

THE POWERLESSNESS OF NECESSITY

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ABSTRACT

This paper concerns anti-Humean intuitions about connections in nature. It argues for the existence of a *de re* link that is not necessity. —

Some anti-Humeans tacitly assume that *metaphysical necessity* can be used for all sorts of anti-Humean desires. Metaphysical necessity is thought to stick together whatever would be loose and separate in a Hume world, as if it were a kind of universal superglue.

I argue that this is not feasible. Metaphysical necessity might connect synchronically co-existent properties—kinds and their essential features, for example—but it is difficult to see how it could also serve as the binding force for successions of events. That is, metaphysical necessity seems not to be fit for diachronic, causal affairs in which causal laws, causation, or dispositions are involved. A different anti-Humean connection in nature has to do that job.

My arguments focus mainly on a debate which has been the battleground for Humean vs. anti-Humean intuitions for many decades—namely, the analysis of dispositional predicates—but I believe (but do not argue here) that the arguments generalise to causation and causal laws straightforwardly.

(ca. 7,200 words)

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I. HUME’S LEGACY IN POST-KRIPKEAN TIMES

According to Hume, a belief in *necessary connections* in nature is unwarranted, for a necessary relation is neither discoverable by reason—it is not like a mathematical or logical relation (you cannot deduce effects from causes)—nor is it perceivable by the senses (it is not seen or felt). So, “being epistemologically problematic, it is metaphysically suspect.” (Edgington 1990: 59)

Hume’s first argument, that we have no *a priori* means of discovering necessary connections in nature, is widely accepted amongst both Hume’s supporters and his opponents. However, many philosophers no longer accept Hume’s second argument, that we have no *a posteriori* epistemic access to necessity. These philosophers subscribe to ideas put forward by Kripke, Putnam, Kaplan, etc., who conceive of *de re* connections as *a posteriori*, conceptually contingent, yet, *metaphysically necessary* links, and they argue for such connections not only on the grounds of semantic considerations about (direct) reference and rigid designation, but also on the grounds of scientific discovery. The latter is the place where *a posteriori* knowledge enters the picture. On the basis of these arguments many people saw the chance of a revival of anti-Humean metaphysics of a broader kind.¹ Speaking here of natural laws, 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. [...] As a result of this, the then dominant view of laws as mere regularities started to be seriously challenged. (Psillos 2002: 161; my italics)²

In the final addendum to his *Naming and Necessity*, Kripke himself already cautiously suggests an extension of his findings:

A good deal of what contemporary philosophy regards as mere physical necessity is actually necessary *tout court*. The question how far this can be pushed is one I leave for further work. (Kripke 1972: 769)

Yet, I am convinced that the influence Kripke has had, on a wide variety of issues in metaphysics, must be thought of as merely psychological rather than philosophical: Kripke has opened people’s minds for connections in nature which have been banned from (some) philosophy since Hume, but Kripke has not come up with a kind of link that fits all anti-Humean purposes.³ This is the main subject of the paper. I will start with some more abstract preliminaries and then turn towards a concrete example, involving dispositions, for more specific arguments.

II. SYNCHRONIC/ATEMPORAL VS. DIACHRONIC LINKS

Metaphysical necessity is, in Kripke's original arguments, first and foremost attributed to:

- 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".

In Putnam we also find

- natural kinds possessing certain features essentially: "Tigers are essentially mammals".

What these applications have in common is that metaphysical necessity is attributed to synchronic or atemporal occurrences, co-existences, possessions, or identities of properties.⁴

Some extensions of metaphysical necessity's domain to further areas in philosophy of science might well be feasible because they only extend what Kripke and Putnam have started. In underlining that certain kinds of objects possess certain features essentially, modern *scientific essentialism*, for example, merely enlarges Putnam's example class: "if something is water it is necessarily a dipole", "salt is necessarily soluble in water", "electrons necessarily have unit charge", etc. What all these examples have in common with the original cases is that they are synchronic or atemporal matters.

