Counterpossibles (not only) for dispositionalists

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Abstract

Dispositionalists try to provide an account of modality – possibility, necessity, and the counterfactual conditional – in terms of dispositions. Dispositionalists about possibility must hold that there are no dispositions with metaphysically impossible stimulus and/or manifestation conditions; dispositionalist accounts of counterfactuals, if they allow for non-vacuous counterpossibles, require that there are such 'impossible dispositions'. I argue, first, that against a recent paper by Carrie Jenkins and Daniel Nolan there are in fact no impossible dispositions; and second, that the dispositionalist can nevertheless acknowledge the non-vacuity of some counterpossibles. The strategy in the second part is one of 'divide and conquer' that is not confined to the dispositionalist: it consists in arguing that counterpossibles, when non-vacuous, are read epistemically and are therefore outside the purview of a dispositional account.

1 Dispositionalism

Dispositionalism is the view that the truth or falsity of modal statements is a matter of the dispositions that are present or instantiated in the actual world. (Many dispositionalists speak in terms of truth-makers: thus they will say that modal truths are made true by the dispositions that are present or instantiated in the actual world.) Thus, concerning possibility statements, a dispositionalist may claim that 'possibly p' is true iff something has a disposition, or a disposition to have a disposition, or ..., for p to be the case (Vetter 2015), or that a '[s]tate of affairs S is possible iff there is some actual disposition d,

the manifestation of which is (or includes) S' (Borghini and Williams 2008, 26; both statements represent only the starting point, not the final version, of the accounts given in the cited works). Concerning counterfactual conditionals, a dispositionalist may claim that a conditional 'if p were the case, then q would be the case' is true iff the right kinds of objects have a disposition whose stimulus consists in p being the case, and whose manifestation consists in q being the case. Let me label these claims for future reference. The truth conditions for possibility claims are relatively straightforward (though still simplified):

(POSS) 'Possibly p' is true iff something has a disposition whose manifestation consists in p.[1]

'Necessarily p' can then be defined, as usual, in terms of the impossibility of p's negation.

The truth-conditions for the counterfactual conditional are a little more complicated, but the basic idea is straightforward. It is generally agreed[2] that dispositions are correlated with conditionals in the following way: if x has a disposition to M when S, then *ceteris paribus* it is true that if x were S, x would M. The '*ceteris paribus*' clause is, of course, crucial: given the possibility of finkish, masked, and otherwise interfered-with dispositions, the disposition ascription does not guarantee the truth of the conditional (nor, indeed, *vice versa*). Nevertheless, the dispositionalist's hope will be to build on that relation a dispositional account of counterfactuals, just as others have tried to build on it a counterfactual-based account of dispositions. A useful first step is to note that the bearer of the relevant disposition need not be the grammatical subject of the counterfactual's antecedent or consequent. (And, of course, there are true counterfactuals whose antecedent and/or consequent does not have a grammatical subject.) When a fragile glass is packed in styrofoam, we deny the counterfactual 'if the glass were struck, it would break', despite the glass's being disposed to break when struck, because the larger 'system' of the glass together with the styrofoam lacks the disposition for the glass to break when struck (or has it, perhaps, to an insufficient degree[3]).

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[1] I take (POSS) to be only a first step towards a dispositionalist account of possibility; my own view is developed in Vetter 2015. The shortcomings of (POSS) that I attempt to overcome there are not relevant to my present concerns, so I will stick with the simplified version here. Note that (POSS) quantifies over the dispositions' bearers; an alternative approach, exemplified by the Borghini/Williams formulation, would quantify over the dispositions themselves and thus leave room for uninstantiated dispositions to give rise to possibilities as well.

[2] Generally, but not universally: see Vetter 2014, Lowe 2011.

[3] On the importance of degrees of dispositions, see Manley and Wasserman 2007, Manley and Wasserman 2008, and Vetter 2015, ch. 3. I will leave this qualification implicit in what follows.

So we might want to say that 'If p were the case, q would be the case' is true iff the contextually relevant system has a disposition whose stimulus consists in p and whose manifestation consists in q. The contextually relevant systems will typically be somewhat larger systems – in our example it was the glass with the styrofoam, not the glass on its own –, but that may vary somewhat, hence allowing an account of the context-dependence of counterfactuals.

Of course, there may not be one unique relevant system. There may, in a given context, be a range of relevant disposition-bearers: the glass and the styrofoam; the glass, the styrofoam, and the person handling them; the glass, the styrofoam, the table on which they are positioned, and the floor; and so forth. So it may be that the truth of 'the glass would break if it were struck' requires not just that *one* of these systems has a disposition for the glass to break if struck; rather, we might require that *all* of the relevant systems should have that disposition. Thus we get the following dispositional truth-conditions for counterfactuals:

(COUNT) 'If p were the case, q would be the case' is true iff all contextually relevant systems have a disposition whose stimulus consists in p and whose manifestation consists in q.

It may be objected that (COUNT) is too strong. Perhaps some contextually relevant systems have no disposition concerning p and q in the first place. Perhaps the contextually relevant systems are those in the speaker's vicinity; those may include a fragile glass, a stone floor, and a bar of chocolate. It may feel wrong to ascribe to the bar of chocolate a disposition whose stimulus consists in the glass's being dropped onto the floor, and whose manifestation consists in the glass's breaking. Yet that fact clearly does not detract from the truth of the counterfactual 'If the glass were dropped onto the floor, it would break' in this context. Thus we may add a specification to (COUNT) which requires that the relevant systems *have* pertinent dispositions, as follows:

(COUNT*) 'If p were the case, q would be the case' is true iff all contextually relevant systems are such that if they have any disposition whose stimulus consists in p, then they have a disposition whose stimulus consists in p and whose manifestation consists in q. [4]

Neither (COUNT) nor (COUNT*) need to be the dispositionalist's last word on the matter, and both contain vocabulary that would

