

ANTIDOTES FOR DISPOSITIONAL ESSENTIALISM

ABSTRACT

Since the mid-90s dispositionalism, the view that dispositions are irreducible, real properties, gained strength due to forceful counterexamples (finks and antidotes) that could be launched against Humean anti-dispositionalist attempts to reductively analyse dispositional predicates.

In the light of these anti-Humean successes, and in combination with ideas surrounding metaphysical necessity put forward by Kripke and Putnam, some dispositionalists felt encouraged to propose a strong anti-Humean view under the name of “Dispositional Essentialism”.

In this paper, I show that, ironically, the counterexamples dispositionalists have used against the Humean reductive analysis of dispositional predicates also prove to be problems for a strong form of dispositional essentialism that assimilates dispositionality and metaphysical necessity.

Help comes from an unlike ally—Carnapian reductions sentences—but the alliance is not unproblematic.

1. THE COUNTERFACTUAL ANALYSIS OF DISPOSITIONAL PREDICATES

Humean minded philosophers have argued: if dispositions, like, for example, fragility and solubility, were real properties they would bring an anti-Humean element to the world. The disposition would somehow point towards its manifestation and thereby generate a connection in nature, a necessity between wholly distinct entities, the existence of which Hume, allegedly, proved to be nonexistent. Consequently one should, as a Humean, deny the existence of dispositional properties.

One way to get rid of dispositions is, presumably, to eliminate them at a very early stage, namely already at the level of discourse: one should, as a Humean, aim to show that dispositional talk can be translated into terms of a language free from dispositional predicates (as famously the logical empiricists tried to do). Preferably, a simple reductive analysis along the following lines would suffice:

x has the disposition $D \leftrightarrow$ if x were exposed to the test T , x would show the reaction R , i.e.: $Dx \text{ iff } Tx \square \rightarrow Rx$.

For example: x is fragile \leftrightarrow if x were dropped, x would break.

If a semantic reductive analysis of dispositional predicates along these lines is successful then the existence of dispositional properties is, so the Humean, put into doubt. Yet, anti-Humean dispositionalists—that is, those philosophers who believe that

dispositions are irreducible, real properties—have launched forceful counterexamples to such counterfactual analyses which are supposed to show that no such analysis can succeed. Some of these counterexamples have reached folkloric status within analytic metaphysics:

2. FINKS AND ANTIDOTES

The simple counterfactual analysis (as above) saw, for example, its downfall with C. B. Martin’s seminal paper *Dispositions and Conditionals* (Martin 1994). Martin has convincingly shown that a pure counterfactual conditional is neither sufficient nor necessary for an object to be disposed to react. His example is a live wire (live being the disposition in question) to which a machine—Martin calls it an “electro-fink”—is connected. This machine is built in such a way that it stops the power supply immediately if the wire is touched by a conductor. The conditional analysis of “x is live”, taken to be “if x were touched by a conductor, then electric current would flow from x to the conductor” is inadequate, since the wire is live *ex hypothesi*, but the conditional is not true due to the fink. So, the conditional is not necessary. We can rephrase the story *mutatis mutandis* such that a reverse-electro-fink is operating on a non-live wire and thereby show that the conditional is not sufficient either.

A forceful counterexample of a different nature, to a counterfactual analysis of a more sophisticated kind, has been given by Alexander Bird in his *Dispositions and Antidotes* (Bird 1998). Bird’s counterexample was targeted at David Lewis analysis in *Finkish Dispositions* (Lewis 1997) which was supposed to handle at least Martin’s finks. Both Bird’s and Lewis’s efforts have been duly discussed in the literature and I wish to spare the reader the details here.¹ Suffice it to say that what Bird calls an “*antidote*” is an interference with the temporal succession of causal events starting with the disposition’s stimulus s and (possibly) ending with manifestation r . The difference between finks and antidotes is that finks destroy the disposed object’s internal structure so that the disposition is lost when triggered. Bird’s antidotes, however, leave the disposed object intact. (This is not important for the considerations in this paper, though.)

One of Bird’s examples is a uranium pile (cf. Bird 1998: 229). It has the disposition to chain-react catastrophically (r , the response) when above critical mass (s , the stimulus).

¹ The history of the ups and downs of the reductive analysis is well documented. See, for example, (Malzkorn 2001) and (Schrenk 2009b). Detailed analyses of Lewis’s, Bird’s and many other attempts can be found in the literature listed in footnote 2.

