a nomically intrinsic disposition iff, for every pair x and y of nomic duplicates, x has D iff y has D.

Note that the Intrinsic Dispositions Thesis stated above is the universal generalization of the left-hand side of (3). Meanwhile, the universal generalization of the right-hand side of (3) is Lewis's statement of the Intrinsic Dispositions Thesis: for every pair x and y of objects, if x and y are perfect duplicates and subject to the same laws of nature, then they have all the dispositions in common. This means that the two statements of the Intrinsic Dispositions Thesis are logically equivalent. This suggests that my clarification is in accord with what Lewis has in mind by the Intrinsic Dispositions Thesis.

2. The Two Versions of the Conditional Analysis of Dispositions

There is general agreement among contemporary philosophers of dispositions that there is some connection between dispositions and counterfactual conditionals. But they do not agree on the exact relationship between dispositions and counterfactual conditionals. In this regard, the two representative versions of the conditional analysis of dispositions, i.e., the simple and reformed conditional analysis of dispositions have been hotly discussed over years. I believe that we can tighten our grip on the connection between dispositions and counterfactual conditionals by thoroughly exploring the theoretical potential of these two versions of the conditional analysis of dispositions.

According to the simple conditional analysis of dispositions, a dispositional ascription is analyzed into a counterfactual conditional (Prior, Pargetter, and Jackson, 1982). For example,

(4) Something x is fragile at time t iff, if x were struck at t then it would break.

As well known, however, Martin (1994) offers his electro-fink counterexamples against the simple conditional analysis of dispositions. A variant of one of them due to Lewis (1997, p. 138)—call it 'Martin's case'—goes as follows: a glass G_1 is struck but does not break because it is protected by a sorcerer who detects when G_1 is about to be struck and reacts by

instantaneously casting a spell that renders G_1 no longer fragile, and thereby aborts the process of breaking. In this case, the analysans of (4) is not satisfied. Therefore, G_1, which is clearly fragile, does not come out as such by (4). This means that the simple conditional analysis of dispositions does not provide a necessary condition for fragility.

In response to this, the proponents of the simple conditional analysis of dispositions might bite the bullet and insist that G_1 is not fragile. I think this move would bring into focus the conflict between the simple conditional analysis of dispositions and the Intrinsic Dispositions Thesis. Let us consider an unprotected glass G_2 that is a nomic duplicate of G_1. According to the Intrinsic Dispositions Thesis, fragility is a nomically intrinsic disposition. Therefore, the Intrinsic Dispositions Thesis implies that if the proponents of the simple conditional analysis of dispositions are to bite the bullet on Martin's case and insist that G_1 should not be fragile, then they would have to say that G_2 is not fragile, either. But, G_2 would break if struck because it is not protected by any sorcerers. According to (4), therefore, it is fragile. This means that (4) contradicts the Intrinsic Dispositions Thesis. If so, it seems that, on the assumption of the Intrinsic Dispositions Thesis, Martin's case conclusively undermines (4).

Meanwhile, Lewis, convinced that the simple conditional analysis of dispositions is dead, proposes an alternative analysis of dispositions that he calls the reformed conditional analysis of dispositions:

> RCA. Something x is disposed at time t to exhibit manifestation m in response 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 exhibiting manifestation m,

where an x-complete cause is "a cause complete in so far as havings of properties intrinsic to x are concerned, though perhaps omitting some events extrinsic to x" (Lewis, 1997, p. 149).

It is important to realize that, for Lewis, RCA does not on its own provide an analysis of such an ordinary dispositional property as fragility. It analyzes only a disposition that is couched in the "overtly dispositional locution"[2]—a disposition to exhibit a manifestation in response to a stimulus—by means of a counterfactual conditional. In order to apply RCA to an ordinary dispositional property, say, fragility, we first need to define fragility in the overtly dispositional locution by

[2] This term is due to McKitrick (2003).

specifying the characteristic stimulus and manifestation of fragility. Thus Lewis's approach to dispositions consists of two steps and RCA is pertinent to the second.[3]

It will be useful to see how this two-step approach works in specific cases. Let us consider Bird's (1998) case of dispositional antidotes—call it 'Bird's case:' a fragile glass G_3 is struck but does not break because straight away a sorcerer administers a fragility-antidote that cancels out the shock of the striking and thereby aborts the process of breaking. In this case, RCA delivers the verdict that G_3 does not have the disposition to break in response to being struck—for short, call this disposition 'D^*.' To see this, let B_g be an intrinsic property of G_3 that would join with striking to cause breaking. On the one hand, G_3 is struck and retains B_g for a sufficient time. Therefore, the antecedent of the analysans of RCA for D^* is satisfied by B_g. But the striking and B_g are not jointly a G_3-complete cause of G_3's breaking because G_3 does not break. Therefore, the consequent of the analysans of RCA for D^* is not satisfied by B_g. As a result, the analysans of RCA for D^* is not true of B_g. Indeed, there is no intrinsic property of G_3 of which the analysans of RCA for D^* is true. Consequently, according to RCA, G_3 does not have D^*.

Does this mean that G_3 is not fragile? Under Lewis's two-step approach, the answer depends on how to define fragility in the overtly dispositional locution. For instance, suppose that we roughly define fragility to be the disposition to break in response to being struck, i.e., D^*. Then G_3's not having D^* entails G_3's not being fragile. Given that it is clear that G_3 is fragile, therefore, Bird's case serves as a counterexample against Lewis's analysis of dispositions. But Lewis will not accept the rough definition of fragility.[4] On his view, the correct definition of fragility would be something like the disposition to break in response to being struck in the absence of fragility-antidotes (Lewis,

[3] For a detailed discussion about Lewis's two-step approach, see (Choi, 2003).