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[4](COUNT) will collapse into (COUNT*) if we make the possession of a disposition with a stimulus consisting in p a condition on the relevance of a system. In order to keep the two claims apart, I will assume that we do not impose such a requirement on relevance.

require further explication (exactly what is it for a stimulus or manifestation to 'consist in p'?). We might vary them to quantify not over the systems that have dispositions, but over the dispositions themselves. We might uphold that there is, after all, a single relevant system in every context, so we need a definite description, not a universal quantifier, in the truth conditions for counterfactuals. We might, finally, try a very different route and use, instead of the idea that dispositions are correlated with counterfactuals via their stimulus and manifestation, the idea that dispositions come together as 'mutual manifestation partners' to produce an effect together.[5] I think that none of these different options will make a difference to the argument that follows. What matters is that we have a quantificational structure and that somewhere in that structure we talk about dispositions whose stimulus condition consists of p, the conditional's antecedent. For the time being, let 'dispositionalism about modality' stand for the conjunction of (POSS) with one of (COUNT) and (COUNT*).[6]

Dispositionalism about modality has appealed to many in recent years (Pruss 2002, Borghini and Williams 2008, Jacobs 2010, Bird 2007, Contessa 2009, Vetter 2015). It is a thoroughly actualist view that locates modality in what we intuitively take to be the constituents of reality: individual objects and their properties.

Dispositionalism does, of course, come with a number of costs and worries, both regarding its material adequacy (Wang 2014, Vetter 2015, Contessa 2009, Cameron 2008) and regarding its formal adequacy (Yates forthcoming, Vetter 2015). I will not go into these here. What I want to do, instead, is look at the place that counterpossibles have within dispositionalism. More specifically, in section 2, I will point to certain tensions within dispositionalism about modality on the assumption that there are non-vacuous counterpossibles. The

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[5]I have suggested something close to (COUNT) and (COUNT*) in Vetter 2013 and Vetter 2015. Jacobs (2010) provides a better worked-out semantics which does not quantify over the systems that have the relevant dispositions, but rather over 'property complexes' that have powers to produce further 'property complexes', which appears to me to have elements of two of my suggestions in the text: quantifying over dispositions, not their bearers, and (more implicitly) the idea of mutual manifestation. My arguments in this paper can easily be rephrased to fit his approach: the question I am about to raise, whether anything might have dispositions with impossible stimulus or manifestation conditions, then becomes the question whether any property complex, instantiated or not, includes such dispositions. The restriction to instantiated dispositions that is implicit in my way of phrasing the question makes no difference to the argument.

[6]The conjunction may, but need not, be ordered in terms of priority. Thus Jacobs (2010) defines necessity, and thereby possibility, in terms of the counterfactual, which in turn is understood in terms of dispositions or powers. My point in what follows will concern a much weaker assumption that should be common to dispositionalists: the *compatibility* of (POSS) (or something like it) with (COUNT), (COUNT*), or something like them.

following sections will then examine whether or not there is reason to believe, given the dispositionalist picture, that there are such non-vacuous counterpossibles.

2 Counterpossibles

By a 'counterpossible', I mean a counterfactual conditional whose antecedent is metaphysically impossible, such as

(1)   If Hobbes had squared the circle, sick children in the mountains of South America at the time would not have cared. (Nolan 1997, 544)

or

(2)   If Hesperus were not Phosphorus, Hesperus would still be Hesperus.

(In what follows, I will often drop the qualification 'metaphysically', but all impossibilities are to be implicitly understood as metaphysical unless otherwise noted.) Recent debate about counterpossibles has centered around the question whether all of them are true, as implied by the standard Lewis/Stalnaker semantics for counterfactuals (Lewis 1973) and defended more recently by Williamson (2007), or whether our intuitive verdict that some of them are true while others are false can be upheld, a view most prominently defended by Nolan (1997). Where does a dispositionalist semantics stand on this issue?

In answering this question, the key issue is whether or not things have dispositions with impossible stimuli, i.e., stimuli consisting in p where it is metaphysically impossible that p. If there are no such dispositions, then according to (COUNT*) all counterpossibles are true, while according to (COUNT) all counterpossibles are false. Conversely, if there are both true and false counterpossibles, then for both (COUNT*) and (COUNT) there must be dispositions with impossible stimuli. Let me explain.

(COUNT*) has the form of a universal quantification, stating that *all* systems with relevant dispositions whose stimulus consists in p are such-and-such. If for all impossible p, there is *no* disposition at all with a stimulus consisting in p, and hence no system with such a disposition, then the truth conditions for 'if p were the case, then q would be the case' are trivially met, and the conditional is vacuously true. In general, a universal quantification 'All Fs are G' is vacuously true iff there are no Fs.

(COUNT) also has the form of a universal quantification: it says that all systems have the disposition with p as stimulus and q as man-

ifestation. If for all impossible p, there is no disposition at all with a stimulus consisting in p, and hence no system with such a disposition, then a fortiori it will be false that all the relevant systems (of which, I am assuming, there will always be some) are systems with such a disposition. So all counterpossibles will be false, given (COUNT). Let me refer to this case – the case of a universal quantification 'All Fs are G' where there simply are no Gs, F or otherwise – as 'vacuously false', and group it together with the case of vacuous truth as 'vacuity'. It is not, of course, a case of vacuity in the proper sense. But my point is merely that when counterpossibles are classified as vacuous in my extended sense, they will be either all true or all false; there will be no variation in truth value. Then we can say: whether the dispositionalist adopts (COUNT) or (COUNT*), counterpossibles are going to be vacuous – either all true or all false – if there are no dispositions with impossible stimulus conditions.[7] By contraposition, if there are non-vacuous counterpossibles, as Nolan has argued, then there must be dispositions with impossible stimulus conditions.