Yet, there is a safety mechanism—the antidote—which lets boron moderating rods penetrate the pile in case radioactivity increases. The boron rods absorb the radiation and so, although the stimulus s is given (uranium is above critical mass) and although the intrinsic structure of the uranium pile is not altered (it remains disposed to chain react) the uranium will not display the disposition's manifestation r .

Bird concludes:

The existence of the causal basis plus stimulus will never be enough to guarantee the required response nor, if the response comes into being, that it came about in the right way. *A causal chain can always be interfered with.* (Bird 1998a: 233; my emphasis)

Needles to say, there have been further attempts to rescue the counterfactual analysis. One version of such attempts aims to exclude the peculiar intervention of finks and antidotes by upgrading the counterfactual's antecedent with some proviso clause and thereby restore the analysis' reductive force: "Conditionals which give the sense of power ascriptions are always understood to carry a *saving clause*." (Martin 1994: 5; my emphasis). Specifically targeted at his own example Martin offers: "If the wire is touched by a conductor *and other things are equal*, then electrical current flows from the wire to the conductor" (Martin 1994: 5). In formulae: $Dx \text{ iff } Cx \ \& \ Tx \ \Box \rightarrow Rx$ (where C holds *other things*, i.e., external influences fixed, or states some adequate conditions, or...).

However, it proved to be doubtful whether this move is successful for, as Martin could show, it seems impossible to spell out explicitly and adequately what is meant by such a "*saving*" or "*ceteris paribus*" or "*other things are equal*" clause: a complete explicit (extensional) exclusion list, C , of all finks, all antidotes and all other unwanted interferers would possibly be infinite and thus not available to us. Bird agrees with Martin on this point: "It is certain that the circumstances c , whether rare or common, are not finitely specifiable" (Bird 1998a: 233). This, however, would seem to be a necessary requirement for a reductive analysis.

Unfortunately, also a general (intensional) characterisation of finks and other interferers seems impossible: Martin points out that the only one feature the to-be-excluded interferers share is that each of them brings it about that it is not the case that the disposition manifests itself (cf. Martin 1994: 6). However, if we take this feature to characterise the interferers and enhance the counterfactual analysis of the dispositional predicate accordingly we end up in a circular, tautological characterisation (here again targeting Martin's original example): The wire is live *iff*

if the wire is touched by a conductor, and nothing happens to make it false *that the wire is live* [...] then electrical current flows from the wire to the conductor. (Martin

1994: 6; my emphasis)

As a consequence Martin, and with him many other proponents of dispositional realism, see the counterfactual analysis ultimately fail. Their conclusion is radical and pessimistic: “Counterfactuals have a place, of course, only as clumsy and inexact linguistic gestures to dispositions and they should be kept in that place.” (Martin 1994: 7-8) Consequently many dispositionalists have taken the (alleged) failure of the analysis as good evidence and great motivation for the belief that dispositions are irreducible, real properties.²

Of course many further suggestions to save the reductive analysis and more counterexamples have been given. In fact, the analyses vs. counterexamples rivalry can soon compete with the “Gettier industry” in epistemology.³ While some Humeans remain optimistic that some reduction will eventually succeed it seems to be consensus amongst dispositionalists that “the problem of providing a way of specifying C [...] has so far found no satisfactory solution” (Bird 2007: 38)

I do not want to judge who is right here, the dispositionalists or the Humeans. Rather I would like to show next that *if* the dispositionalists’ arguments against the reductive counterfactual analysis along the lines of $Tx \square \rightarrow Rx$ are successful and the analysis has to be dropped *then* so must convictions (some) dispositionalists themselves hold. In more detail, a dispositionalist cannot both believe in the failure of the counterfactual analysis and also be a dispositional essentialist of a certain strong kind that links the dispositional power too closely to a metaphysically necessary conditional (see, for example, Bird and Ellis). The two next sections introduce the doctrine of *dispositional*

² Which consequences we should really draw from the (alleged) failure of a semantic analysis is, of course, more controversial than we suppose here. Inspired by logical empiricists’ (anti-)metaphysics, their epistemology, and verificationist semantics people have assumed that if Humeans should be able to provide a watertight analysis that answers to all possible counterexamples then dispositions are not real and vice versa. Yet, outside the constraints of empiricism/verificationism, conclusions from semantics to metaphysics are not so straightforward.