However, many who share these anti-Humean intuitions also seem to tacitly assume that diachronic phenomena can also be linked as a matter of metaphysical necessity. That is, they make a seemingly smooth transition from static facts to "the necessary connections among events in the natural world" (Fine 2002: 1), and seem to think that in causation, causal laws, or manifestations of dispositions, one event at space-time point $\langle x, y, z, t \rangle$ is necessarily linked to another event at $\langle x^*, y^*, z^*, t + \Delta t \rangle$. Yet, none of the original Kripke/Putnam cases involve necessary relations whose *relata* are, first, temporally distinct and, second, events rather than individuals and/or properties. Why, then, do people feel entitled to think that this connection is feasible and why would it be desirable in the first place?

It is desirable for the anti-Humean because it is at the heart of anti-Humean intuitions that there is some kind of causal nexus, such that when one event causes

another this is not a mere matter of regularity, but involves the first event bringing about the other or forcing it to happen. The first event should have some kind of causal *oomph* or *biff*, that is, a push towards the second. In other words, the belief is that there is “something that binds the goings-on in the universe together” (Beebe 2006: 509) or that there is “a further fact than (mere) regular succession [between two particular events] . . . a dependency or connection, a fact making it so that when the first happens the second *must* happen” (Blackburn 2000, 103).

Now, what would be more convenient than to be able to assume that metaphysical necessity—which is, as such, already largely accepted in the philosophical community—can fulfil the job description of causal *oomph* as well? Also, some parsimony principle—resembling a kind of monotheistic belief—could be behind this idea: what holds the world together has to be *One*. These appear to be the reasons why anti-Humeans are happy to suppose that metaphysical necessity will also somehow bind events or temporally separate property instantiations together.⁵

Yet, we have to ask again: are they entitled to believe that this is correct? The transfer of metaphysical necessity to these cases is only permissible either if it can be shown that Kripke-Putnam style arguments which seem to have been successful in synchronic (or atemporal) co-existence cases can also be applied effectively to diachronic succession cases, or failing a successful direct application of the Kripke-Putnam machinery of direct reference, rigid designation, etc., if we can make an otherwise plausible case for why we should assume that metaphysical necessity is also the binding force in these cases.

There has been at least one attempt to pursue the first strategy:⁶ in his *Scientific Essentialism* Brian Ellis (Ellis 2001) sketches an application of the Kripkean strategy to the diachronic case. Although this application is elliptical in that it does not explicitly and fully address the similarities and differences to the original Kripke arguments, it has some *prima facie* credibility.

However, in the core section (Section V) of this paper I attempt to prove metaphysical necessity’s unsuitability to act as a binding force or push that brings about successions of events. Roughly, my core argument will be this: whenever a process, starting with event C and ending with event E, is temporally extended, that is, whenever E is supposed to succeed C after a period of time Δt , there is the in-principle possibility of an interference with C such that E could be prevented. If such

a possibility exists, C and E cannot be related by necessity. If successful my argument shows that neither strategy from above can work.⁷

Before I proceed, three short notes for clarification might be helpful:

(a) I take, at least in this paper, no issue with one aspect of the thesis often called “Dispositional Essentialism”, namely that certain natural kinds possess certain powers of metaphysical necessity. Claims like “salt is necessarily soluble in water”, for example, remain untouched by my arguments. Rather, I focus on solubility itself. That is, what I doubt is that a power to do E when C-ed can be analysed in terms of necessitation. I claim that something being soluble does not mean that, necessarily, it dissolves when put in water.

(b) I confine myself to the discussion of deterministic dispositions. However, I believe that probabilistic dispositions, dispositions that manifest themselves only with probability $p < 1$ when triggered, are even more problematic for a necessitarian theory than the deterministic dispositions under concern here.

(c) There is a group of physical laws or principles which are neither clear cut cases of causal laws (diachronicity/succession) nor of property identities or essential relations between properties (synchronicity/atemporality). For example, it is difficult to judge whether atomic decay is a matter of causation or whether it just so happens. Similarly puzzling are cases of particles that share an entangled state and are therefore so deeply intertwined that measurement events on one of them seems to instantaneously affect the other, no matter how far away from each other they are located. This phenomenon appears to be synchronic and uninterferable, and it therefore comes close to the original Kripke examples. As intriguing as these cases are, I must leave them aside here.

III. THE CASE OF DISPOSITIONS

We encounter diachronic succession cases in causation, causal laws, and dispositions (and maybe others). In order to show the inapplicability of metaphysical necessity to such cases I will concentrate on dispositions—more precisely, on the history of the analysis of dispositional predicates in terms of (counterfactual) conditionals—but I believe my arguments generalise.