The prima facie tension for the dispositionalist is now easy to see. Suppose that there are non-vacuous counterpossibles, and therefore dispositions with metaphysically impossible stimulus conditions. Plausibly (though not necessarily), some of these dispositions will also have metaphysically impossible manifestations; at any rate, given metaphysically impossible stimulus conditions, there is no way that we can exclude metaphysically impossible manifestations. And if that is so, then the dispositionalist truth conditions for possibility statements, as exemplified in (POSS), are inadequate: they do not provide a sufficient condition for the truth of 'possibly p'. After all, it may be that p is the manifestation of a disposition, but that the disposition is one that underwrites a counterpossible; and therefore it may be that p is not metaphysically possible after all.

The tension I have outlined has not gone entirely unnoticed (see Jenkins and Nolan 2012, more about which below). It may also seem to be not entirely germane to the dispositionalist view. For can a parallel argument not be constructed for possible-worlds semantics of possibility statements and of counterfactual conditionals, respectively? On a standard possible-worlds semantics for counterfactuals, the acceptance of non-vacuous counterpossibles pushes us towards accepting impossible worlds (see Nolan 1997); but if there are impossible worlds

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[7]Note that this is not purely a consequence of the universal quantifier that governs both (COUNT) and (COUNT*). If we thought that there was one relevant system in any given context and rephrased the truth-conditions accordingly, we would still end up with a kind of systematic falsity, because no system could have the dispositions required for the truth of a counterpossible.

as well as possible ones, then we can no longer define possibility as truth-in-some-world (or necessity as truth-in-all-worlds).

The answer to this question is obvious. It is simply we need to distinguish the possible from the impossible worlds, and say that possibility is truth in some of the *right* kind of worlds. Which are the right kind of worlds? The possible ones, of course. If we stop here, we will have adopted a non-reductive approach to modality, along the lines, for instance, of Stalnaker (2003). Instead, we might continue to analyse what it is that sets the possible worlds apart from the impossible ones, by providing further, non-circular, criteria for the distinction, along the lines of Cameron (2008) and Sider (2011). Whichever way we choose, worlds do not carry the metaphysical weight of a reduction of modality – either because there is no such reduction, or because it is ultimately the conditions that distinguish between possible and impossible worlds that do the work.

But this should not worry the possible-worlds theorist too much. She has a great many uses for possible worlds that do not require a reduction of modality to these worlds. Possible worlds provide models for modal logic, they are used in the best semantics that we have of modal language, and they figure in theories of different but potentially related phenomena, such as belief, content, properties, and (indicative) conditionals. Even without reducing modality straightforwardly to worlds, the possible-worlds theorist is still able to link possibility and counterfactuals to those various phenomena in interesting ways.

No such response is available for the dispositionalist. Dispositions have yet to prove their value in any of the many arenas where possible-worlds models have flourished. What is more, the motivation for dispositionalism about modality tends to be genuinely metaphysical: we accept dispositionalist views of modality, if we do, not because they provide useful formal models, but because they provide an attractive picture of the metaphysics of modality. This kind of motivation would be blatantly off-topic if we adopted a version of dispositionalism akin to either Stalnaker's or Cameron and Sider's view of possible worlds.[8]

It seems clear, then, that the dispositionalist had better not envisage non-vacuous counterpossibles. But is that really an option?

One kind of threat to the dispositionalist comes from the existing literature on counterpossibles, with its examples of putatively non-vacuous counterpossibles and arguments for their indispensability. Obviously, the dispositionalist's allies are those who, like Williamson (2007) and (an unlikely ally!) Lewis (1973), argue that all counterpossibles are vacuously true. (Note, however, that the dispositionalist

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[8]Note, however, that dispositionalism is in an important sense non-reductive: it does not 'reduce the modal to the non-modal'. But that kind of non-reductionism is of no help here.

need not care whether counterpossibles are vacuously true or false; all she needs to worry about is non-vacuity.)

A different kind of threat is one that is *inherent* to dispositionalism. Such a threat would arise from reasons to believe that there are dispositions of the kind that, by (COUNT) or (COUNT*), make some counterpossibles non-vacuously true and others non-vacuously false and thereby produce counterexamples to (POSS). Jenkins and Nolan (2012) have presented a case for such an internal threat, by giving examples of dispositions that have impossible antecedents (and/or manifestations). If there are such dispositions – call them 'impossible dispositions' – then we can expect to get some non-vacuous counterpossibles. But even more directly, we can expect to get counterexamples to (POSS), as Jenkins and Nolan (2012, 751) have noted. (Again, the obvious threat for (POSS) are dispositions with impossible manifestations. But once we admit dispositions with impossible stimuli, it is hard to see how such dispositions could still guarantee the possibility of the manifestation's occurring.) So the dispositionalist needs to have a response to their cases.

Section 3 will present some of those inherently threatening cases, reflect on some of their features and present an argument against accepting them. Section 4 will then offer a dispositionalist (but not merely dispositionalist) solution to the external threats, by explaining how apparently non-vacuous counterpossibles do not, after all, present a problem for a dispositionalist semantics properly understood.

3   Against impossible dispositions

3.1   The argument

Jenkins and Nolan (2012) have argued for dispositions with metaphysical (as well as logical and nomological) impossibilities as their stimulus and/or manifestation condition, by citing an array of examples. Their examples come in two kinds. The first kind are dispositions of agents to react in certain ways to metaphysical (as well as logical and nomological) impossibilities: Jane's disposition 'to be surprised when there is a detectable round square object in front of her' (738), for instance, or Heidi's disposition to 'produce a proof of conjecture X on the condition that there is one' (739), for a necessarily false but as yet unrefuted mathematical conjecture X. A second class of examples does not invoke agents. These include dispositions of mechanisms to react to different laws of nature, i.e., nomologically impossible reactions to nomologically impossible circumstances; dispositions of computers (i.e., another form of mechanism) to react, much like Heidi, to mathematical impossibilities; and scientific idealizations, such as a rabbit

population's disposition 'to increase by 0.1 of a rabbit in a given period of time' (746), a disposition whose manifestation is presumably metaphysically impossible.