John Heil, for example, points out: “Even if you could concoct a conditional analysis of dispositionality impervious to counter-examples, it is not clear what you would have accomplished. You would still be faced with the question, What are the truth makers for dispositional claims? Suppose you decide that ‘object o is fragile’ implies and is implied by ‘o would shatter if struck in circumstances C’. You are not excused from the task of saying what the truth maker might be for this conditional. Presumably, if the conditional is an analysis, its truth maker will be whatever the truth maker is for the original dispositional assertion. This is progress?” (Heil 2005: 345)

Be that as it may, all that is needed for the argument of the rest of the paper is, in any case, only the assumption that the counterfactual analysis is under threat by finks, antidotes, and other possible interferences whether or not this amounts to an argument against such analyses and for dispositional realism or not.

³ To name but a few: (Molnar 1999), (Malzkorn 2000) with a reply by (Mumford 2001), (Gunderson 2000) with a reply by Bird (Bird 2000), (Choi 2003, 2006).

essentialism. The mentioned friction between dispositionality and necessity will emerge *en passant*.

3. A FURTHER, INDEPENDENT SOURCE OF ANTI-HUMEAN CONNECTIONS IN NATURE

Independent of the debates surrounding dispositions, a further anti-Humean element in metaphysics has gained strength in the past decades: many philosophers subscribe to the ideas put forward by Kripke and Putnam who have made acceptable the belief in a conceptually contingent, *a posteriori*, *de re* connection in nature, namely *metaphysical necessary*. On the basis of Kripke's and Putnam's arguments many people saw the chance of a revival of anti-Humean metaphysics of a broad kind. Stathis Psillos, for example, comments:

It was *Kripke's liberating views* in the early 1970s that changed the scene radically. By defending the case of necessary statements, which are known *a posteriori*, Kripke [1972] made it possible to think of the existence of *necessity in nature* which is weaker than logical necessity, and yet strong enough to warrant the label necessity. (Psillos 2002: 161; my emphasis)⁴

Kripke and Putnam's claims include *theoretical identifications*, that is, the identity of properties, "water is necessarily H₂O"; *one's origin*, "I necessarily originated from a particular sperm and ovum"; *individual objects possessing properties*, "This desk is necessarily made of wood"; and *natural kinds possessing certain features*: "Tigers are essentially mammals".

The details of Kripke's (et al.) arguments surrounding externalist semantics, direct reference, rigid designation, etc. are well known and there is no need to discuss them here at large. For the sake of the argument of this paper I accept them uncritically.⁵

4. DISPOSITIONAL ESSENTIALISM

Unsurprisingly, amongst those who defend essentialism there are also many dispositionalists and the combination of the two, called "*dispositional essentialism*", leads to the claim that natural kinds have some of their *dispositional* features *essentially*. For

⁴ I am not saying here that Psillos is an anti-Humean. I quote him because he gives expression to the view that Kripke was significantly involved in the anti-Humean revolution the defenders of essentialism and *de re* necessity have attempted.

⁵ Yet, I wish to add that I am generally not convinced by the original Kripkean arguments and that I rather endorse Humean or conventionalist intuitions in regard to (metaphysical) necessity.

example: “necessarily, salt is soluble”, where NaCl is the natural kind and solubility the respective disposition.⁶

A particularly strong form of dispositional essentialism goes beyond this mere combination of the two doctrines. This strong version not only says that dispositions are possessed by kinds with necessity but they merge necessity and dispositionality, i.e., they bring together the anti-Humean connection that dispositions bring to the world and *de re* necessity: not only do kinds possess their *dispositional* features *necessarily* but, also, a triggered disposition is said to *metaphysically necessitate* its manifestation. Both the atemporal correlations of kinds and their dispositional features and the diachronic causal events from the trigger to a manifestation of a disposition are considered to be necessary.

We find explicit expression of this belief in the writings of, for example, Brian Ellis and Alexander Bird:

Therefore, [...] for all x, *necessarily*, if x has p [MS: the power], and x is in circumstances of the kind C, then x will display an effect of the kind E. (Ellis 2002: 158; my emphasis)

Necessarily if the potency is instantiated and receives its stimulus, then the manifestation will occur. (Bird 2007: 64)

Note that, ironically, these statements are not dissimilar to the Humeans’ reductive analyses in that they closely relate the disposition to a conditional: the Humean offers the reductive $Dx \text{ iff } (Tx \Box \rightarrow Rx)$ which is said to have failed; the dispositional essentialists give us: $\Box(Dx \ \& \ Tx \supset Rx)$.