The history of the conditional analysis can be interpreted as an ongoing battle between Humeans and anti-Humeans: if dispositions were real they would bring an anti-Humean connection to the world. Consequently, those who share the Humean

belief that connections in nature do not exist assume that dispositional talk can be analysed in terms of language without dispositional predicates. As well as getting rid of dispositional talk (a linguistic phenomenon), one would also get rid of dispositions (ontologically speaking). Unsurprisingly, the history of such an analysis started with empiricist/verificationist attempts to reduce dispositional predicates to an observational trigger condition and an observational manifestation which are linked by the material conditional (cf. Carnap 1936/37).⁸

However, this is not the place to go into these historical details. Suffice it to say that this analysis, and its numerous and various successors, had to face serious counterexamples and it is one kind of counterexample my main argument will pivot on. I will claim that if this counterexample is indeed effective against the Humean reductionist analysis, then a certain kind of anti-Humean realism about dispositions is also in jeopardy. More specifically, if this counterexample works then it shows *en passant* that metaphysical necessity can hardly be the driving force behind dispositional powers as envisaged by some metaphysicians (call them “*necessitarian dispositionalists*” and their thesis “*necessitarian dispositionalism*”).

The counterexamples I have in mind are Alexander Bird’s *antidotes* from his *Dispositions and Antidotes* (Bird 1998) which were directed against David Lewis’s sophisticated reformed counterfactual analysis. In order to appreciate the force of Bird’s paper we first need to look at Lewis’s analysis, but since Lewis’s definition is “an unlovely mouthful” (Lewis 1997: 157) I present a slightly shorter version which, I hope, still does justice to the original:

Something x is disposed at time t to give response r to stimulus s , iff x has some intrinsic property B so that: if x were to undergo stimulus s at time t and retain property B long enough, s and x ’s having of B would cause x ’s giving response r . (cf. Lewis 1997: 157)

Now, an *antidote*, as conceived by Bird, is a preventative factor for the temporal succession from stimulus s to manifestation r which does not destroy the intrinsic basis, B , of the disposed object, but interferes with the causal process starting at t with s . One of Bird’s examples is a uranium pile above critical mass (cf. Bird 1998: 229). The pile has the disposition to chain-react catastrophically and s , the stimulus, is realised. Yet, there is a safety mechanism which lets boron moderating rods penetrate the pile in case radioactivity increases. The boron rods absorb the radiation and prevent a chain reaction (r , the response, is not realised). Although the stimulus s occurs (uranium is above critical mass) and although the intrinsic structure of the

uranium pile is not altered (B is retained), the disposed uranium does not display the disposition's manifestation r . Hence, Lewis's analysis is insufficient.

Sure enough, there have been further attempts to save this analysis (or at least derivatives thereof). While Humeans remain optimistic that some reduction will eventually succeed, anti-Humeans hope that also all future analyses will fail. I will not address these issues any further here, however.⁹

IV. TURNING THE TABLES

The main concern of this paper is to show that, supposing we accept the anti-Humean view that dispositions are real, the link in nature dispositions bring to the world cannot be thought of in terms of Kripke-style metaphysical necessity. My strategy to prove this claim is to focus on Bird's counterexample to reductionist attempts to analyse dispositional predicates in terms of counterfactual conditionals. I will assume that Bird's counterexample as introduced above is successful. However, I will then turn the tables and ask what the anti-Humeans themselves have to say about antidote cases where the trigger of a disposition is pulled, yet, its manifestation still does not occur. In other words, I will ask how one ought to conceptualise the antidote case when one subscribes to necessitarian dispositionalism. This will lead to the core of the present paper.

Above, I have stressed that it should be controversial in the first place whether metaphysical necessity (which was originally only applied to atemporal cases of property identity or possession) can be legitimately projected onto diachronic cases which involve one property instance (or event) at t , namely the trigger (plus other activation conditions if needed), and another property instance (or event) at $t+\Delta t$, namely the disposition's manifestation. Call this “**Argument 0 – Diachronic Events**”.

I have also offered two possible strategies to tackle Argument 0, i.e., how one could get from the Kripke/Putnam cases to diachronic cases. I will now introduce Brian Ellis's strategy and then show how it can be challenged by antidote cases.