[4] Of course, we sometimes use the predicate 'disposed to break in response to being struck' in such a non-standard way that it refers to fragility whatever the exact stimulus and manifestation appropriate to the concept of fragility may be. According to this use, to say that something is disposed to break in response to being struck is simply another way of saying that it is fragile. Then it is a trivial truth that fragility is identical to D^*. But we have another standard use of the predicate 'disposed to break in response to being struck' according to which it refers to such a dispositional property P that the stimulus appropriate to P is the event of being struck and the manifestation appropriate to P is the event of breaking. In this paper, I am concerned with this standard use of the predicate 'disposed to break in response to being struck.'

1997, p. 145).[5] If so, fragility is not identical to D^*, and therefore G_3's not having D^* does not immediately entail G_3's not being fragile. In fact, in (Choi, 2006, pp. 372–373), I've argued that RCA rules that G_3 has the disposition to break in response to being struck in the absence of fragility-antidotes. Then it follows that, supposing that fragility is something like the disposition to break in response to being struck in the absence of fragility-antidotes, G_3 comes out as being fragile under Lewis's two-step approach, which is a satisfying result.

We can get the same result for the following case due to Lewis (1997, pp. 145–146). When a styrofoam dish S_1, which is not fragile, is struck, it makes a distinctive sound; the Hater of Styrofoam is within the earshot of S_1; when the Hater of Styrofoam hears the distinctive sound, he comes and tears S_1 apart by brute force. It is easy to see that, in this case, according to RCA, S_1 has D^*.[6] This, however, does not immediately mean that S_1 is fragile. Indeed, in (Choi, 2005, p. 186), I've demonstrated that, under Lewis's two-step approach, Lewis can disqualify S_1 from being fragile by assuming that fragility is something like the disposition to break in response to being struck in the absence of fragility-mimickers (and fragility-antidotes), where a fragility-mimicker is an entity like the Hater of Styrofoam that is extrinsic to a putatively fragile object and would cause it to break through an indirect and non-standard process if it were to be struck.[7]

It seems that Lewis's analysis of dispositions, unlike the simple conditional analysis of dispositions, does not clash with the Intrinsic Dispositions Thesis in Martin's case. On the one hand, according to RCA, the protected glass G_1 has the disposition to break in response to being struck in the absence of fragility-antidotes and fragility-mimickers because if G_1 were to be struck (in the absence of fragility-antidotes and fragility-mimickers) and retain its microstructure for a sufficient time, then the striking and its microstructure would be jointly a G_1-complete cause of its breaking. On the other hand, there is no question about the fact that, according to RCA, the unprotected glass G_2 has the disposition to break in response to being struck in the absence of fragility-antidotes and fragility-mimickers. As a result, according to RCA, both of the glasses have the disposition under consideration. Then, on Lewis's view that fragility is something like the disposition to

[5] It is worth mentioning that Lewis does not actually talk about fragility, but rather about poisonousness that he believes can be defined to be something like the disposition to cause death in response to being ingested without antidotes. But this makes no significant difference.

[6] For details, see (Choi, 2005, p. 183).

[7] In (Choi, 2005, pp. 184–185), I've pointed out that Lewis's own way of dealing with this case is mistaken.

break in response to being struck in the absence of fragility-antidotes and fragility-mimickers, both of them come out as being fragile under Lewis's two-step approach. This result is in line with the assumption that fragility is a nomically intrinsic disposition. This suggests that there is no conflict between RCA and the Intrinsic Dispositions Thesis in Martin's case. Thus Lewis's analysis of dispositions seems to resolve the conflict that troubles the simple conditional analysis of dispositions.

3. The Simple Conditional Analysis Defended and New Contradictions

In the previous section, we have seen how Lewis's two-step approach works. In this regard, it is important to realize that there is no theoretical consanguinity between Lewis's analysis of dispositions and Lewis's two-step approach to dispositions. Indeed, we can take Lewis's two-step approach to dispositions without accepting his analysis of dispositions. Based on this observation, I've advanced the claim that the adherents of the simple conditional analysis of dispositions can rebut a number of alleged counterexamples by taking Lewis's two-step approach to dispositions (Choi, 2006, pp. 374–375). To see this, let us formulate the simple conditional analysis of dispositions in the following way:

> SCA. Something x has the disposition at time t to exhibit manifestation m in response to stimulus s iff, if x were to undergo stimulus s at t, it would exhibit manifestation m.[8]

It should be noted that the analysandum is put in terms of the overtly dispositional locution. This shows that SCA is designed to analyze a disposition that is couched in the overtly dispositional locution in terms of a counterfactual conditional, namely, that it is designed to be pertinent to the second step within the framework of Lewis's two-step approach. SCA does not on its own provide an analysis of such an ordinary dispositional property as fragility.

Lewis's two-step approach makes it possible that the simple conditional analysis of dispositions does not contradict the Intrinsic Dispositions Thesis in Martin's case. Given that G_1 would not break if struck, it is indisputable that, according to SCA, G_1 does not have D^*. Does this mean that G_1 is not fragile? As noted above, under Lewis's two-step approach, the answer to this question depends on how to define

[8] SCA is precisely the formulation of the simple conditional analysis of dispositions that Lewis (1997) presents and attacks in the beginning of his paper. But, he, unlike me, does not make it explicit that his two-step approach is incorporated into SCA although he does make it explicit that it is incorporated into RCA. Nonetheless I presume that, when Lewis presents the simple conditional analysis of dispositions, Lewis means the same thing as I do by SCA.

fragility in the overtly dispositional locution. If we accept the rough definition of fragility, namely, that fragility is the disposition to break in response to being struck, then it follows that G_1 is not fragile. But SCA, together with the rough definition of fragility, gives the verdict that the unprotected glass G_2 is fragile. If so, because the Intrinsic Dispositions Thesis implies that fragility is a nomically intrinsic disposition, we have a clash between the simple conditional analysis of dispositions and the Intrinsic Dispositions Thesis.