There are important differences between the two, though. The first, (i), is that Bird’s and Ellis’s statements use an anti-humean metaphysically necessary conditional instead of the weaker counterfactual conditional and, in this respect, make a stronger claim; the second, (ii), is that their formulation does not completely exhaust the disposition’s character. In this respect their version is weaker. This is visible in that Bird and Ellis do not offer an explicit semantic explication along the lines of, for example, the bi-conditional $Dx \text{ iff } \Box(Tx \supset Rx)$ for the dispositional predicate D.⁷ Rather, they make the having of the disposition a (crucial)⁸ part of the antecedent of the conditional:

⁶ I will set aside generally important but here irrelevant distinctions between essences and necessary properties (cf. Fine 1994, 2002).

⁷ Note that this is at variance with my (Schrenk 2009a) where I have taken the dispositional essentialist to mean the stronger “ $Dx \text{ iff } \Box(Tx \supset Rx)$ ” and where I discuss the inadequacy of that formulation.

⁸ I say “an (essential) part of the antecedent” because the essentialist dispositionalist would probably want to deny that $\Box(Tx \supset Rx)$ holds just by itself for, on their dispositionalist account, it is precisely x’s having of the disposition that powers the reaction from stimulus to manifestation. Thus, the conditional is itself conditional on Dx.

$\Box(Dx \ \& \ Tx \supset Rx)$. Thereby, they give (at most) a *partial* definition of what it means to have that disposition. I come back to this point in section 7.

5. FINKS AND ANTIDOTES FOR (STRONG) DISPOSITIONAL ESSENTIALISM

I will now show that Bird's and Ellis's strong form of dispositional essentialism—which does not only state that properties have their dispositional powers essentially but that also, qua the dispositional power, a disposition's manifestation is *necessitated* by its stimulus—are problematic. I will then, in the next section, introduce a strategy to counter the worries here raised. This strategy might be successful but it will also reveal that the relation between dispositionality and necessity is not straightforward.

The cause for trouble is rather ironic: dispositionalists who believe that antidotes, finks and the like are convincing arguments against the counterfactual conditional analysis of dispositional predicates (counterfactually linking trigger and manifestation) cannot also believe the stronger claim that there is a necessary link between a triggered disposition and its manifestation. Clearly, the two statements that “Necessarily if the potency is instantiated and receives its stimulus, then the manifestation will occur.” (Bird 2007: 64) and “A causal chain can always be interfered with.” (Bird 1998a: 233) do not go together well.

In other words, if the dispositionalists' arguments against the counterfactual analysis are taken seriously (and most dispositionalists do take them seriously) then there is no reductive counterfactual (not even a sophisticated one that is backed up by proviso clauses) along the lines of “if x were touched by a conductor, then electric current would flow from x to the conductor”. However, if this is taken for granted then it is even less plausible to believe that a logically stronger conditional “necessarily, if x is live and touched by a conductor then electric current flows from x to the conductor” can hold: if the dispositionalists' arguments are successful against counterfactuals along the lines of $Dx \text{ iff } Tx \ \Box \rightarrow Rx$ then they must, *a fortiori*, also prove wrong the stronger necessity claim $\Box(Dx \ \& \ Tx \supset Rx)$.

6. A DIFFERENCE BETWEEN REDUCTIONIST ANALYSES AND (MERE) INFORMATIVE EXPLICATIONS

I wish to suggest a way in which the dispositional essentialists might be able to defend their suggestion. Above I said that their claim is, in one respect, (i), stronger than the Humeans' analysis—it proposes a metaphysically necessary conditional where the Humean used only a counterfactual conditional—but also that, in another respect, their statement is weaker: the dispositionalists neither mean their claim to be a *reductive* analysis nor could they because, (ii), it does not come in the form of an explicit definition.

The crucial idea to defend the dispositionalists against the trouble the stronger aspect of their statement, (i), causes is to utilise the modesty, (ii), their proposal displays in this other respect. Here is how this defence might work:⁹

The fink and antidote examples to the counterfactual analysis let us too easily forget an important, if trivial, fact: ontologically, there clearly are conditions in which, for example, fragile glasses always break, live wires do conduct electricity, salt definitely dissolves, etc. The trouble is not that these conditions do not exist, the trouble is that we fail to be able to spell out exactly what they are in such a way that we arrive at a non-gappy, non-empty, non-circular counterfactual analysis which can be said to reductively analyse the dispositional predicate.