V. THE POWERLESSNESS OF NECESSITY

Ellis writes: “Essentialists have their own special brand of necessity. This kind of necessity has traditionally been called ‘metaphysical necessity’” (Ellis 2002: 110). His

idea is, now, this: not only are there *natural kinds of objects* which have certain properties necessarily (mostly powers in his view), there are also *natural kinds of processes*. And, here is the crucial point, it is of the *essence* of a natural kind of process that two event types are linked by *metaphysical necessity*. The disposition's trigger event leads *with necessity* to the disposition's manifestation event because this process is a natural kind of precisely that character:

Suppose, for example, that *p* is a natural dispositional property that would be triggered in circumstances of the kind *C* to produce an effect of the kind *E*. Then *the processes of this kind will themselves constitute a natural kind*, the essence of which is that it is a display of *P*. 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*. (Ellis 2001: 286; my emphasis)¹⁰

Although these claims are elliptical when taken as Kripkean style arguments, I will not dwell on the fact that crucial steps are missing: a description of how reference is fixed for event-type terms (rather than kind terms) in baptism situations; arguments that event-type terms rigidly designate, etc. Rather, I will show that unacceptable problems arise in antidote and similar cases if we assume that metaphysical necessity enters into the story as Ellis tells it.¹¹

Argument 1 – Monotonicity. Suppose, for the purpose of the argument, that there is a disposition *D* to react with *E* in circumstances *C*. (The disposed uranium pile is triggered to chain react, *E*, for it has critical mass, *C*). As I read Ellis, this is to say that there is a natural kind of process: the process from *C* events to *E* events. Further, *C* events and *E* events are (when mediated by the disposition) joined as a matter of metaphysical necessity (“Causal relations involve necessary connections between events—namely, between the triggers and displays of basic dispositional properties.” (Ellis 2001: 106)). The problem is now that in antidote cases, *E* does not come about although *C* does occur. Yet, how can that be possible if *C* and *E* are, due to *D*, linked by metaphysical necessity? Not even an antidote should be able to interfere with necessary connections. The crucial point is that necessity is *monotonic*: if *C necessarily* leads to *E*, so must *C* plus the antidote *A*.

In fact, this argument is not novel and it is well known in a different disguise: necessities—of a *logical*, *analytic* or *de dicto* kind in the following example—cannot handle cascading if-then sentences. Remember Goodman's match: if match *m* had been scratched it would have lighted, but if match *m* had been wet and scratched it would not have lighted, but if match *m* had been wet and scratched and the

surrounding temperature had been extremely high it would have lighted... (cf. Goodman 1979: 8). Surely, none of the links in those counterfactual conditionals can be of logical, analytic, or *de dicto* necessity. This is a message which has been frequently acknowledged and which was once a reason for, for example, David Lewis to develop semantics for counterfactuals which are not as strong as a material conditional preceded by a necessity operator. But why should, now, *metaphysical* necessity be able to handle the very same sort of difficulty? It is not clear that it can, yet this is what many necessitarian dispositionalists assume.

In short: while dispositionalists argue, on the one hand, against the possibility of a reduction of dispositional predicates along the line of counterfactual conditionals, “ $Dx \text{ iff } Cx \Box \rightarrow Ex$ ”, they, on the other hand, seem to relapse tacitly into a view involving the stronger “ $\Box(Cx \supset Ex)$ ”, with “ \Box ” expressing metaphysical necessity. Yet, metaphysical necessity is, as much as logical necessity, modally too strong. It does not have the variable strictness counterfactual conditionals allow for: while $Cx \Box \rightarrow Ex$ and $Cx \wedge Dx \Box \rightarrow \neg Ex$ and $Cx \wedge Dx \wedge Fx \Box \rightarrow Ex$... are coherent, $\Box(Cx \supset Ex)$ and $\Box(Cx \wedge Dx \supset \neg Ex)$ and $\Box(Cx \wedge Dx \wedge Fx \supset Ex)$... are not (cf. Lewis 1973: 10, 13).