However, the proponents of the simple conditional analysis of dispositions have no reason to accept the rough definition of fragility. Indeed, in (Choi, 2006, pp. 375–377), I've claimed that they will propose that, to a first approximation, fragility is the disposition to break in response to being struck in the absence of fragility-finks as well as fragility-antidotes and fragility-mimickers, where a fragility-fink is something like the sorcerer in Martin's case that would render a fragile object no longer fragile if it were to be struck. That being said, fragility is not identical to D^*, and therefore G_1's not having D^* does not entail G_1's not being fragile. Note that if G_1 were to be struck in the absence of fragility-finks and so on, it would break. Then, according to SCA, G_1 is disposed to break in response to being struck in the absence of fragility-finks, fragility-antidotes, and fragility-mimickers. It is evident that we can get the same result for G_2. Assuming that fragility is the disposition to break in response to being struck in the absence of fragility-finks, fragility-antidotes, and fragility-mimickers, therefore, the two nomic duplicates, G_1 and G_2, come out as being fragile under Lewis's two-step approach. This result is in agreement with the assumption that fragility is a nomically intrinsic disposition. To wrap up, the advocates of the simple conditional analysis of dispositions can take Lewis's two-step approach to dispositions with the result that, in Martin's case, there is no conflict between the simple conditional analysis of dispositions and the assumption that fragility is a nomically intrinsic disposition.[9]

It may be correctly pointed out, though, that the definition of fragility in terms of fragility-finks and so on is patently circular, and therefore eventually unacceptable. It seems that we can cash out the concepts of fragility-fink, fragility-antidote and fragility-mimicker only in terms of the very dispositional concept of *fragility*. If so, given the

[9] According to (4), G_3 is not fragile since it would not break if struck. This means that Bird's case serves as a counterexample to (4). Like Martin's case, though, it doesn't spell trouble for SCA. Given that the specification of the characteristic stimulus of fragility includes the absence of fragility-antidotes, the proponents of the simple conditional analysis of dispositions can easily get Bird's case right in the same way as Lewis does. We can draw a similar conclusion for Lewis's case of the styrofoam dish. For details, see (Choi 2003, p. 577; Choi 2006, p. 375).

definition of fragility in terms of fragility-finks and so on, we end up with a conceptual circle. It is remarkable, though, that this problem of circularity is not unique to the proponents of the simple conditional analysis of dispositions. Since Lewis needs to say that, to a first approximation, fragility is the disposition to break in response to being struck in the absence of fragility-antidotes and fragility-mimickers, he also suffers from the same problem of circularity.

Then how can the proponents of the simple conditional analysis of dispositions remove this circularity? To give a detailed answer to this question takes a comprehensive and encompassing discussion, and therefore is beyond the scope of this paper. But I would like to relieve some possible concerns by outlining how to answer that question. My proposal is that the proponents of the simple conditional analysis of dispositions can crack the problem of circularity by saying that fragility is the disposition to break in response to being struck under the ordinary conditions for fragility, where the ordinary conditions for fragility are, roughly speaking, extrinsic conditions that obtain in the majority of cases that we come across where striking leads to breaking.[10] On this proposal, the ordinary conditions for fragility are spelt out without appealing to the concept of fragility, which means that the problem of circularity does not arise. Further, because the sorcerer in Martin's case is ruled out from the ordinary conditions for fragility, it is easy to see that, according to SCA, both G_1 and G_2 are disposed to break in response to being struck under the ordinary conditions for fragility, and therefore that, on my proposal, both of them qualify as being fragile by SCA under Lewis's two-step approach. This result is in keeping with the assumption that fragility is a nomically intrinsic disposition.

The problem of circularity will make no significant difference to what follows. However, setting aside the problem of circularity, the definition of fragility in terms of fragility-finks, fragility-antidotes and fragility-mimickers is still quite useful. Therefore, in what follows, I will continue to use the definition of fragility in terms of fragility-finks, fragility-antidotes and fragility-mimickers as the definition of fragility in terms of ordinary conditions has not yet been fully presented.

We have found above that, under Lewis's two-step approach, SCA does not necessarily contradict the assumption that fragility is a nomically intrinsic disposition in Martin's case. It does not follow from this, though, that SCA does not necessarily contradict the Intrinsic

[10] It is generally accepted that the connection between dispositional ascriptions and counterfactual conditionals is mediated by the concept of ordinary condition or something akin to it. See (Bird, 1998, pp. 233–4), (Mumford, 1998, pp. 88–90), (Malzkorn, 2000, pp. 456–459), (Gundersen, 2002, p. 407), and (Cross, 2005, p. 324).

Dispositions Thesis. In fact, Lewis (1997, p. 139) will respond that though SCA does not necessarily contradict the intrinsic character of fragility, it still contradicts the Intrinsic Dispositions Thesis: ''Given that G_1 would not break if struck, it does not have D^* according to SCA. Conversely, G_2 would break if struck, and hence it has D^* according to SCA. Then it follows that SCA contradicts the assumption that *the disposition to break in response to being struck*, i.e., D^*, is a nomically intrinsic disposition. Admittedly, this disposition is not identical to fragility. Indeed there seem to be no simple predicates in English that correspond to it. Nevertheless, D^* has every feature of dispositionality,[11] and therefore the Intrinsic Dispositions Thesis implies that it is a nomically intrinsic disposition. Consequently, on the assumption of the Intrinsic Dispositions Thesis, we reach the conclusion that SCA should still be repudiated as it contradicts the assumption that D^* is a nomically intrinsic disposition.''[12] In the following, however, I will argue that this response is not feasible. But, before that, I will demonstrate that it invites a *tu quoque* argument against Lewis's own analysis of dispositions.