But again, the fact that we, epistemically and/or semantically can't get a good grip on these conditions for the strict requirements of a *reductive* semantic analysis does neither mean that these conditions do, ontologically, not exist¹⁰ nor that a less demanding, maybe benignly circular, yet still informative *characterisation* (as opposed to a *strictly reductive analysis*) of dispositions can be given. And, so, the dispositional essentialist might claim that the requirements for the soundness of their metaphysically informative statement about dispositions are weaker than the prerequisites for reductive semantic analyses. In other words, they could claim that some informative, non-reductive statement along the

⁹ Another possible move to reconcile dispositionalism with the dispositionalist's necessary conditional is to point out that for an important set of dispositional properties—namely, for the fundamental, basic, perfectly natural ones—there are no finks (and many other interferers). Bird endorses this line of argument in *Nature's Metaphysics* (Bird 2007: chapter 3.3). (However, he also concedes that antidotes might be possible even on the fundamental level and therefore still be problematic.)

¹⁰ To deny their existence seems almost to deny the uniformity of nature: repeat again everything involving a disposed object and the same will again happen to that object.

lines of $\Box(Dx \& Tx \& Cx \supset Rx)$ is possible, where C are just vaguely described conditions that guarantee the absence of any interference.¹¹

As Martin showed, this would be hopeless for the reductively interpreted Dx iff $Tx \& Cx \Box \rightarrow Rx$ because the bi-conditional analysis would turn out to be unacceptably circular—we most probably have to mention the disposition itself in the characterisation of what the absence of any interference is—but for the dispositionalist’s statement the disposition may well be mentioned again in the characterisation of C. There’s no circularity to fear for there is no ambition to spell out explicitly what the disposition is in its entirety.¹²

7. REDUCTION SENTENCES

Surprisingly, the dispositionalists’ $\Box(Dx \& Tx \& Cx \supset Rx)$ together with much that has been said in the previous section is reminiscent of one of the early empiricist attempts to get hold of dispositional predicates, namely of Carnap’s reduction sentences. Having convinced himself that an explicit definition of dispositional predicates along the lines of a material conditional— Dx iff $(Tx \supset Rx)$ —would not work, Carnap offered, in his *Testability and Meaning* (Carnap 1936/37) the statement $Tx \supset (Dx \supset Rx)$ as a step towards an analysis of dispositional predicates (mostly accompanied by the additional $Tx \supset (\neg Dx \supset \neg Rx)$). These so called “reduction sentences” are only *partial* or *implicit* definitions of dispositional predicates for they do not enable us to replace “D” wherever it occurs, as, for example, the explicit definition Dx iff $(Tx \supset Rx)$ with its equivalence between *definiendum* und *definiens* would:

[T]he terms introduced in this way have the disadvantage that in general it is not possible to eliminate them, i.e. to translate a sentence containing such a term into a sentence containing previous terms only. (Carnap 1936: 443)

In order to overcome or, at least, minimise the resulting indeterminacy (and deficit in reductive power) Carnap suggested to gradually add further reduction sentences to the original single one and thus offer a whole list of partial definitions capturing more and more of the disposition’s (dispositional predicate’s) character. We might, for example,

¹¹ To be fair to Ellis I have to confess that I omitted a line from his quote where he already attempts to exclude interferences in this fashion: “Therefore, [...] for all x, necessarily, if x has P, and x is in circumstances of the kind C, then x will display an effect of the kind E, *unless there are defeating conditions that would mask this display.*” (Ellis 2001: 286; my emphasis) As I will show now, this is still problematic.

¹² There is a danger here, of course, that $(Dx \& Tx \& Cx \supset Rx)$ turns out to be analytically rather than (merely) metaphysically necessary due to an unfortunate definition of C. One would hope that analyticity can be avoided.

want to add $T^*x \supset (Dx \supset R^*x)$ and further statements with yet different trigger-reaction pairs. This could be inspired both by further conceptual analysis—we might find that the dispositional predicate should also (partially) *mean* that test T^* is followed by reaction R^* —or, indeed, by empirical research: we might find out that also $T^*x \supset (Dx \supset R^*x)$ is correct for all objects for which $Tx \supset (Dx \supset Rx)$ holds. Carnap was aware of the fact that conceptual analysis and the acquisition of empirical knowledge go hand in hand at this point and that, thus, the partial definitions, taken together, have empirical content (cf. Carnap 1936: 444).