I think that some of these examples can be disregarded or explained away by the dispositionalist. Examples that feature nomological impossibilities are irrelevant for present purposes; examples that involve scientific idealizations can presumably be explained by whatever strategies we use to deal with scientific idealizations in general; and some of the agent-involving examples may be explained away as reactions to an agent's *representation* of an impossibility rather than to the impossiblity itself, e.g., to Jane's *belief* that there is a round square in front of her. I will not, however, pursue this strategy here since there remain some examples that appear to be not so easily explained away. Heidi's disposition to prove conjecture X if there is a proof of it cannot be explained away in terms of her mental states: Heidi is certainly not disposed to prove conjecture X if she believes that X is true, at least not on the intended reading of 'prove' which requires the truth of what is proved. Similar considerations apply to the computer that is disposed, it seems, to display a mathematical impossibility on condition of its being true.

We are left, then, with at least some examples that are genuinely worrying for the dispositionalist.[9] How are we to argue about those examples? What kind of evidence do we have?

Jenkins and Nolan rely heavily and explicitly on their linguistic intuitions about the disposition ascriptions at issue, though they are aware of the risk that one might confuse such disposition ascriptions with something else (739f.). I have argued elsewhere (Vetter 2014, 146-148) that unlike linguistic intuitions about dispositional adjectives such as 'fragile' or 'soluble', linguistic intuitions concerning the expressions 'disposed' and 'disposition' are not a reliable guide to the metaphysics of dispositions: outside philosophy, these expressions are not typically used to ascribe the kinds of properties that philosophers are after when debating dispositions such as fragility, solubility, and so forth. They are, rather, technical terms with little theory-independent intuition behind them, and therefore they ought to be used to conform with

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[9]In Vetter (2015, ch. 7.2), I do try to explain away *all* of Jenkins and Nolan's examples. I there appeal to the idea (which I defend at length earlier in the book) that dispositions are individuated only by their manifestation, not by a stimulus condition. In this paper, I do not want to assume my views on the individuation of dispositions, so I am taking a different angle on Jenkins and Nolan's argument. Everything that I say here is compatible with the argument in Vetter 2015.

the phenomenon that we are trying to capture with them, rather than giving us a pretheoretical grasp on those phenomena.[10]

In itself, of course, this does not refute Jenkins and Nolan's claims. It may give us a strategy of explaining away recalcitrant intuitions once we have (elsewhere) found reasons to disbelieve them. What we need, either way, are better reasons for or against the putative kinds of dispositions that Jenkins and Nolan have cited.

I want to offer a *general* argument against impossible dispositions. The argument is very simple:

Premise 1 If there are impossible dispositions, then they give rise to referential opacity.

Premise 2 Dispositions never give rise to referential opacity.

Conclusion There are no impossible dispositions.

I use 'referential opacity' in a rather restrictive way, to mean non-substitutability of proper names. What is it for a disposition to 'give rise to' referential opacity? Take the canonical ascription of a disposition to be of the form 'x is disposed to M if S', 'M' being a description of the disposition's manifestation and 'S' of its stimulus. A disposition D gives rise to referential opacity if its canonical description (or one of its canonical descriptions, if there are several) is referentially opaque where the description of its stimulus and manifestation that are embedded in D are not referentially opaque. I will now look at the two premises in turn.

On Premise 1. It has been argued that non-vacuous counterpossibles, if there are any, must be referentially opaque (Williamson 2007, 174). Defenders of non-vacuous counterpossibles will want to hold that (3) is true while (4) is false (both are from Williamson 2007, 174):

(3)   If Hesperus had not been Phosphorus, Hesperus would not have been Phosphorus.

(4)   If Hesperus had not been Phosphorus, Phosphorus would not have been Phosphorus.

Yet the putatively true counterpossible (3) would result from subsistuting a co-referential name in the allegedly false counterpossible (4). Williamson (2007) takes their referential opacity to be one of a number of fatal objections to non-vacuous counterpossibles. Others have disagreed (Brogaard and Salerno ms.). I do not want to take a stand in the debate at this point; all I want to point out is that *if* there are

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[10]I find this line of objection less decisive in the present case than in the case that I address in the paper where this argument originates. Still, we should be cautious in appealing to linguistic intuition.

non-vacuous counterpossibles, they had better be referentially opaque. This much seems uncontroversial.

This does not, of course, establish my Premise 1. Disposition ascriptions are not in general equivalent to counterfactuals. My claim is that nevertheless we can apply the same form of argument to them. Suppose that Hari is an excellent astronomer who specializes in the celestial bodies of our planetary system. If anything has impossible dispositions, then surely Hari has the disposition to find out that Hesperus is not Phosphorus on the condition that Hesperus, indeed, is not Phosphorus. Given that finding out about this would constitute a great discovery, defenders of impossible dispositions should take this to be a true canonical description of such a disposition:

(5)   Hari is disposed to make a great discovery if Hesperus is not Phosphorus.

The reasoning for (5) runs very much in parallel to that adduced by Jenkins and Nolan for Heidi's disposition to find out if conjecture X is true. [11]

Now suppose further that Hari has not ever given much thought to philosophical logic and has no interest in, nor much of a talent for, participating in debates of classical vs non-classical logic. Then the following canonical disposition ascription should be false:

(6)   Hari is disposed to make a great discovery if Phosphorus is not Phosphorus.

Of course, (6) results from (5) (or vice versa) by substitution of a coreferential name in a canonical disposition ascription. So if there are impossible dispositions, it appears that their canonical descriptions will be referentially opaque.[12]

Impossible dispositions, if there are any, would thus have to give rise to referential opacity, just as counterpossibles do. But does that observation constitute evidence against impossible dispositions?

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[11]Note that (5) deviates from the Heidi case in that it introduces reference to a concrete object other than the disposition's possessor itself in the scope of the disposition ascription. (I think that if we spell out what conjecture X says in the Heidi case, we would find that we are dealing with objects as well, but of course they would be abstract objects.) We need reference to an object, of course, in order for the definition of referential opacity to have any traction at all; I use a concrete object to avoid dispute about the status of abstract objects. I will briefly address – or, at any rate, mention – an objection to object-involving dispositions in section 3.2.