Lewis's reason to reject SCA will be equally a reason to reject his own RCA because RCA as well as SCA contradict the assumption that D^* is a nomically intrinsic disposition. Let us take a look at Bird's case again. As stated above, according to RCA, G_3 does not have D^*. Let 'G_4' denote an unprotected glass that is a nomic duplicate of G_3. It is clear that, according to RCA, G_4 has D^*. Consequently, the two nomic duplicates, G_3 and G_4, are different with respect to D^*. Then it follows that, according to (3), D^* is not a nomically intrinsic disposition, which contradicts the Intrinsic Dispositions Thesis. As a result, RCA contradicts the Intrinsic Dispositions Thesis exactly in the same way as SCA does. The same can be said about Lewis's case of the styrofoam dish. As already noted, according to RCA, S_1 has D^*. Let us now consider such a nomic duplicate S_2 of S_1 that there is no Hater of Styrofoam within the earshot. Then it is clear that, according to RCA, S_2 does

[11] McKitrick (2003) offers four marks of dispositionality: (1) a dispositional property P has a characteristic manifestation; and (2) there are circumstances that would typically bring about the occurrence of this manifestation; and (3) there is a certain counterfactual conditional that is typically true of things that possess P; and (4) P is named by the overtly dispositional locution. It is clear that D^* has all of the marks of dispositionality. D^* has a manifestation, breaking, that occurs in the circumstances of manifestation, being struck. When something has D^*, it is typically true of it that if it were to be struck it would break. And D^*, as it stands, is referred to by the overtly dispositional locution. Hence D^* has every mark of dispositionality considered by McKitrick.

[12] I think that this contradiction is exactly what Lewis (1997, p. 139) means by a ''tug-of-war between the conflicting attractions'' of the simple conditional analysis of dispositions and the Intrinsic Dispositions Thesis.

not have D^*. Thus the two nomic duplicates, S_1 and S_2, do not share D^*. This implies that, according to (3), D^* is not a nomically intrinsic disposition, which contradicts the Intrinsic Dispositions Thesis.

In short, RCA clashes with the Intrinsic Dispositions Thesis in both the case of the styrofoam dish and Bird's case.[13] From this we can conclude that SCA and RCA are *the same* with respect to being contradictory with the Intrinsic Dispositions Thesis. Therefore, if Lewis is to reject the simple conditional analysis of dispositions on the assumption of the Intrinsic Dispositions Thesis, he would have to reject his own analysis, too.

4. Intrinsic Dispositions

As we have seen, both RCA and SCA contradict the Intrinsic Dispositions Thesis. Therefore, if the Intrinsic Dispositions Thesis is true, we will have compelling reasons to throw away the two versions of the conditional analysis of dispositions. But I am convinced that McKitrick (2003) conclusively refute the Intrinsic Dispositions Thesis by showing that some full-fledged dispositions are not nomically intrinsic dispositions. For example, consider my key's disposition to open my front door if inserted into its lock.[14] McKitrick claims that this property has every feature of dispositionality but my key will lose it if I have changed my key's environment, specifically, the lock on my front door. Hence two nomic duplicates can differ with respect to the disposition to open my front door, which means that, according to (3), the disposition to open my front door is not a nomically intrinsic disposition.

Weight is not a nomically intrinsic disposition, either. Stephen Yablo (1999, p. 611) proposes that weight can be roughly defined in the following way:

(5) x has weight n iff x has the disposition to depress a properly constructed scale so as to elicit a reading of n pounds in x's gravitational field.

I agree with McKitrick that weight as defined above has every feature of dispositionality but a person's weight will change if his environment is altered, more specifically, if he moves from the earth to the moon. Therefore, it is possible that two nomic duplicates have different weights, which means that weight is not a nomically intrinsic disposition.

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[13] It does not take much effort to see that SCA, like RCA, contradicts the assumption that D^* is a nomically intrinsic disposition in both Bird's case and the case of the styrofoam dish (Choi 2003, p. 579).

[14] This example is due to Shoemaker (1984, p. 221).

Once this is recognized, it is clear that not every disposition is a nomically intrinsic disposition. On this ground, I think that McKitrick is right that the Intrinsic Dispositions Thesis is wrong. With this in mind, I resolve the contradiction between the Intrinsic Dispositions Thesis on the one hand and SCA or RCA on the other hand by denying the former. Here it is important to note, though, that each of SCA and RCA not only contradicts the Intrinsic Dispositions Thesis but also contradicts the assumption that D^* is a nomically intrinsic disposition. Moreover, in spite of the falsity of the Intrinsic Dispositions Thesis, it is still possible that D^* is a nomically intrinsic disposition. This means that we cannot resolve the contradiction between SCA or RCA on the one hand and the assumption that D^* is a nomically intrinsic disposition on the other hand by denying the Intrinsic Dispositions Thesis.

What matters is whether D^* is a nomically intrinsic disposition or not. If it is, then we will have to abandon both SCA and RCA in spite of the falsity of the Intrinsic Dispositions Thesis. Otherwise, we will be able to resolve the contradiction in question by denying that D^* is a nomically intrinsic disposition. But it is not clear how to determine if D^* is a nomically intrinsic disposition or not. Presumably an unprotected glass such as G_2 and G_4 has D^*. If so, according to (2), D^* is a nomically intrinsic disposition only if the glass's nomic duplicates—for example, G_1 and G_3—have D^*, too. Then do they have D^*? Given that D^* is a technically defined disposition that, in everyday life, we do not use at all, we have no strong intuitions to be relied upon to work out an answer to this question. If we were to have an adequate analysis of dispositions at hand then we would be in a better position to answer it. Unfortunately, however, we have not gotten an adequate analysis of dispositions yet. What is worse, we should not rely upon SCA or RCA in seeking an answer to that question. Or else we would beg the question against those who attempt to criticize SCA or RCA on the assumption that D^* is a nomically intrinsic disposition. Thus, at least apparently, the prospect of determining if D^* is a nomically intrinsic disposition or not is gloomy.