The dispositional essentialists' $\Box(Dx \ \& \ Tx \ \& \ Cx \supset Rx)$ —or, equivalently, and in line with Carnap, $\Box(T_{Cx} \supset (Dx \supset Rx))$ ¹³—is also only a partial and implicit explication of the disposition in the sense that it (only) gives some information about some (crucial) aspect of the disposition, namely that necessarily, when triggered with T in the right circumstances, C , the disposed object, D , will react with reaction R . Yet, it does by no means exhaust what the disposition D is and can otherwise give rise to. It remains silent about, for example, all those interesting cases where the conditions, C , are not ideal and the disposition does not quite deliver R but a partial manifestation only. Also, just like Carnap's reduction sentences, the dispositional essentialist's claim does not entitle us to replace the predicate “ D ” wherever it occurs.

This should be perceived as no disadvantage for the dispositional essentialists for it is anyway not in their aim to reductively analyse dispositions (dispositional predicates). On the contrary, dispositions are meant to be real properties in their own right for which no such analysis (and later replacement) is wanted.¹⁴

In fact, Carnap's idea to accumulate additional reduction sentences for the same dispositional predicate should suit the dispositional essentialist well. Not only might the very same disposition D give raise to further, different trigger and reaction events — electric conductivity might turn out to be linked also to heat conduction—more importantly, as mentioned above briefly, we have to remember that $\Box(T_{Cx} \supset (Dx \supset Rx))$ captures only a disturbance-free trigger and a pure reaction. However, disposed objects are rarely in such ideal circumstances and, so, rarely show a disposition's pure manifestation. Yet, a dispositional essentialist would surely want to say that what happens in those impure cases happens, too, necessitated by the disposition. In

¹³ I have merged Tx and Cx into T_{Cx} and given a formulation that is logically equivalent to the dispositional essentialist. A remaining dissimilarity to Carnap is, of course, the necessity operator.

¹⁴ Unless, of course, the dispositional essentialist really would like to see dispositions and dispositionality completely reduced to metaphysical necessity. Yet, see (Schrenk 2009a) for the hopelessness of this aim.

other words, $\Box(T_C^* \supset (Dx \supset R^*x))$ shall hold just as much as the pure case, where, here, T_C^* is a trigger in not quite disturbance-free circumstances and R^* is not quite the disposition's pure manifestation.

A sheer infinity of such statements could, in principle, be added but clearly no subset exhausts the disposition D 's whole character. Yet, this is perfectly in line with the dispositionalist's credo that dispositions are real properties in their own right that cannot be analysed away.

8. EVALUATION: THE *RELATA* AND THEIR DIACHRONICITY, THE MONOTONICITY OF NECESSITY

I wish to shed some more light on what the conditions C commit us to. Some tension between metaphysical necessity and dispositionality will emerge that might be a little worrisome for the dispositionalist's version of Carnapian reduction sentences despite the positive assessment given so far.¹⁵

The *Relata* and their Diachronicity. It has to be noted that the dispositional essentialists' claims bring, due to circumstances C , a whole new type of metaphysically necessary statements to the Kripke and Putnam classes of statements. Circumstances C , so we have granted the dispositionalist, can be described as those conditions a disposed object has to be in such that no interferer (antidote, fink, mask, etc.) is or will be present at least till it is certain that the reaction comes about (i.e., C has to take care even of very late preventions). What this tells us about C , ontologically speaking, is that C has to fix whatever is in the light-cone just before R so to make absolutely sure that no interference can sneak in. Note, that C has to encompass also what might *actually* seem to be causally irrelevant for the disposition's manifestation: already space-time regions that could only *possibly* house a potential interferer have to be, so to speak, silenced pre-emptively because we wish to make a statement that is not only factually true but *necessarily* true i.e., true in all possible worlds. And, so, we have to exclude also interferers that are merely *possible*.¹⁶

¹⁵ For further charges see my (Schrenk 2009a).

¹⁶ This is, of course, no new argument: already Russell argued in his famous "On the Notion of Cause" (Russell 1912/2003) that "in order to be sure of the expected effect, we must know that there is nothing in the environment to interfere with it. But this means that the supposed cause [corresponding to a minimal antecedent in a disposition; my addendum] is not, by itself, adequate to ensure the effect." (Russell 1912/2003: 169)

This is a major commitment for C and also for what the necessity operator holds together: in $\Box(Dx \& Tx \& Cx \supset Rx)$, metaphysical necessity not only binds the disposition and a simple trigger to a reaction but, rather, whole world states to a succeeding world state.