[12]Note that while Williamson uses referential opacity to argue against the claim that counterpossibles are non-vacuous, and in effect against *false* counterpossibles, I will use it (given premise 2) against the view that there are *true* ascriptions of impossible dispositions. My strategy is different from Williamson's although we share a starting point.

On Premise 2. My argument for premise 2 is metaphysical. Dispositions – on the dispositionalist view, at any rate – are in no way dependent on language (except when they are dispositions to act on or react to language) or on our cognitive states (except when they are dispositions to act on or react to a cognitive state). Coreferential names such as 'Hesperus' and 'Phosphorus' in (5) and (6) differ *qua* signs, that is, as bits of the language; and they may well differ cognitively, in what we know about an object under the guise of one name or another. But neither of these differences should be relevant to the dispositions ascribed in (5) or (6); they are dispositions to act on or react to a given object, the referent of n_1 and n_2.

When referential opacity is at stake, we are dealing with disposition ascriptions that involve *names*. Such disposition ascriptions will typically ascribe *extrinsic* dispositions: dispositions whose possession depends on the existence, and quite likely on the nature, of an object or objects distinct from the disposition's possessor – namely, the object or objects referred to by the names in question. (I say 'typically' because I have not excluded the case where the name refers to the disposition's possessor itself.) But again, such an extrinsic disposition depends not on other objects *under some guise*, cognitive or linguistic; it depends on the objects themselves. Take a given key, call it Kay, and a door, to which we give two names: 'Dora' and also 'Doris'. If we say that Kay is disposed to open Dora when inserted into Dora's lock, we ascribe to Kay a disposition that is extrinsic in that Kay would not have it were Dora not to exist, or to have its lock exchanged. (In possible worlds talk: an intrinsic duplicate of Kay's in another world may lack the disposition if, in the duplicate's world, Dora does not exist or is fitted with a different lock.) But what Kay's disposition depends on – besides Kay's own intrinsic constitution – is just Dora/Doris, the door, not Dora under some name or another. The same should hold for the disposition(s) ascribed in (5) and (6).

What individuates a disposition is its manifestation and (on the view here under consideration) its stimulus condition. There may be some room for disagreement about the metaphysical status of a disposition's manifestation and stimulus: are they properties? Or events? And if events, are they type or token? But it seems clear that they are not properties or events *under some guise*, symbolic (referred to by one sign or another) or cognitive.

This concludes my argument for premise 2. From premise 1 and 2 taken together, it follows that there are no impossible dispositions. How might the opponent react to my argument?

3.2 Objections and replies

First, the opponent may respond that dispositions of agents are different. Suppose I know of the author of *Middlemarch*, whom I adore, only under the name 'George Eliot', not under the name 'Marian Evans'. Now is it not true, the opponent asks, that I am disposed to read a novel by George Eliot when presented with one, but not disposed to read a novel by Marian Evans if presented with one? Or suppose that Reinhold, an avid and able mountaineer, knows of the tallest Mountain in the world only under the name 'Mt Everest', but not under the name 'Sagarmatha'. Now is it not true, the opponent continues, that Reinhard is disposed to climb Mt Everest if he tries but not disposed to climb Sagarmatha if he tries?

But the counterexamples are confused. I *am* disposed to read a novel by George Eliot/Marian Evans when presented with one that has the name 'George Eliot' on it, but not disposed to read a novel by George Eliot/Marian Evans when presented with one that has the name 'Marian Evans' on it. Reinhold is disposed to climb Mt Everest/Sagarmatha when he tries to do so, under whatever name. Trying to climb Mt Everest and trying to climb Sagarmatha are exactly the same thing; and he is disposed to succeed when doing that very thing. If we think of trying more along the lines of an internal monologue, then we introduced a referentially opaque operator into the disposition's stimulus. Reinhold may be disposed to climb Mt Everest/Sagarmatha upon thinking to himself 'I shall climb Mt Everest!', but not disposed to climb Mt Everest/Sagarmatha upon thinking to himself 'I shall climb Sagarmatha!', perhaps because he takes Sagarmatha to be the name of Mt Everest's neighbouring mountain, Lhotse (so he is disposed to climb Lhotse upon thinking to himself 'I shall climb Sagarmatha!'). But that is not a matter of *dispositionality* giving rise to referential opacity.

Second, the opponent may try claiming that the identities in question play a role similar to that of the better-known intervening factors such as masks, finks, and mimics. Like those intervening factors, the identity facts are external to the disposition itself and ought not to affect it; what they do, rather, is prevent the disposition from manifesting. On this view, Kay may have contradicting dispositions with respect to Dora and Doris, but given the identity of Dora and Doris, Kay will never simultaneously manifest those contradicting dispositions. Nevertheless, the opponent says, such dispositions would then give rise to referential opacity.

But of course the identities in question are precisely *not* external to the disposition in question – not, at any rate, in the crucial sense that possession of the disposition is independent of them. The disposition to open Dora, I have said, is an extrinsic disposition that involves Dora

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itself, the door – and that just is to say that it is a disposition which involves Doris.

The first two objections were targeted on premise 2, the exclusion of referential opacity. Alternatively, the opponent may focus on premise 1 and deny that impossible dispositions have to give rise to referential opacity. My examples were, and indeed had to be, dispositions that involved specific *objects* in their stimulus and/or manifestation. But, the opponent might argue, there are no such object-involving dispositions; dispositions are inherently general. And once we have ensured that our dispositions are fully general, of course, there is no place for referential opacity (or transparency) in canonical disposition ascriptions.