Fortunately, I believe, we can work out a criterion for identifying nomically intrinsic dispositions by using the concept of a causal basis. To begin with, in the following I will assume the causal thesis that every disposition has a causal basis.[15] Or, if there are ungrounded—or

[15] It is noticeable that the causal thesis, by itself, does not imply that a causal basis must be a categorical or intrinsic property, only that a causal basis exists in every case of disposition (Prior, Pargetter, and Jackson, 1982, p. 253).

baseless—dispositions at all, I will set them aside.[16] Let me provide a necessary condition for a grounded disposition's being nomically intrinsic to an object in terms of causal basis:

(6) For every object x that has a disposition D, D is nomically intrinsic to x only if x has *an intrinsic causal basis* for D, i.e., an intrinsic property or property-complex that serves as a causal basis for D.

Then (6) joins with (2) to imply the following criterion for identifying nomically intrinsic dispositions:

(7) A disposition D is a nomically intrinsic disposition only if every object that has D has an *intrinsic causal basis* for D, i.e., an intrinsic property or property-complex that serves as a causal basis for D.

To see what (6) and (7) mean, suppose that x has a disposition D. Then, according to the causal thesis, x has a property or property-complex that serves as a causal basis for D. According to (6), when D is nomically intrinsic to x, x not only has a property or property-complex P that serves as a causal basis for D but also P is an intrinsic property or property-complex of x. Therefore, x has an intrinsic property or property-complex that serves as a causal basis for D, i.e., an intrinsic causal basis for D. What if an object has a causal basis for D but does not have an intrinsic causal basis for D? In which case, it has D but D is not nomically intrinsic to it. According to (7), a nomically intrinsic disposition is such that there is no object that has it but does not have an intrinsic causal basis for it.

I will argue below that (6)—and therefore (7)—is reasonably plausible. Before that, however, a clarification is needed of the concept of a causal basis. Following Prior, Pargetter, and Jackson (1982), I define a causal basis for D as the property or property-complex that, together with the characteristic stimulus of D, is a causally operative sufficient condition for the characteristic manifestation of D in the case of "sure-fire" dispositions, and in the case of probabilistic dispositions is causally sufficient for the relevant chance of the manifestation. Then what is a causally operative sufficient condition? It would be a formidable

[16] Some philosophers of dispositions like Stephen Mumford (1998, pp. 167–169) and George Molnar (1999, p. 9) suggest that fundamental physical dispositions of sub-atomic particles are likely to have no causal bases as those particles have no sub-structural properties. But this makes no difference to my subsequent discussion since it only concerns non-fundamental dispositions.

job to give a detailed answer to this question. Fortunately, though, we do not need such a detailed answer for the present purpose.

To a first approximation, a condition is a causally operative *sufficient* condition for some effect only if, given the laws of nature, whenever the condition is present it is causally necessary that the effect occurs. For instance, let us consider a match existing in the actual world. The match's having appropriate chemicals in its head, being dry, being placed in a condition where oxygen is present, being struck against a matchbox, and so forth are jointly a causally operative sufficient condition for its lighting. This is because, given the actual laws of nature, whenever an object has appropriate chemicals in its head ... and is struck against a matchbox, it is causally necessary that the object lights. To summarize, we have the following necessary condition for x's having a causal basis for a disposition D:

(8) x has a causal basis for D only if x has such a property or property-complex P that, given the laws of nature governing x, whenever an object has P and undergoes the characteristic stimulus s of D, it is causally necessary that the object exhibits the characteristic manifestation m of D.

To argue for the plausibility of (6), let us first consider a specific example. Suppose that Yablo, who is currently on earth, weighs n pounds. In the following I will show that Yablo has no intrinsic causal basis for weight of n pounds. Consider a property-complex Q_y composed of all the intrinsic properties of Yablo. I think that Q_y does not serve as a causal basis for weight of n pounds. According to (5), this is because, Q_y, together with the stimulus appropriate to weight of n pounds—the event of being placed on a properly constructed scale in x's gravitational field[17]—is not a causally operative sufficient condition for the event of the scale's eliciting a reading of n pounds. Consider a nomic duplicate Y_n of Yablo that is on the moon. By definition, it is governed by the same laws of nature as Yablo, namely, the actual laws of nature. And, since Q_y is composed of the intrinsic properties of Yablo, Y_n has Q_y as well. But if Y_n were to be placed on a scale in its gravitational field, i.e., in the gravitational field of the moon, the scale would not elicit a reading of n pounds; and thereby it would not be causally necessary that the scale elicits a reading of n pounds. As a result, given the

[17] Here I would like to make it clear that, according to (5), the stimulus appropriate to weight of n pounds is the event of being placed on a properly constructed scale in x's gravitational field, not the event of being placed on a properly constructed scale, say, in the gravitational field of the earth. I will discuss this issue again later in the paper.

actual laws of nature, even if Y_n were to have Q_y and be placed on a properly constructed scale in its gravitational field, it would not be causally necessary that the scale elicits a reading of n pounds. This means that it is not the case that, given the actual laws of nature, whenever an object has Q_y and is placed on a properly constructed scale in its gravitational field, it is causally necessary that the scale elicits a reading of n pounds. This being the case, according to (8), Q_y does not serve as a causal basis for Yablo's weight of n pounds. In view of the fact that Q_y is composed of *all* the intrinsic properties of Yablo, it is reasonable to assume that Yablo has no other intrinsic properties or property-complexes that would serve as a causal basis for weight of n pounds. So I conclude that Yablo has no intrinsic causal basis for weight of n pounds.