Moreover, we must not forget that statements of dispositional trigger-manifestation correlations should bear time variables, which have so far been omitted for simplicity. Instead of $\Box(Dx \& Tx \& Cx \supset Rx)$ we should rather write something like $\Box(D(x, t) \& T(x, t) \& C(x, t) \supset R(x, \Delta t))$ ¹⁷. However, none of the Kripke/Putnam cases is about diachronic successions in time. Remember that Kripke and Putnam’s original examples are all similar to the timeless “water is necessarily H₂O”, “I necessarily originated from a particular sperm and ovum”, “This desk is necessarily made of wood”, or “Tigers are essentially mammals”.

Taking now both considerations together—that the *relata* are not individuals or kinds or properties but also include world state types and events *and* that we are confronted with successions in time rather than with atemporal statements—we might start to doubt whether Kripke and Putnam’s metaphysical necessity is at all applicable here: the transfer of metaphysical necessity to the dispositional cases—from static, eternal facts to the necessary connections among events in the natural world—seems only permissible either if it can be shown that Kripke-Putnam style arguments which might be successful in synchronic or atemporal relations of individuals, kinds, and properties can also be applied effectively to diachronic succession cases linking world states and events, or failing a direct application of the Kripke-Putnam machinery of direct reference, rigid designation, etc., if we can give an otherwise plausible argument for why we should assume that metaphysical necessity is also the binding force in these diachronic über-events.

Monotonicity of Necessity. There is a further worry that needs to be addressed. It questions not the nature of the *relata* and their diachronicity but the robustness of the metaphysical necessity under concern. Take, for comparison, one of the orthodox statements of metaphysical necessity as found in Kripke and Putnam and their followers: “necessarily, electrons are negatively charged”. If true then, since it is in the essence of electrons to be so charged, any particular electron will be charged *no matter what*: whether it is surrounded by a magnetic field, or in the presence of a neutron, or being subjected

¹⁷ Cf. the formulations with time variables Lewis and Bird introduced in (Lewis 1994) and (Bird 1998).

to gravitation, etc. In other words, one could, in principle, add anything one pleases to the antecedent of a conditional like “necessarily, if x is an electron then x is negatively charged”. It still holds with necessity that if x is an electron *and in a magnetic field, and in the presence of a neutron and ...* then x is negatively charged. Necessity is, to take a notion normally applied to logical entailment, *monotonic*: antecedent strengthening does not affect the original necessary conditional regarding electrons and negative charge. One might even be tempted to suggest that antecedent strengthening is a test for the alleged necessity: if it is true that electrons are negatively charged, come what may, then you are justified to state a necessary relation between electrons and negative charge.

Things turn out to be crucially different in the case of dispositions, their triggers and their manifestations. Here, not everything goes.¹⁸ On the contrary, it proved to be important to add to the first envisaged antecedent, $Dx \ \& \ Tx$, an exclusion clause C such that unwanted additional factors are debarred. In fact, the conditions C in $\Box(Dx \ \& \ Tx \ \& \ Cx \supset Rx)$ are there to disallow antecedent strengthening because the presence of a fink, an antidote, or other interferences would make the conditional false. The relation between $Dx \ \& \ Tx$ and Rx is only robust, that is, *of necessity*, if no antecedent strengthening is allowed, i.e., if the above envisaged necessity-robustness test is, with the help of C , forbidden by *fiat*.

I will leave it an open question whether, therefore, necessity has been obtained surreptitiously only but I believe the last word has not yet been spoken on the metaphysical necessity of dispositionality.¹⁹

9. SUMMARY

Within the last 10-15 years dispositionalism, the view that dispositions are real irreducible properties, has gained a lot of support. This is partially due to a debate between Humean minded philosophers, who aim to give reductive analyses of dispositional predicates, and anti-Humean oriented dispositionalists, who have launched forceful counterarguments against this eliminative analysis.

¹⁸ Kit Fine observes similarly: “It would be harder, for example, to break the connection between the truth of $P \ \& \ Q$ and the truth of P than the connection between cause and effect.” (Fine 2002: 278-9).

¹⁹ Thanks are due to Stephen Mumford, Matthew Tugby, Charlotte Matheson and Rani Lill Anjum for invaluable discussions of this observation.

There has been a second anti-Humean movement in current analytic metaphysics: Kripke's arguments in *Naming and Necessity* have encouraged people to believe in metaphysical *de re* necessity and, related, in a modern version of essentialism.