In response, I reject the claim that all dispositions are inherently general. A key's power or disposition to open a particular door serves as a perfectly intuitive counterexample. Such object-involving dispositions are extrinsic, as McKitrick (2003) has shown: their possession depends on the existence and features of the objects that are involved in them. It may be argued that extrinsic dispositions are not, at least, among the most natural or fundamental dispositions, and we might refuse to use them as examples on that count.[13] But Jenkins and Nolan's examples are not particularly natural or fundamental dispositions either, and in general concern about dispositions has often concerned the fundamental as well as the derived. So I see no reason to exclude the examples that support premise 1 from the status of *bona fide* dispositions.

A fourth and quite different strategy is to accept my premises but, as it were, isolate the point I have made with them. Thus the opponent may point out, as she did already in the third objection, that the distinction between referential opacity and tranparency can be meaningfully applied only to disposition ascriptions that have a name (or, presumably, another rigid designator) in them; and she may then continue to claim that there are impossible dispositions that can be ascribed without names: the disposition to see a round square if there is one, for instance. My argument, she will continue, has done nothing to disprove the existence of *those* impossible dispositions.

In response, it seems *ad hoc* to introduce such a distinction in response to my argument. The intuitive considerations that speak in favour of impossible dispositions seem just as strong in the cases which the opponent now gives up as they do in the cases which she retains. But if she accepts my argument, that suggests that something was

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[13]Molnar (2003) does so; Bird (2007) conjectures that the fundamental dispositions are intrinsic, and I have argued (Vetter 2015) that all extrinsic dispositions are grounded in intrinsic ones. McKitrick (2003) herself acknowledges that her examples are dispositions on a liberal conception.

wrong with the intuitive considerations in the first place, so why rely on them elsewhere?

3.3 Upshot

There is certainly room for further debate. But let us, for the moment, pause to take stock. I have argued, first, that linguistic intuitions about the locution 'x is disposed to M when S' are not quite enough, and that we need further evidence. I have then adduced such evidence, consisting in the brief argument that impossible dispositions, if there are any, must give rise to referential opacity, but that dispositions cannot give rise to referential opacity.

This is my response to the internal challenge for dispositionalism, understood as the conjunction of a dispositional account of possibility (along the lines of (POSS)) and of counterfactuals (along the lines of (COUNT) or (COUNT*)). But the external challenge remains: what is the dispositionalist to do with the intuitively plausible examples of non-vacuous counterpossibles? We have seen above that such counterpossibles would require impossible dispositions by the lights of the dispositionalist account; but there are no such impossible dispositions. Can we say something to explain away the appearance of non-vacuous counterpossibles? I believe we can, and I will show how I think we should do it in the next section. As it turns out, it is the very aspect of would-be impossible dispositions which I have made use of in this section, referential opacity, that enables the dispositionalist also to deal with counterpossibles.

4 Non-vacuous counterpossibles for dispositionalists: divide and conquer

What, then, is the dispositionalist to do with apparently non-vacuous counterpossibles? In this section, I want to suggest a strategy which goes especially well with dispositionalism but is, in principle, available to other theories that are committed to the vacuity of counterpossibles. It is a strategy of *divide and conquer*: it divides the counterpossibles into those we care about, and which are vacuous (true or false, as our theory may have it), and those which are non-vacuously true or false, but which we do not need to care about. The strategy, very briefly, is this: first, we apply the well-known distinction between circumstantial and epistemic 'flavours' of modality to counterfactuals; second, we argue that the relevant counterpossibles for our purposes are the circumstantial ones; and third, we argue that the apparently non-vacuous counterpossibles, precisely because they are referentially opaque, must be epistemic.

First: flavours of modality.

It is well-known in the literature on modal semantics that modal expressions can express more than one 'flavour' of modality. A sentence such as 'Paula may come later' may express *deontic* modality, stating that Paula has permission to come later, or *epistemic* modality, saying (roughly) that it is possible in view of one's evidence that Paula will come later. A sentence such as 'Paula can play the violin', in turn, may be used *circumstantially* to ascribe to Paula an ability, perhaps coupled with an opportunity, to play the violin (she's taken lessons, she has an instrument at hand, etc.); or it may, like the first sentence, be used deontically, to say that Paula is permitted to play the violin (there's no rule against her playing the violin at this time and place, etc.). There is a great deal of variability even within any given flavour: whose permission and which rules are at stake, for instance, in the deontic modal? Whose knowledge or evidence is the epistemic modal relative to? And how broadly are we to think of the external circumstances required in addition to the subject's intrinsic abilities to make a circumstantial 'can' claim true? These are not questions that I will discuss here, but the standard way of dealing with them is to treat them, as well as the distinction between the different flavours of epistemic, deontic, and circumstantial modality (and potentially any others) as matters of context-sensitivity (see Kratzer 1981). All that I will need is the general distinction, and in fact only that between epistemic and circumstantial modality.

Which flavours of modality, then, do counterfactual conditionals express? The focus in the philosophical debate on 'would' counterfactuals, at any rate, appears to be on the circumstantial. It is generally supported by the well-known contrast between the indicative conditional (7) and the subjunctive, that is, counterfactual conditional in (8) (both are from Adams 1970):

(7)   If Oswald did not shoot Kennedy, someone else did.

(8)   If Oswald had not shot Kennedy, someone else would have.

The change from the indicative to the subjunctive mood, in this pair of examples, signals a change from an epistemic reading to a circumstantial one: in (7), we hold fixed what we know (that Kennedy was shot) and can conclude on this basis that if Oswald did not shoot Kennedy, someone else must have done it ('must', in turn, being an epistemic modal)[14]; in (8), we consider circumstances that we know not to obtain, and make a claim about an actual basis for different developments

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[14]For the epistemic reading of indicative conditionals with implicit or explicit 'must', see the classic Kratzer 1986.

under those circumstances – the actual basis, in this case, being the (alleged) presence of at least one other shooter.

I do not wish to dispute that many, and indeed many philosophically interesting, counterfactuals have circumstantial readings. However, I want to point out that 'would' counterfactuals are sometimes just as naturally read as epistemic.