It is plausible that Q_y and the event of being placed on a properly constructed scale in x's gravitational field, together with the condition that x is in the gravitational field of the earth, are jointly a causally operative sufficient condition for the event of the scale's eliciting a reading of n pounds.[18] Then, Q_y, together with the condition that Yablo is in the gravitational field of the earth, constitutes a property-complex C_B that serves as a causal basis for his weight of n pounds. This does not mean, though, that Yablo has an *intrinsic* causal basis for his weight of n pounds since the added condition is not intrinsic to him.

For the sake of argument, suppose that Yablo has an intrinsic causal basis for a certain disposition D. Then, according to (8), Yablo has such an intrinsic property or property-complex P_y that, given the laws of nature governing Yablo, whenever an object has P_y and undergoes the stimulus s appropriate to D, it is causally necessary that it exhibits the manifestation m appropriate to D. Given that P_y is an intrinsic property or property-complex of Yablo, a nomic duplicate of Yablo has to have P_y. Moreover, by definition, it is subject to the same laws of nature as Yablo. If so, a nomic duplicate of Yablo has such a property or property-complex—namely, P_y—that, given the laws of nature that govern it, whenever an object has the property or property-complex and undergoes s then it is causally necessary that the object exhibits m. As a result, it is deducible from the fact that Yablo has an intrinsic causal basis for D, that every nomic duplicate of Yablo

[18] To be precise, I will have to consider such things as "weight-of-n-pounds-finks." For, assuming that a weight-of-n-pounds-fink is operative, even if an object that has Q_y and is in the gravitational field of the earth were to be placed on a scale in its gravitational field, the scale would not elicit a reading of n pounds as a result of the operation of the weight-of-n-pounds-fink; and thereby it would not be causally necessary that the scale elicits a reading of n pounds. For simplicity, however, I will leave this consideration aside.

satisfies a necessary condition for having a causal basis for D, namely, the right-hand side of (8).

As we have seen, Yablo has no intrinsic causal basis for weight of n pounds. This means that a nomic duplicate of Yablo does not necessarily satisfy the right-hand side of (8) for weight of n pounds. In fact, I think that Y_n, who is a nomic duplicate of Yablo on the moon, does not satisfy it. It is clear that Y_n has no such (intrinsic or not) property or property-complex P that given the laws of nature governing Y_n, whenever an object x has P and is placed on a scale in x's gravitational field, it is causally necessary that the scale elicits a reading of n pounds. For instance, the property-complex C_B that serves as a causal basis for Yablo's weight of n pounds does not serve as such a property or property-complex P. This is because, since the specification of C_B includes a reference to Yablo's extrinsic property of being in the gravitational field of the earth, Y_n lacks C_B. If so, according to (8), it follows that Y_n has no causal basis for weight of n pounds. Therefore, according to the causal thesis, Y_n does not have weight of n pounds. As a result, not every nomic duplicate of Yablo has weight of n pounds. This means that weight of n pounds is not nomically intrinsic to Yablo. Consequently, it is derivable from the fact that Yablo has no intrinsic causal basis for weight of n pounds, that weight of n pounds is not nomically intrinsic to him.

Keeping this in mind, we can prove that (6) is reasonably plausible. Suppose that x has a disposition D but does not have an intrinsic causal basis for D. Then x has a property or property-complex P_x that serves as a causal basis for D. Since x is supposed not to have an intrinsic causal basis for D, however, P_x can't be an intrinsic property or property-complex of x. Then the specification of P_x must include a reference to extrinsic properties of x. Let us consider (actual or merely possible) nomic duplicates of x that have no other properties or property-complexes than P_x that would serve as a causal basis for D. It is reasonable to suppose that at least one of them—call it x^*—lacks the aforementioned extrinsic properties, and therefore P_x. If so, P_x cannot serve as x^*'s causal basis for D. Assuming that x^* has no other properties or property-complexes that would serve as a causal basis for D, x^* has no causal basis for D. Then, on the assumption of the causal thesis, it does not have D. Hence there exists a (actual or merely possible) nomic duplicate of x that does not have D. It follows that not every nomic duplicate of x has D, and therefore that D is not nomically intrinsic to x. As a result, we have the conclusion that if an object that has D has no intrinsic causal basis for D then D is not nomically intrinsic to it, which is (6). This being the case, it is sensible enough to accept (6).

Unfortunately, however, one objection can be raised against (6). As noted above, it is plausible that Q_y and the event of being placed on a properly constructed scale in x's gravitational field, together with the extrinsic condition that x is in the gravitational field of the earth, are jointly a causally operative sufficient condition for the event of the scale's eliciting a reading of n pounds. Then what if x is in the gravitational field of the earth *in virtue of the laws of nature*? In this case, one might think, x would have no intrinsic causal basis for weight of n pounds but weight of n pounds is nomically intrinsic to x:

> Suppose that a perfect duplicate Y_d of Yablo weighs n pounds in a possible world that is the same as the actual world except that, in that world, it is a law of nature that every object with the same mass as Y_d is in a particular gravitational field G. According to the causal thesis, Y_d has a causal basis for weight of n pounds. But it has no intrinsic causal basis for weight of n pounds because, like Yablo, the specification of its causal basis for weight of n pounds will include a reference to its extrinsic property of being in the particular gravitational field G. In this case, nevertheless, weight of n pounds is nomically intrinsic to Y_d. Since a nomic duplicate of Y_d is subject to the same (non-actual) laws of nature and has the same mass as Y_d (on the plausible assumption that mass is an intrinsic property), it must be in the particular gravitational field G; thereby, it must weigh n pounds. This means that every nomic duplicate of Y_d weighs n pounds. Thus, contrary to (6), Y_d has no intrinsic causal basis for weight of n pounds, yet weight of n pounds is nomically intrinsic to Y_d.