Argument 2 – Discreteness. The natural reaction towards this first argument is, of course, to say that C has never been the correct first *relatum* of the necessary relation under concern. Rather, what is linked necessarily to E is C *and the absence of any interfering factor*. Then the unwelcome C+A poses no problem because that would simply be a C *with* an interfering factor.¹²

The problem now is that, as well as being *monotonic*, metaphysical necessity is *discrete*: that two specific properties or event types, an uninterfered with C and an E, are necessarily linked (and hence conjoined in all possible worlds) has no bearing whatsoever on the instantiations and correlations of any other properties or event types even if they are very much like C and E. As a consequence, the natural kind of process from uninterfered with C to E with its metaphysical link cannot help to explain a disposition’s power in non ideal cases. Yet, this needs to be explained for take, for example, our antidote case: boron rods are safely inserted in our uranium pile, and so nothing happens. Pull them out a bit and the amount of free electrons will increase, then pull them out further and the situation becomes critical. However, this whole spectrum of cases which are gradually approaching C and E cannot be explained, in the present picture, by the uranium pile’s disposition to chain react, for

that kicks in only when the boron rods are completely removed. As strong as necessity might be once it applies, it has no power as long as C is not a pure, uninterfered with C.

Note, that we know of many other instances of such *partial displays* in impure, interfered-with-C cases. In fact, in our actual, messy world they probably outnumber the pure ones by far: there is, for example, partially dissolved sugar (because of supersaturated water); there are smouldering, yet not burning inflammables (in cases of low oxygen levels); there are lower than expected accelerations (because of counteracting forces); etc., etc.

Spelled out in anti-Humean terms, the problem is that if there is only a necessary link between *C plus the absence of any interfering factor* and E, then, because of necessity's discreteness, C*'s (the impure case's) push towards an impure E* remains mysterious. As similar as C* might be to C, and as similar as E* might be to E, $\Box(Cx \supset Ex)$ does not explain C*'s bringing about E*.¹³

So far, the necessitarian's strategy fails due to a simple dilemma: either the disposition's trigger C leads with necessity to E—and thus it explains the dispositional push towards manifestation E whenever C is realised. Yet, this is too strong, for then we cannot account for the fact that E *does not occur* in antidote cases (**Argument 1 — Monotonicity of Necessity**). Or the disposition's trigger is C *and the absence of any interfering factor*, but then we cannot account for the fact that E (or a partial E) *should occur* in impure cases. That is, the disposition's push in impure cases remains unexplained. (**Argument 2 — Discreteness of Necessity**)

Argument 3 — Hyper Mosaics. Here is a way in which the necessitarian dispositionalist might try to handle the problem of both necessity's monotonicity and its discreteness: that some object has a disposition D means that an infinite number of pairs—the uninterfered with C and E, a slightly interfered with C₁ and E₁, C₂ and E₂, C₃ and E₃, etc. *ad infinitum*—are necessarily linked. Thereby, any possible prior state a disposed object could be in (including those with pure triggers and, more importantly, those with antidotes or impurities of all kinds) is captured. Even though it is discrete, the necessity relation can, if it holds between zillions of particular states (of different purity degrees), cover by its sheer number what seems otherwise to be a continuous spectrum. Or so the necessitarians might hope.

How is necessity's troubling *monotonicity* being dealt with? The answer is that each of the C , C_1 , C_2 , C_3 etc., the pure ones and the ones with interferers, are not to be conceived of as just minimally circumscribed trigger conditions, for those would not save us from further possible but unwanted interferences additional to those we have happily included in the C_i s. Rather, stipulate that the C_i s are complex, structural situation types that, when instantiated, fix the sum total of all (positive) states of affairs and events at least for a sufficiently large region in space so that further unexpected interferers are excluded simply because such a complex state of affairs and events includes and fixes all there is and, by *fiat*, 'all there is' simply cannot have any extra interferer which could prevent the respective E_i s.¹⁴

The required complex structural event types have to be expanded in yet another dimension for we must also consider time: there are cases of late preventions (like late antidotes) in which the interference comes about shortly after C_i . In other words, while a C_i might have been instantiated without any unwanted interferer at t , it could be interfered with at $t+\Delta t$ where $t+\Delta t$ is still early enough to prevent E_i at t^* (with $t < t+\Delta t < t^*$). But since we have already extended the C_i s in space, why not also extend them in time? Our C_i s are, then, event types that encompass fairly large *four dimensional* areas that are temporally extended at least until an infinitely short time $\Delta\epsilon$ just before the instantiation of E_i . To have, with certainty, fixed everything causally relevant we might want to identify the many C_i s with all the physically possible reverse light cones (before the respective E_i s) a disposed object could find itself in. This way, no interference could put into doubt that a certain C_i *metaphysically necessitates* its respective E_i .