We can borrow a nice array of examples from Dorothy Edgington (2008) (who is using them for a different purpose):

> (i) There is a treasure hunt. The organizer tells me 'I'll give you a hint: it's either in the attic or the garden.' Trusting the speaker, I think 'If it's not in the attic it's in the garden.' We are competing in pairs: I go to the attic and tip off my partner to search the garden. I discover the treasure. 'Why did you tell me to go to the garden?' she asks. 'Because if it hadn't been in the attic it would have been in the garden: that's (what I inferred from) what I was told.' That doesn't sound wrong in the context.
> (ii) Or consider: 'Why did you hold Smith for questioning?' 'Because we knew the crime was committed by either Jones or Smith—if it hadn't been Jones, it would have been Smith.'
> (iii) There's also a nice example of van Fraassen's (1981): the conjuror holds up a penny and claims he got it from the boy's pocket. 'That didn't come from my pocket', says the boy. 'All the coins in my pocket are silver. If that had come from my pocket, it would have been a silver coin.'
> (Edgington 2008, 16f.; numbers and paragraphs inserted by me)

All three examples, I maintain, favour an epistemic reading. In (i), Edgington tells her partner, not that reality (before the hiding of the treasure) was such that the treasure would have been hidden in the garden if it had not been hidden in the attic – the organizer may never have considered hiding the treasure in the garden. (In possible worlds terms: the closest world where things are most similar to the way they actually were up to the hiding of the treasure but where the treasure is not in the attic need not be such that the treasure is hidden in the garden in all, or even in any, of them.) Rather, Edgington is saying something like this: on the assumption of the treasure not being in the attic, her evidence would have led her to conclude that the treasure is in the garden. (In possible worlds terms: the worlds that are best compatible with her overall evidence at the time except that in them, the treasure was not hidden in the attic are such that in all of them the treasure is hidden in the garden.)

Likewise, the detective in (ii) need not say, as we imagine the speaker of (8) to say about Kennedy's murder, that Smith at some point was ready to commit the crime if Jones did not succeed (that the worlds most similar to actuality until just before the time of the crime and in which Jones did not commit the crime in question are all worlds where Smith did it) – it may by now have become clear that Smith is an impeccable citizen who has nothing whatsoever to do with the case. What she is saying, rather, is that her evidence would have led her to conclude, on the assumption of Jones's evidence, that Smith committed the crime (that the worlds best compatible with her overall evidence at the time except that in them, Jones did not commit the crime are such that in all of them, Smith committed it).

The same, finally, goes for (iii). Here the boy does not say that the penny that the conjurer is holding would have turned into silver had he inserted it into his pocket earlier (or that the possible worlds most similar to actuality except for that coin having come from his pockets are such that the coin is silver in all of them) – that would certainly be greater magic than that which the conjurer is trying to practise on him. Rather, the boy says that he can rule out the penny's having come from his own pocket since, on the assumption that it did, his evidence would lead him to conclude that it was a silver coin (the possible worlds best compatible with his overall evidence except that in them the penny held up in front of him had come from his pocket are such that the penny is made of silver) – but since it isn't, the penny must (epistemic *must*!) have come from elsewhere.

I have used the vocabulary of evidence leading one to conclude one thing on the assumption of another, and that of possible worlds, in commenting on the cases. But I do not think that either vocabulary is required to see that the relevant sentences express epistemic, not circumstantial modality: they concern, in some sense, not the world but the subject's state of evidence. The semantic analysis of epistemic modality is highly contested, and I do not want to take a stand on it[15], but any reasonable semantics should yield the verdict that (i)–(iii) are epistemic and not circumstantial. It should not come as a surprise that 'would' counterfactuals have epistemic readings; most modal expressions do. A recent corpus-linguistic survey even concluded that the 'hypothetical *would*' was used epistemically in 64.3 % of cases, and circumstantially in only 22.9% (Collins 2009, 140).

I conclude, then, that there are 'would' counterfactuals with epistemic readings.

Now on to our *second* step: why the dispositionalist is not concerned with epistemic modality.

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[15]Nor can I begin to provide a survey of the literature. But see, for instance, Egan et al. 2005, Yalcin 2007, and von Fintel and Gillies 2007.

The dispositionalist has good reason to go for a sharp distinction between circumstantial and epistemic modality. As I have argued elsewhere (Vetter 2013, Vetter 2015), the dispositionalist semantics is really naturally suited only for circumstantial modals: dispositions are a matter of how things are and of how things could be, given how they are; that is just what circumstantial modality is about. The dispositions of a given object are not a matter of our knowledge of or evidence about that object; but that is precisely what epistemic modality appears to be about.[16] Nor is this an *ad hoc* move on the part of the dispositionalist: there is good evidence in linguistics, both syntactic and semantic, that epistemic and circumstantial modality are really not quite on a par. Epistemic modals appear to function as sentence operators, taking scope over a whole sentence, tense, aspect, and all; while circumstantial modals tend to have the logical form of a predicate operator, scoping under tense and aspect and being parsed naturally with the predicate of the sentence, or perhaps a 'proto-sentence' containing the sentence's subject and predicate but not expressing a full proposition. (See, for instance, Vetter 2015, ch. 6.9, Brennan 1993, Hacquard 2009.) In fact, from the dispositionalist's point of view, that difference is hardly surprising. Modality, to her, is after all about the modal properties of objects, and 'disposed to' is best understood as a predicate operator. Epistemic modality, if it is about (say) the compatibility of a proposition with our knowledge or evidence, must of course be expressed by a sentence operator with a semantic value that can be applied to an entire proposition.

The dispositionalist, then, has independent reason for the second step of my divide and conquer strategy: the claim that she cares only about the circumstantial counterfactuals, as only those are suitable for a properly dispositionalist semantics in any case.[17]

The *third* step, then, is to argue that non-vacuous counterpossibles are never circumstantial (but rather epistemic[18]), and hence they are not within the scope of a properly understood dispositionalist semantics anyway.