I disagree. My rejoinder to this objection is that, unlike Yablo, Y_d does have an intrinsic causal basis for weight of n pounds. The property-complex Q_y composed of all the intrinsic properties of Y_d serves as such an intrinsic causal basis.[19] Suppose that x has Q_y and is governed by the same laws of nature as Y_d. Then x has the same mass as Y_d. But one of the laws of nature that govern Y_d is that every object with the same mass as Y_d is in the particular gravitational field G. If so, x must be *in the particular gravitational field G*. Then, given the laws of nature governing Y_d, whenever an object has Q_y and is placed on a scale in its gravitational field, it is causally necessary that the scale elicits a reading of n pounds because in virtue of the laws of nature it must be in the particular gravitational field G. This suggests that Q_y and the event of being placed on a scale in x's gravitational field are jointly a causally operative sufficient condition for the event of the scale's eliciting a reading of n pounds. It follows that Q_y serves as a causal basis

[19] Given that Y_d is a perfect duplicate of Yablo, Q_y is also the property-complex composed of all the intrinsic properties of Yablo.

for Y_d's weight of n pounds. In short, once Y_d is in a particular gravitational field G in virtue of the laws of nature, we do not have to add to Q_y its extrinsic property of being in such a gravitational field G in order to get a causal basis for its weight of n pounds since the laws of nature do what the extrinsic property is supposed to do. Since Q_y is an intrinsic property of Y_d, Q_y serves as an intrinsic causal basis for Y_d's weight of n pounds. Having said that Y_d has an intrinsic causal basis for weight of n pounds, (6) is not in trouble with the fact that weight of n pounds is nomically intrinsic to Y_d. As a result, the objection has been defused.

5. Applications

In the previous section, I have argued that we have a good reason for endorsing (6)—and therefore (7). In this section, I will demonstrate that (7) delivers the right verdicts on intuitive cases, which will provide another support for (6) and (7). Let us first take a look at the case of my key. My key has the disposition to open my front door if inserted into its lock. This disposition is not a nomically intrinsic disposition, which is vindicated by (7). For instance, let 'Q_k' denote a property-complex composed of all the intrinsic properties of my key. I take it that Q_k does not serve as a causal basis for the disposition to open my front door. This is because, Q_k, together with the event of being inserted into the lock on my front door, is not a causally operative sufficient condition for the event of opening my front door. Imagine a nomic duplicate of my key under a circumstance where I have changed the lock on my front door. It has Q_k and is subject to the same laws of nature as my key. But if the nomic duplicate of my key were to be inserted into the lock on my front door, it would not match the lock; thereby, it would not be causally necessary that it opens my front door. Therefore, it is not the case that, given the laws of nature, whenever an object has Q_k and is inserted into the lock on my front door, it is causally necessary that it opens my front door. This means that, according to (8), Q_k does not serve as a causal basis for the disposition to open my front door. Since Q_k is composed of *all* the intrinsic properties of my key, my key has no other intrinsic properties or property-complexes that would serve as a causal basis for the disposition to open my front door. Then it follows that my key, which has the disposition to open my front door, has no intrinsic causal basis for it. Consequently, according to (7), the disposition to open my front door is not a nomically intrinsic disposition, which is a satisfying result.

I will now argue that the disposition to break in response to being struck—as above, call it D^*—is not a nomically intrinsic disposition.

Presumably an unprotected glass G_2 has D^*. But it has no intrinsic causal basis for D^*. Suppose that a property-complex Q_g is composed of all the intrinsic properties of G_2. It does not take much effort to see that Q_g does not serve as a causal basis for D^*. Consider a nomic duplicate G_1 of G_2 that is protected by a sorcerer. Although G_1 has Q_g and is subject to the same laws of nature as G_2, if G_1 were to be struck it would not break as a result of the sorcerer's operation; and thereby, it would not be causally necessary that G_1 breaks. Therefore, it is not the case that, given the laws of nature, whenever an object has Q_g and is struck, it is causally necessary that the object breaks. This being the case, according to (8), Q_g does not serve as a causal basis for D^*. Since Q_g is composed of *all* the intrinsic properties of G_2, G_2 has no other intrinsic properties or property-complexes that would serve as a causal basis for D^*. Because G_2 has D^* but does not have an intrinsic causal basis for D^*, D^* is not a nomically intrinsic disposition according to (7).

Of course, it is plausible to suppose that Q_g and the event of being struck, together with the condition that there are no operative fragility-finks, fragility-antidotes, and so on, are jointly a causally operative sufficient condition for the event of breaking. Then, Q_g, together with the condition that there are no operative fragility-finks, fragility-antidotes, and so on, serves as G_2's causal basis for D^*. This does not mean, though, that G_2 has an *intrinsic* causal basis for D^*, i.e., the disposition to break in response to being struck since the added condition is not intrinsic to G_2.

There is one remarkable though ultimately unsuccessful objection against my contention. What if we take the specification of the stimulus appropriate to D^* as including the condition that there are no operative fragility-finks, fragility-antidotes, and so on? Then, assuming that it is acceptable that Q_g and the event of being struck in the absence of fragility-finks, fragility-antidotes, and so on are jointly a causally operative sufficient condition for the event of breaking, it appears that, contrary to my view, Q_g serves as an intrinsic causal basis for D^*. I am afraid, though, that this objection misfires. The stimulus appropriate to D^* is the event of being struck. If we add the new condition to the specification of this stimulus, we will get a new disposition, namely, *the disposition to break in response to being struck in the absence of fragility-finks, fragility-antidotes and so on*, which must be distinguished from the disposition to break in response to being struck. Among other things, it is undeniable that such protected glasses as G_1 and G_3 are disposed to break in response to being struck in the absence of fragility-finks, fragility-antidotes, and so on, whereas, as we have seen in the preceding sections, it is deniable that they are disposed to break in

response to being struck. On my view, therefore, what follows from the fact that Q_g and the event of being struck in the absence of fragility-finks, fragility-antidotes, and so on, are jointly a causally operative sufficient condition for the event of breaking is not that Q_g serves as an intrinsic causal basis for D^* but merely that Q_g serves as an intrinsic causal basis for this new disposition. Hence I conclude that the objection under consideration fails to threaten my claim that Q_g does not serve as an intrinsic causal basis for D^*.