Taking these two steps together (the first to deal with discreteness, the second to deal with monotonicity) we arrive at the following picture: while, in ordinary language, our dispositional *predicates* are merely associated with the most interesting and frequent, elliptically described conditions (dropping and breaking, being above critical mass and chain-reacting), dispositional *properties* really provide an (infinite) cluster of possible trigger-response connections where the multitude of possible triggers are all the spatio-temporally vastly extended event types (covering the reverse light cones before E_i) the disposed object could possibly be in. It seems that for those C , C_1 , C_2 , C_3 , etc. and E , E_1 , E_2 , E_3 , etc. the necessitarian dispositionalist can safely postulate necessary connections.¹⁵

Is this, then, a way in which metaphysical necessity could be seen as the anti-Humean link dispositions bring to the world? Does a disposition indeed amount to a bundle of an infinite number of metaphysically necessarily joined C_i - E_i pairs¹⁶, where the C_i s are enormous event types fixing what happens in very large space-time areas, namely the reverse light cones just before the respective E_i s? I still think this is a problematic assumption. I will give four reasons why.

First, note that Argument 0 (Diachronic Events) is seriously aggravated when we accept the kind of C_i s introduced above as antecedents: while the precedent cases for metaphysical necessity are synchronic or atemporal correlations of properties or individuals and their features, we have, now, in the case of dispositions, not only diachronic relations as already criticised above, but also very different *relata*. The *relata* turn out to be fine grained and spatio-temporally widely extended situation or event types as opposed to simple properties, natural kinds, or individuals. It should be rather doubtful that, without further argument, we are allowed to merely stipulate that metaphysical necessity is still the appropriate link for these cases. The dissimilarities to Kripke's original cases are too big to warrant unargued transferability.

Moreover, what dispositionalists are usually aiming for is a kind of strong *de re* dependence between a minimal antecedent and consequent which persists despite external disruptions. What the necessitarian dispositionalist offers instead are connected holistic super states that allow for no disruptions.

Related to the last point we might want to ask, second, whether we have really saved metaphysical necessity's monotonicity. That is, does the invoked relation really pass the test for monotonicity? The test, to recall, is that if C necessitates E then, whatever else, A, is the case, it should still be the case that if C and A, then E. The monotonicity here is at least questionable, for what we did is stipulate that C is all there is and, by *fiat*, nothing else could possibly be the case. In other words, the "monotonicity" we have created seems artificial in that a test for it is prohibited by decree. Disallowing the test for monotonicity is, however, not quite the same as being monotonous.¹⁷ It is, then, for this reason questionable whether we have really kept metaphysical necessity in the picture.

Suppose that the first two worries can be overcome. There is still the following third concern: the C_i -event types are so encompassing and so specific that, most probably, they happen only once within a world, if they happen at all: most of them

are probably never actualised. As a consequence, what happens with necessity does not happen often.¹⁸ We get regularities or constant conjunctions only across worlds (because of the alleged necessity) but not intra-world (because of their unique complexity).

I end with a fourth worry which is independent of the arguments given so far, yet, it shows its full force with them in the background. The concern is that if metaphysical necessity itself is exhaustively characterised by truth in all possible worlds, as necessitarian dispositionalists often seem to assume—“Truth in all possible worlds is the defining characteristic of all forms of strict necessity” (Ellis 2002: 110)—then, no matter whether we believe in the concrete reality of possible worlds (cf. Lewis) or are *ersatzists* of a kind (viewing possible worlds as propositions, etc.), it is not clear that the necessitarian dispositionalists have achieved their main goal with the above characterisation of dispositionality in terms of necessity: namely, the aim to capture a disposition’s power to *bring about* things. Instead, the resulting picture looks more like a kind of *über*-Humeanism rather than anti-Humeanism: we have a kind of hyper-mosaic through possible worlds. Yet, within a world, there is still no intrinsic link, nothing with a productive character. All those C_i - E_i pairs in an infinity of possible worlds remain co-instantiations of facts that still seem ultimately unrelated.¹⁹

Maybe the above four points can find their answers in some elaborate necessitarian framework, yet, whatever the answers, the costs of necessitarian dispositionalism have been increased to a high degree.²⁰

V. CONCLUSION

I conclude that we have reasons to be sceptical about the merits of necessitarian dispositionalism, the idea that the link dispositions bring to the world can be identified with metaphysical necessity. C. B. Martin once claimed that *counterfactuals* are clumsy and inexact gestures to dispositions (cf. Martin 1994: 8). My conviction is that the same can be said about *metaphysical necessity*.