The key here is precisely the feature that I have pointed out earlier: the referential opacity of non-vacuous counterpossibles. If a given modal gives rise to referential opacity, I want to claim, then that is evidence for an epistemic reading of that modal. (Again, by 'giving

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[16]There may be a dispositionalist semantics for epistemic modals, but it would concern the dispositions of the relevant subject, e.g. the speaker of the sentence, not the dispositions of the objects that the sentence is about. See Vetter 2013.

[17]A result of this instance of dividing may be that modals such as 'would' end up being *ambiguous* between their epistemic and circumstantial uses. I endorse this result, for various reasons; see Viehbahn and Vetter 2014.

[18]I continue to ignore deontic modality. As Williamson (forthcoming) notes, it is less easily confused with circumstantial modality.

rise to referential opacity' I mean the following: when a sentence S is embedded under the modal, the resulting sentence exhibits referential opacity where S alone, unembedded, did not exhibit referential opacity.)

To begin with, we need to see that there is indeed referential opacity in the scope of epistemic modals. I will support this part of the claim with two more vignettes, using the uncontroversially epistemic 'might'. I owe the first vignette to Beau Madison Mount.

Ortcutt (Quoted directly from personal communication:) Ortcutt runs a criminal enterprise on the East Coast under his own name and one on the West Coast under the pseudonym of Lingens. The police officer who is investigating both cases finds some suggestive clues that link them, but no convincing evidence. Nonetheless she starts working on the hypothesis that both names refer to the same man. Her partner, worried that she's ignoring other explanations, says 'Don't get carried away. Ortcutt might not be Lingens.' Of course, her partner would not dream of warning her that 'Ortcutt might not be Ortcutt'.

Astronomy In an ancient culture with advanced but patchy astronomy, Phosphorus is revered as bringing on the new day, while no one is particularly interested in the heavenly bodies that appear in the evening. Astronomers have just discovered the difference between stars and planets and have classified Phosphorus as a planet. As an afterthought, one of them goes through the heavenly bodies seen in the evening and says, 'Hesperus might not be a planet.' Of course, the same astronomer would not assent to 'Phosphorus might not be a planet.'

In (Ortcutt), the police agent does not know that the names 'Ortcutt' and 'Lingens' name the same individual. Hence she is prepared to make different modal statements about the same individual under these two different designations. More importantly, it seems that, given their epistemic state, the police officer's statement to her partner is true. But 'Ortcutt might not be Ortcutt' would be false. Likewise, the astronomer in (Astronomy) appears to be making a true statement of epistemic possibility about Hesperus, despite the same statement being false when we substitute the necessarily coreferential name 'Phosphorus'. [19]

All of this should not come as a surprise: Given that epistemic modality is a matter of *what we know*, we should expect it to be transparent only for names that are *known* to be coreferential.

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[19]In effect, I am saying that the epistemic modals in my vignettes are 'monstrous' in Kaplan's sense (Kaplan 1977); thanks to Mathias Böhm for pointing this out to me.

If this is right, then epistemic modals do in general allow for referential opacity. But I want to claim further that, when faced with a choice between an epistemic and a circumstantial reading, the modal's giving rise to referential opacity is conclusive evidence for the epistemic reading. The reason is simply that circumstantial modality concerns the objects, properties, and relations that a given modal claim is about, not any representational or cognitive features of the terms we use to refer to them. A failure of substitutivity for names is generally an indication that what matters are certain representational features of the names, rather than the objects to which they refer. My reasoning is essentially the one used by Williamson against referential opacity in counterfactuals: two counterfactuals that differ only in using different coreferential names, according to Williamson, must have the same truth value

> because their antecedents and consequents concern the same objects, properties, and relations: it matters not that different names are used, because the counterfactuals are not about such representational features (if the substitution of coreferential names in propositional attitude ascriptions does not preserve truth value, the reason is that such ascriptions are about representational features). (Williamson 2007, 175)

My argument differs from Williamson's only in that I use it to exclude referential opacity in what I take to be a sub-class of counterfactual conditionals: the circumstantial ones. His reasoning, I now submit, is cogent when it comes to counterfactual conditionals *read circumstantially*; but it does not touch on counterfactual conditionals when read epistemically.

Putting these lines of thought together, we can conclude that counterfactuals that allow for referential opacity are therefore to be read epistemically (as opposed to circumstantially). This applies, a fortiori, to counterpossibles. And as we have seen above, counterpossibles that are non-vacuously true or false must indeed be referentially opaque.

The dispositionalist can claim that counterpossibles, read circumstantially, are vacuously true, if she adopts (COUNT*); or that they are (in the non-standard terminology of section 1) vacuously false, if she adopts (COUNT); and at the same time she can concede that there is an epistemic reading available for the interesting examples of counterpossibles, which allows for non-vacuity and referential opacity, and for which some such semantic account as that suggested by Nolan (1997) may well be true.

Since non-vacuous counterpossibles give rise to referential opacity,[20] they ought to be read epistemically; and since they ought to be read epistemically, they fall outside the purview of a (properly restricted) dispositionalist semantics. This is the strategy of 'divide and conquer'.

Dispositionalism, I conclude, can avoid the threat of non-vacuous counterpossibles, be it internal (section 3) in the form of seemingly impossible dispositions, or external (section 4) in the form of seemingly non-vacuous counterpossibles.[21]

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[20]Defenders of non-vacuous counterpossibles should agree; Brogaard and Salerno (ms.), as I have mentioned earlier, argue that it is precisely the referential opacity of counterpossibles that blocks another argument of Williamson's against non-vacuous counterpossibles.

[21]For extremely helpful comments and discussion, I would like to thank Mathias Böhm, Daniel Dohrn, Beau Madison Mount, Daniel Nolan, Lisa Vogt, Lee Walters, and Jonas Werner, as well as the participants of my research colloquium at Humboldt-University in summer 2015.

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