When these two strands of anti-Humean reasoning are combined they culminate in what has frequently been called "*dispositional essentialism*". This is the stance that (all or most) properties or kinds have their *dispositional roles necessarily*.

A stronger version of dispositional essentialism aims to bring necessity and dispositionality even closer together in that it sees the disposition involved in a necessary conditional featuring the trigger and the manifestation of the disposition: "*necessarily, if something has power P and is triggered, it displays the power's manifestation*".

In this paper I have shown that the tenability of this statement is debatable for precisely the reasons the Humean reductive analysis was problematic. However, I have also shown that strong dispositional essentialism might escape these problems because the strict rules for reductive semantic analyses might not apply to mere metaphysical explications or characterisations of dispositionality.

Yet, other grave difficulties still remain: the alleged metaphysical necessity of $(Dx \ \& \ Tx \ \& \ Cx \ \supset \ Rx)$ bears some strong dissimilarities to those cases of necessity Kripke and Putnam originally introduced: the *relata* are different and it is a diachronic business rather than being synchronic or atemporal. Moreover, it is not entirely clear whether the robustness of the alleged necessity has been properly earned or whether it has been obtained surreptitiously.

10. BIBLIOGRAPHY

- Martin, C. B. 1994. 'Dispositions and Conditionals'. *Philosophical Quarterly* 44: 1-8.
- Russell, B. 1912/2003. 'On the Notion of Cause'. Presidential Address to the Aristotelian Society Nov 1912. Here quoted from *Russell on Metaphysics. Selection from the Writings of Bertrand Russell*. Stephen Mumford (ed), London/New York: Routledge 2003.
- Bird, A. 1998. 'Dispositions and Antidotes'. *Philosophical Quarterly* 48: 227-234.
- Bird, A. 2000. 'Further Antidotes: A replay to Gundersen'. *Philosophical Quarterly* 50: 229-233.
- Bird, A. 2007. *Nature's Metaphysics. Dispositions, Laws, and Properties*. Oxford: Clarendon Press.
- Carnap, R. 1936. 'Testability and Meaning I.' *Philosophy of Science* 3: 419-471.
- Carnap, R. 1937. 'Testability and Meaning II.' *Philosophy of Science* 4: 1-40.
- Choi, S. 2003. 'Improving Bird's Antidotes.' *Australasian Journal of Philosophy*. 81(4):

573-580.

Choi, S. 2006. 'The Simple vs. Reformed Conditional Analysis of Dispositions'. *Synthese* 148: 369-379.

Ellis, B. 2002. *The Philosophy of Nature*. Chesham: Acumen.

Fine, K. 1994. 'Essence and Modality'. *Philosophical Perspectives* 8 (ed. J. Tomberlin) as the Nous Casteneda Memorial Lecture, 1-16.

Fine, K. 2002. 'The Varieties of Necessity' in *Conceivability and Possibility*, T. S. Gendler & J. Hawthorne (eds). Oxford: Oxford University Press, 253-282.

Gunderson, L. B. 2000. 'Bird on Dispositions and Antidotes'. *Philosophical Quarterly* 50: 227-229.

Heil, J. 2005. 'Dispositions'. *Synthese* 144: 343-356.

Lewis, D. 1997. 'Finkish Dispositions'. *Philosophical Quarterly* 47: 143-158.

Malzkorn, W. 2000. 'Realism, Functionalism and the conditional Analysis of Dispositions'. *Philosophical Quarterly* 50(201): 452 - 469.

Malzkorn, W. 2001. 'Defining disposition concepts: A brief history of the problem'. *Studies in History and Philosophy of Science* 32(2): 335-353.

Molnar, G. 1999. 'Are Dispositions Reducible?'. *Philosophical Quarterly* 49: 1

Mumford, S. 2001. 'Realism and The Conditional Analysis of Dispositions: Reply to Malzkorn'. *Philosophical Quarterly* 51: 375

Psillos, S. 2002. *Causation and Explanation*, Chesham: Acumen.

Schrenk, M. 2009a. 'The Powerlessness of Necessity'. Forthcoming in *Noûs* 2010.

Schrenk, M. 2009b. 'Hic Rhodos, hic Salta. From Reductionist Semantics to a Realist Ontology of Forceful Dispositions' in G. Damschen, R. Schnepf, K. Stueber (eds) *Debating Dispositions: Issues in Metaphysics, Epistemology and Philosophy of Mind*. Berlin, New York: De Gruyter (forthcoming 2009).