Dispositions have to be conceived of as providing less than necessity but more than mere contingency: more than contingency, for dispositions *tend* to produce their manifestation, yet, less than necessity, for only in a derived sense do dispositions, when triggered by complete world states, ‘necessitate’ their manifestations. Maybe dispositional powers can, at least metaphorically, be compared to Newtonian forces:

a force pushes an object into a certain direction but it does not necessitate a movement, for other forces might well interfere.

There is, unfortunately, no space to argue any further for this kind of *sui generis* dispositional link. In any case, it is tempting to claim that Hume has given us alternatives, not synonyms, when he said that “we are never able [...] to discover any *power* or *necessary connexion*” (Hume 1777: 63; my italics) even though historically this would not be considered to be the correct text exegesis. In a natural follow-up to this paper I would argue that Hume was right about necessary connections but wrong about powers.

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¹ Less frequently, people pursue a different line against Hume's arguments contra the *a posteriori* route to a *de re* link. Causation, so claim these philosophers, can be directly and non-inferentially experienced in certain instances of force or pressure on our body or successful acts of the will. In fact, I believe that a version of these ideas points in the right direction and is, at least for the cases I will be concerned with, a more promising move against Hume than Kripke style arguments. Proponents of this view are, amongst others: (Michotte 1943), (Anscombe 1971), (Edgington 1990), (Fales 1990), (Baldwin 1995), and (Armstrong 1997).

² I am not here saying that Psillos is an anti-Humean. I quote him because he gives expression to the view that Kripke was involved essentially in the anti-Humean revolution (or, better, restoration) the defenders of strong laws have started.

³ If I were more courageous I would add that I am not convinced by the original Kripkean arguments and that I endorse Humean or conventionalist intuitions in regard to (metaphysical) necessity.

⁴ An exception is the necessity of origin which seems to link an individual now to some entities *back then*: that I necessarily originated from a particular sperm and ovum implies the past existence of that sperm and ovum, i.e., my existence now *diachronically* necessitates the existence of these gametes then. However, there are still differences to the diachronic cases I will focus on later: the origin relation is backwards not forwards and also not one of a causing or bringing about character.

⁵ Note that some dispositionalists subscribe to the reverse of this claim. George Molnar, for example, writes: "necessities in nature [...] require truthmakers, and it seems that it will be real powers which provide such truthmakers." (Molnar 2003: 223) Which of the two ways a dispositionalist endorses—dispositions explain necessity *or* necessity explains the dispositional link—my arguments are, if successful at all, equally effective (although they are here formulated against the latter claim). What they generally show is that dispositionality and necessity do not go together well. For convincing arguments against Molnar's direction of the necessity-dispositionality claim see (Eagle forthcoming).

⁶ I know of no explicit attempts to argue along the second strategy. This is largely because many people tacitly assume success.

⁷ In her 1971 paper "Causality and Determination" where Elisabeth Anscombe already argues that "causation [...] is not to be identified with necessitation" (Anscombe 1971: 92). She ends her paper with the words: "The most neglected of the key topics in this subject are: interference and prevention." (Anscombe 1971: 104) That is, Anscombe already saw that there is some major friction between interference and necessity. Support for her arguments can be found in Dorothy Edgington's (Edgington 1990). Note also that Anscombe's way to oppose Hume's scepticism about connections in nature is not via Kripke's *a posteriori* route through scientific discoveries, rigid designation, etc., but via direct perception of causation (cf. my footnote 1).

⁸ This history is well documented and the counterexamples to the analyses ("finks", "antidotes", "prodotes", "masques") have reached folkloric status in analytic metaphysics. Therefore, I allow myself to rehearse only one brief episode of the analysis's ups and downs. For historical accounts see (Malzkorn 2001) and (Schrenk 2008).