We can counter similar objections built on the case of Yablo's weight and the case of my key. For instance, it may be that Q_y and the event of being placed on a properly constructed scale *in the gravitational field of the earth* are jointly a causally operative sufficient condition for the event of the scale's eliciting a reading of n pounds. If so, Q_y would serve as a causal basis for the disposition to depress a properly constructed scale so as to elicit a reading of n pounds if placed on that scale *in the gravitational field of the earth*—for short, call this disposition 'weight* of n pounds.' But it is clear that weight* of n pounds is distinct from what we mean by weight of n pounds. One who has weight of n pounds on earth does not have the same weight on the moon because her current gravitational field changes. By contrast, one who has weight* of n pounds on earth has exactly the same weight* on the moon because, regardless of her current gravitational field, she would yield the same scale reading in the gravitational field of the earth. Having said that, even if Q_y serves as a causal basis for weight* of n pounds, this poses no threat to my contention that Q_y does not serve as a causal basis for weight of n pounds. By the same token, it may be that, in the case of my key, Q_k and the event of being inserted into locks of a certain type K are jointly a causally operative sufficient condition for the event of opening locks of the type K. If so, Q_k would serve as a causal basis for the disposition to open *locks of the type K*. But this disposition is distinct from the disposition to open my front door. Therefore, even if Q_k serves as a causal basis for the first, this does not threaten my claim that Q_k does not serve as a causal basis for the second.

6. Resolution

Now that we have found that D^* is not a nomically intrinsic disposition, we have the resource to resolve the contradiction between SCA or RCA on the one hand and the assumption that D^* is a nomically intrinsic disposition on the other hand. It is the assumption that D^* is a nomically intrinsic disposition that must go. This means that the contradiction does not plague SCA nor RCA. Rather, they are vindicated

as D^*, which is not a nomically intrinsic disposition, does not count as such by them.

In Section 3, I argued that, under Lewis's two-step approach, fragility can be plausibly defined into something like the disposition to break in response to being struck in the absence of fragility-finks, fragility-antidotes, and so on. And, in the previous section, it came to light that Q_g serves as an intrinsic causal basis for the disposition to break in response to being struck in the absence of fragility-finks, fragility-antidotes, and so on. This suggests that Q_g serves as an intrinsic causal basis for fragility. If so, according to (7), fragility satisfies one necessary condition for being a nomically intrinsic disposition. In fact, it is generally assumed that fragility is a nomically intrinsic disposition. This being the case, if either of the simple and Lewis's analysis of dispositions were to contradict the assumption that fragility is a nomically intrinsic disposition then it would be in real trouble. It has been revealed, though, that, under Lewis's two-step approach to dispositions, neither of them contradicts the intrinsic character of fragility.

It will be useful to take stock of what I have established thus far. The two versions of the conditional analysis of dispositions contradict the Intrinsic Dispositions Thesis. But, as McKitrick cogently claims, the Intrinsic Dispositions Thesis is wrong, that is, some dispositions are not nomically intrinsic dispositions. Moreover, under Lewis's two-step approach to dispositions, the two versions of the conditional analysis of dispositions do not contradict the plausible assumption that fragility is a nomically intrinsic disposition. Indeed, however, the simple conditional analysis of dispositions contradicts the assumption that D^* is a nomically intrinsic disposition in Martin's case. On this ground, Lewis claims that, on the assumption that D^* is a nomically intrinsic disposition, we can disprove the simple conditional analysis of dispositions. In the foregoing, however, I have shown that this claim invites a *tu quoque* argument against Lewis's analysis; and that the assumption in question is untenable.

To put another way, the two versions of the conditional analysis of dispositions is at odds with the assumption that D^* is a nomically intrinsic disposition. But it is fragility, not D^* that is a nomically intrinsic disposition. Therefore, the two versions of the conditional analysis of dispositions have no problems with the intrinsic character of dispositions unless we are confused between fragility and D^*.

It is remarkable that Lewis's claim that, on the assumption that D^* is a nomically intrinsic disposition, we can falsify the simple conditional analysis of dispositions is intended to motivate the rejection of the simple conditional analysis of dispositions in favour of his reformed conditional analysis of dispositions. In view of the fact that this claim is

mistaken, we can say that Lewis loses the main motivation for his analysis of dispositions. In response, Lewis might want to say that, though his motivation is not successful, his analysis of dispositions has different kinds of advantage over the simple conditional analysis of dispositions, and therefore that the former is still preferable to the latter. But I've contended in (Choi, 2006) that Lewis's analysis has no such advantages whatsoever; and that, on the contrary, we have a good reason to favour the simple conditional analysis over Lewis's analysis of dispositions.[20]

Appendix: Selected Symbols and Their Definitions

C_B: a property-complex that serves as a causal basis for Yablo's weight of n pounds
D^*: the disposition to break in response to being struck
G_1: a glass in Martin's case
G_2: an unprotected glass that is an intrinsic duplicate of G_1
G_3: a glass in Bird's case
G_4: an unprotected glass that is an intrinsic duplicate of G_3
Q_g: a property-complex composed of all the intrinsic properties of G_2
Q_k: a property-complex composed of all the intrinsic properties of my key
Q_y: a property-complex composed of all the intrinsic properties of Yablo
Y_n: a nomic duplicate of Yablo that is on the moon
Y_d: a perfect duplicate of Yablo in a possible world that is the same as the actual world except that, in that world, it is a law of nature that every object with the same mass as Y_d is in a particular gravitational field G

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