⁹ Which consequences we should draw from the (alleged) failure of a semantic analysis is anyway unclear. Inspired by logical empiricists' (anti-)metaphysics and epistemology 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. Yet, outside the constraints of empiricism/verificationism, conclusions from semantics to metaphysics are not so straightforward (cf. Heil 2005: 345). (This means, of course, that also the opposite question will be controversial: if no counterfactual analysis ever succeeds can we, on this basis alone, conclude that dispositions are real?)

¹⁰ Similarly we find Alexander Bird saying: "Necessarily if the potency is instantiated and receives its stimulus, then the manifestation will occur." (Bird 2007: 64)

¹¹ I should say that Ellis is thankfully someone who explicitly attempts an argument for the application of Kripke to causation where others only tacitly assume that it works.

¹² To be fair to Ellis I have to confess that I omitted a line from one of his quotes where he already excludes interferences in the fashion of attempt (2): "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 additional line still does not resolve our problems.

¹³ Andreas Hüttemann (Hüttemann 1998) has convincing arguments for dispositional realism which revolve around what he calls "CMDs": *continuously manifesting dispositions*. The upshot here is that these continuous displays cannot be captured by metaphysical necessity.

¹⁴ Note that each of these C, C_1, C_2, C_3 , etc. might well itself be a set of a multitude of C', C'', C''' , ... for there might be many more sufficient ways to trigger a disposition so that it then brings about the respective E s. (That, of course, depends on how fine grained one individuates the effects: there might be, after all, only one way to get *exactly that* breaking of a glass.)

¹⁵ This picture reflects, of course, John Mackie's causes as INUS condition. We may translate Mackie's idea thus: an ordinary dispositional predicate's antecedent describes an insufficient, yet, necessary (in the sense of "needed") part of all unnecessary ("not needed") but sufficient C, C_1, C_2, C_3, \dots . The sufficiency of the various C s for their effects corresponds to metaphysical necessitation in our sense.

¹⁶ I wish to use the phrase 'amounts to' in a weak, non-reductive sense. Maybe that bundle is all there is to a disposition, maybe it's just one essential part. This is for the necessitarian dispositionalist to decide.

¹⁷ I owe this insight to Stephen Mumford.

¹⁸ This is not to say that only a few things happen with necessity. Probably everything does in this picture, yet, everything (individuated in a fine grained way) happens only once.

¹⁹ Similar to my conclusions, Nancy Cartwright writes in her recent paper "No God, no Laws": "And a regularity is just a collection of paired events: B follows A once, B follows A again, it does so again, and again and... It doesn't matter in what mode the regularity occurs, whether for instance this kind of pattern would continue [...] in different possible worlds. A regularity is just a collection of paired events and a collection does not make any of its members happen." (Cartwright 2007: 7)

²⁰ Bertrand Russell, in his "On the Notion of Cause" (Russell 1912/2003), argues against the necessitation view of causation in a way that is parallel to my arguments in many respects. (Thanks are due to an anonymous referee of this journal for reminding me of Russell's paper). The necessity Russell attacks is, of course, not Kripkean metaphysical necessity but rather some kind of causal sufficiency: ' a necessitates b iff b follows a invariably'. In his argument Russell, too, highlights first that there is "some finite lapse of time τ between cause and effect" and that therefore, "however short we make the interval τ , something may happen during this interval which prevents the expected result." (Russell 1912/2003: 169). Consequently, "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)

In order to remedy this shortcoming Russell suggests, similar to my reverse light-cones, to "include the environment" (Russell 1912/2003: 169) Yet, analogously to the discreteness argument above, it is clear that "as soon as we include the environment, the probability of repetition is diminished, until at last, when the whole environment is included, the probability of repetition becomes almost *nil*." (Russell 1912/2003: 169) Russell therefore rejects this manoeuvre: a cause "must not be defined too narrowly [...] for if such considerations [the whole universe; my addendum] were relevant, our "event" would occur at most once, and the [causal] law would cease to give information." (Russell 1912/2003: 169)

The overall conclusion Russell draws is slightly different from the one I will end my paper with. Whereas Russell famously opted for the elimination of the concept of causation from our philosophical vocabulary (at least in 1912)—"the word "cause" is so inextricably bound up with misleading associations as to make its complete extrusion from the philosophical vocabulary desirable." (Russell 1912/2003: 164)—I still have all sympathies for dispositional predicates and dispositions. I just do not believe that (metaphysical) necessity has anything to do with them.

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